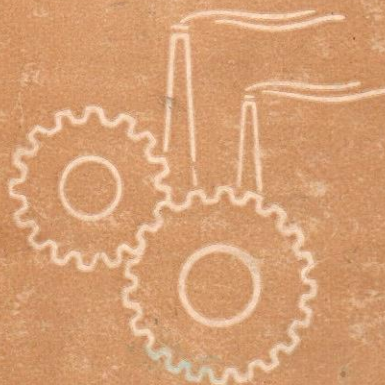


*Special Issue On Incentives*

# PRODUCTIVITY

JOURNAL OF NPC



India and Incentives  
The American Experience  
Incentives in the Soviet Union  
The Other Side of the Case  
Money and Motivation  
Power and Participation  
Scientific Management  
Scanlon Plan  
Bhadravati Bonus Scheme  
Enfield Case  
Incentives in Sugar  
The Incentive Royal  
Truth About Incentives  
A Fair Day's Work?

NATIONAL PRODUCTIVITY COUNCIL, INDIA

Vol. 2 No. 5

June-July 1961

# NATIONAL PRODUCTIVITY COUNCIL

The National Productivity Council is an autonomous organisation registered as a Society. Representatives of Government, employers, workers and various other interests participate in its working. Established in 1958, the Council conducts its activities in collaboration with institutions and organisations interested in the Productivity drive. Local Productivity Councils have been and are being established in industrial centres.

The purpose of NPC is to stimulate productivity consciousness in the country and to provide services with a view to maximising the utilisation of available resources of men, machines, materials and power; to wage war against waste; to help secure for the people of the country a better and higher standard of living. To this end, NPC collects and disseminates information about techniques and procedures of productivity. In collaboration with Local Productivity Councils and various institutions and organisations it organises and conducts training programmes for various levels of management in the subjects of productivity. It has also organised an Advisory Service for industries to facilitate the introduction of productivity techniques.

NPC publications include pamphlets, leaflets and Reports of Productivity Teams. NPC utilises audio-visual media of films, radio and exhibitions for propagating the concept and techniques of productivity. Through these media NPC seeks to carry the message of productivity and to create the appropriate climate for increasing national productivity. This Journal is an effort in the same direction.

The Journal bears a nominal price of Rs 1.50 per issue and is available at all NPC offices. Annual subscription (Rs 9.00 to be sent by cheque in favour of National Productivity Council, New Delhi) is inclusive of postage! Subscription for three years, however, can be paid at the concessional rate of Rs 25.00. These rates can be availed of till 15 October 1961, when new rates, announced in this issue of the Journal, come into force.

Opinions expressed in signed articles are those of the authors and do not necessarily reflect the views of NPC.

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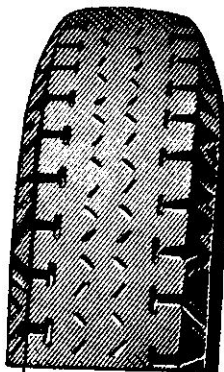
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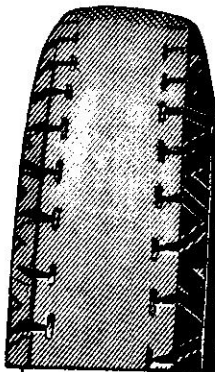
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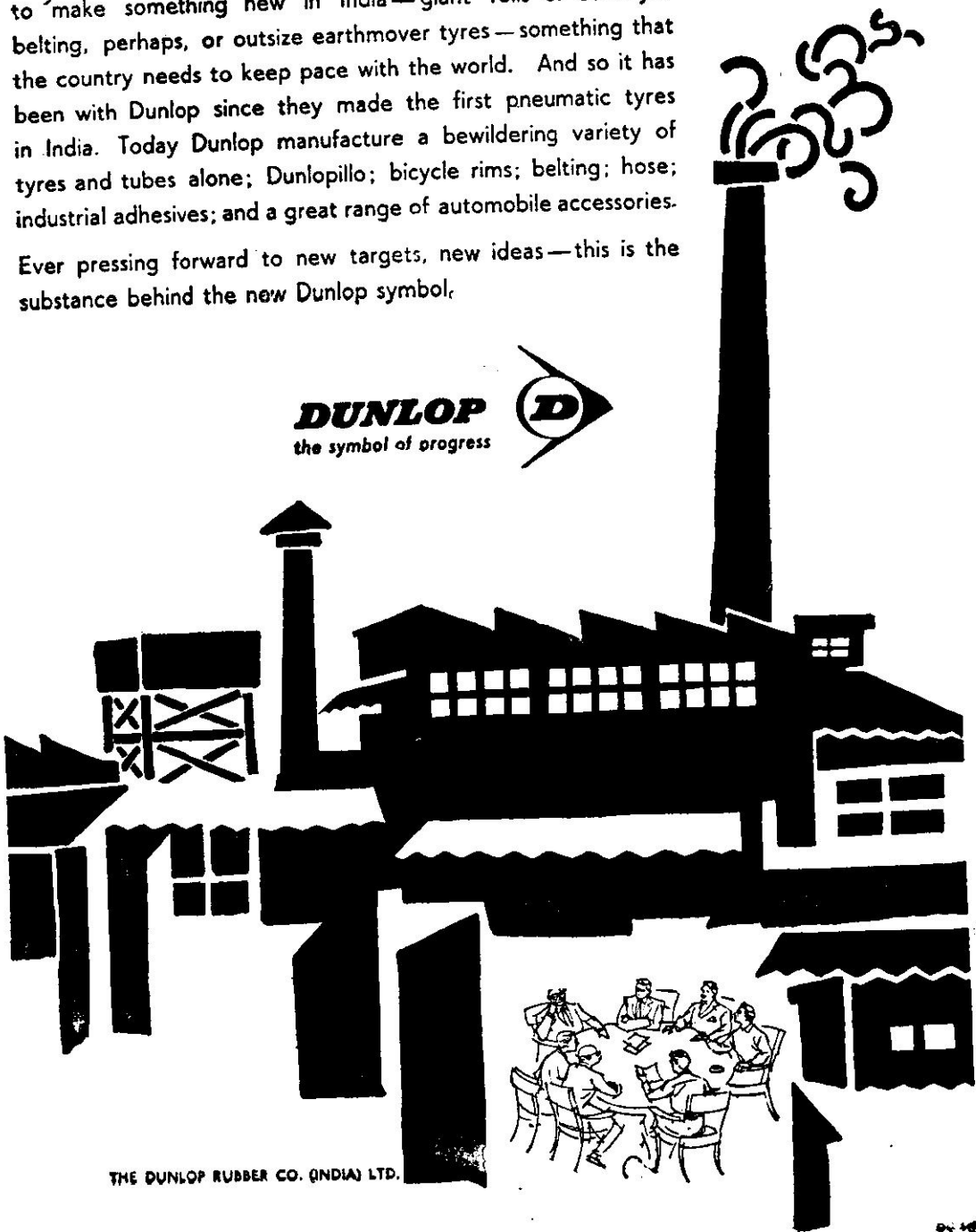
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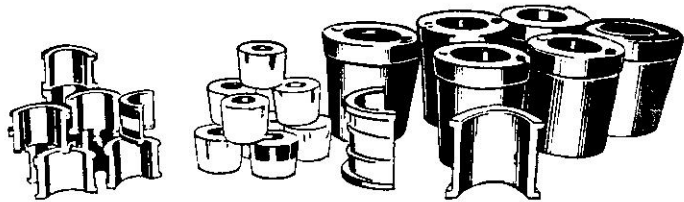
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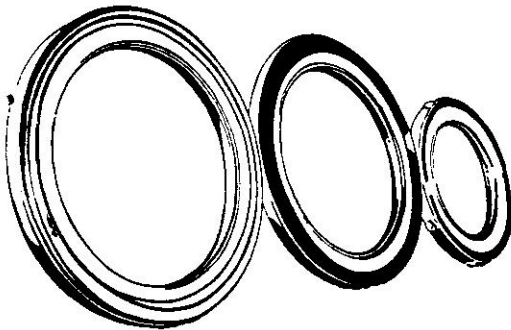
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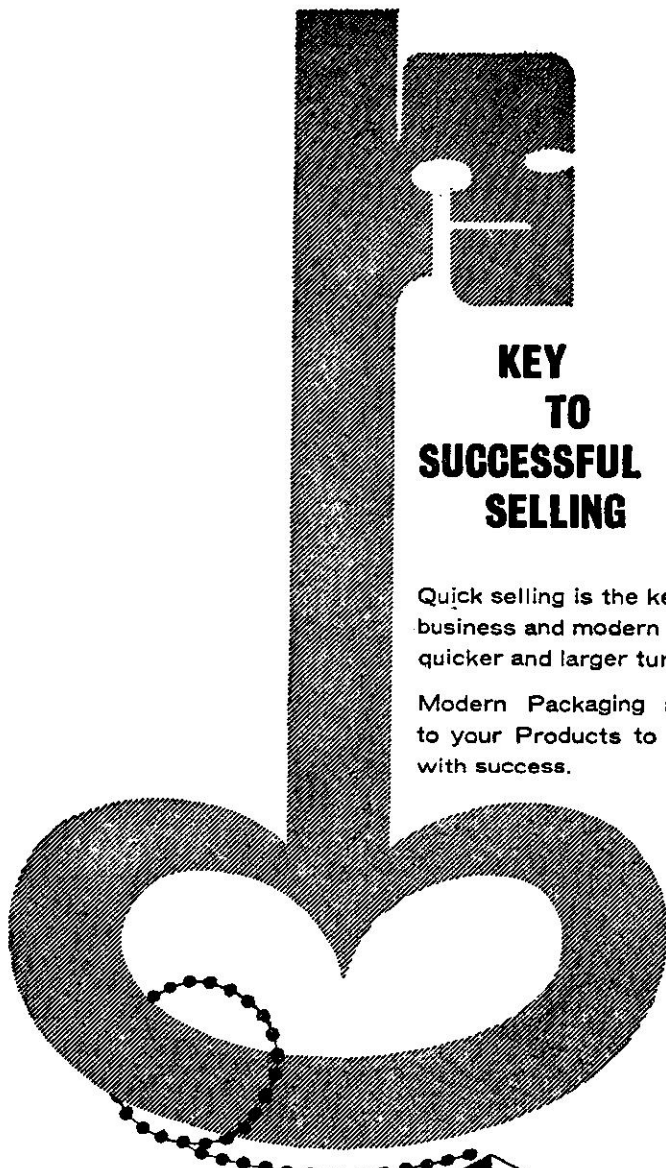
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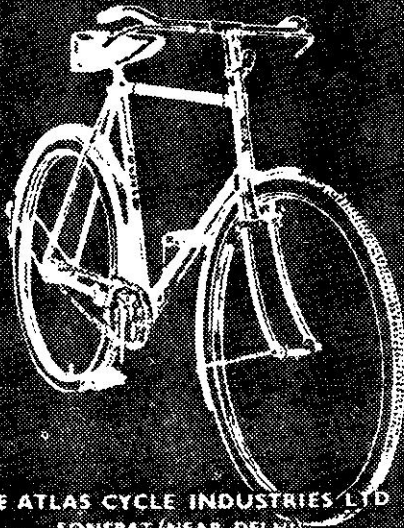
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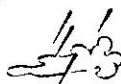


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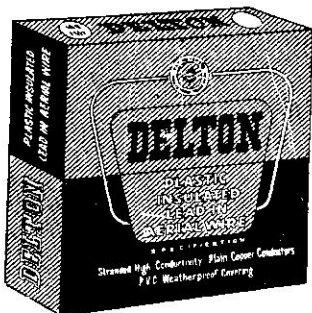
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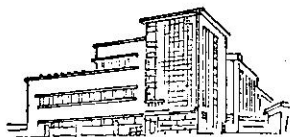
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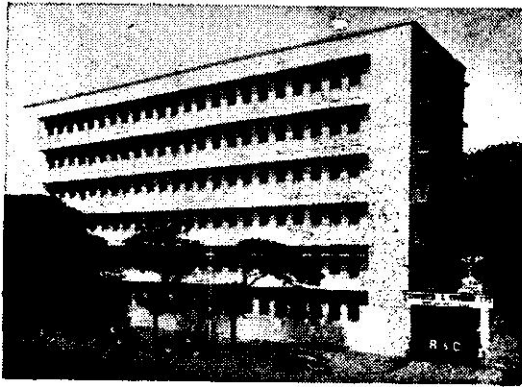
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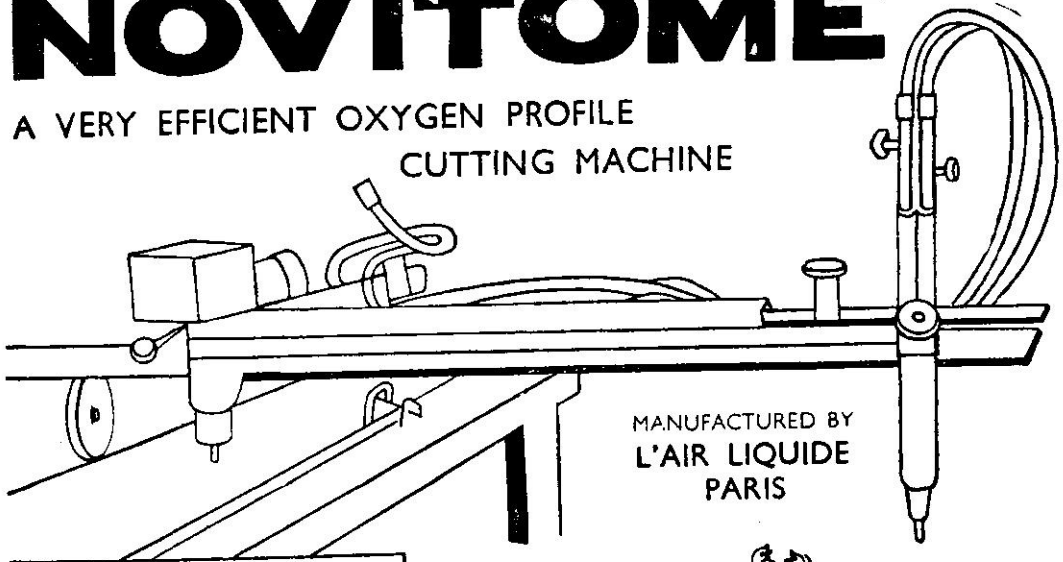
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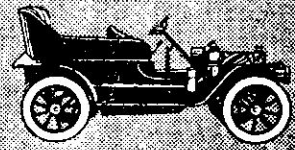
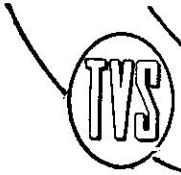
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# NATIONAL PRODUCTIVITY COUNCIL JOURNAL

Vol. 2 No. 5

PRODUCTIVITY

June-July 1961

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## INVESTMENT IN PERSONAL DEVELOPMENT

Both technological advance and improved skills and abilities are the product of personal development. Machines do not improve themselves . . . most technological advance is now the result not of the accident of inspiration or genius but of highly purposeful effort. Once we had to wait for the accidental appearance of Edisons and Wrights. Now through education and organized effort in a laboratory or experimental shop, we get something approaching the same results from much more common clay. So it comes to this. We now get the larger part of our industrial growth not from more capital investment but from improvements in men . . . We get from men pretty much what we invest in them. . . . X

—John Kenneth Galbraith, The Liberal Hour

# This Journal

THIS issue of the NPC Productivity Journal, devoted more or less exclusively to *Incentives in Industry* is a departure from established policy. So far, this Journal has been dealing, by and large, with general issues relating to industrial productivity. Of course, quite a number of special articles and research pieces have appeared, from the very beginning, on standardization, quality control, measurement of productivity, industrial engineering, work study, suggestion schemes, materials handling, inter-firm comparisons etc. By and large, however, the approach has been that of a *generalist* as contrasted with the intensive but somewhat restricted perspective of the specialist. The idea behind this policy was that considering the social and economic situation in India and the level of thought and practice in industrial research, what was necessary, in the first instance, was to cause some sort of an intellectual fermentation so that people should begin to talk and think about productivity; that NPC should be able to contact and tap intellectuals to bring them into the productivity drive and to persuade industrial technicians to record their experiences so that they could improve upon them, and so on.

The ultimate idea was that it should not take long for the NPC to help in a concrete way in the evolution and application of productivity techniques. Hence this special issue relating to *Incentives in Industry*. Subsequent issues will also deal with specialised topics: personnel management, work study, joint consultation, quality control, planning and control in industry (including cost control, budgetary control, inventory control, production planning and control etc). Probably, in between, there will be a few general issues, dealing with a wide variety of topics relating to industrial productivity, but the broad pattern of the Journal now will be a series of special issues.


## IN THIS ISSUE

This being the first special issue, the editor has been particularly ambitious to make it as complete a reference document as it is practicable within the limits of permissible space. Of course, this has really not been possible. The essential theory, however, has been for the most part covered: Professor Whyte's classic analysis of Money and Motivation—particularly the fundamental issues involved in the economics and technology of incentives, and his own solution contained in the concluding chapter on Power and Participation, which is about the best combination of realism and humanism in the literature on Incentives. FW Taylor's Scientific Management, which he thought to be superior to the traditional incentive system, has been reproduced in the great man's own words; and the vintage has not suffered by keeping. The conceptual framework of incentive study has been ably outlined by Sargent Florence of the University of Birmingham.

## CASE STUDIES

The major concentration in this issue, however, is on case studies. Practically every article is either wholly or partially a case study or based on case studies. Even Prof. Whyte's Money and Motivation is replete with case-studies, not reproduced here for want of space. But Prof Whyte's version of the Scanlon Plan, published in this issue, as an article, is based on the famous Lapointe case. The research case studies of the UK Department of Scientific and Industrial Research Medical Council and Joint Council on Human Relations have been summarized in a rather significant piece,<sup>1</sup> as also a sample interview between a worker and a researcher, which throws light on all aspects of worker reaction to incentives. The reader will also find here the British Productivity Council's case studies on Incentives and Job Evaluation.

The more important, however, are the case studies relating to our country: the major schemes of Tisco and Bhadravati; the Enfield case; GD Somani's case study of cotton textiles; Luthar's excellent piece on Incentives in Railway Workshops. A young NPC engineer has summarized his own thesis based on a case study of the application of incentives in a foundry plant (Vaswani's version of the Rucker Plan also originates from his study of an American foundry). Ramananda's analysis of Incentives in (Indian) Industry contains significant statistics of incentive — application to a wide variety of lines. Comprehensive data have been summarized regarding the sugar industry as illustrative of a major industry in which incentives do not yet, for a variety of reasons, figure significantly.


 INDIA AND INCENTIVES X

In a powerful article Mr Mitchell of the ILO (now working with the NPC) has proved how "in many Indian factories, a good incentive plan would eventually increase effort by over 100 per cent". Mr. Mitchell's thesis is grounded in facts. But his warning that we must grasp not only the possibilities, but also the limitations of an incentive system, deserves to be heeded by responsible persons: what incentives can do and *what they cannot do*.

That <sup>incentive</sup> they can do a lot in India is obvious enough, for the large mass of people have very low earnings and a *high marginal propensity to consume*. *On the other hand, from the productivity point of view, the working class deserve a high incentive element in wage payments.* In this context, the observations of Dr PS Lokanathan, the Chairman of NPC, in his inaugural address at the recent Management Training Programme at Coonoor, are significant:

"...Industrial wages are still about the lowest in India. In many cases, Indian wages are only one-tenth the prevalent wages in Europe and one-fifteenth to one-twentieth of the wages...in the USA. *Even in terms of their productivity, workers' wages are low...* in all new industries most foreign firms with standards of comparison drawn from other countries testify that the *Indian worker is just as intelligent and adaptable* as labour in the more developed countries and wants very much the same things: a steady job, decent wages, chances of promotion, reasonable living conditions. *His skills can be quickly developed* and in some of the new industries for example the Machine Tool Plant, the Tata Locomotive and Engineer-

1. Productivity and Economic Incentives

ing and Integral Coach Factory, productivity of the Indian worker is, if not as good as that of the foreign workers, coming nearer and nearer to that level..."

The case for incentives in India probably could not be stated better. The above statement meets practically all the objections that are usually raised both in theory and practice to the application of an incentive programme.

*Run on* An incentive programme might also prove to be particularly useful in the many difficulties that beset the Indian economy at the moment. In his inaugural speech, already quoted, Dr Lokanathan had pointed out how Indian commodities have priced themselves out of world markets. The basic idea in an incentive programme is to reduce the cost of production, through producing more for every rupee of wages spent, also through improved machine and material utilization and spreading the overhead cost over a larger volume of output. It is obvious that in a programme of this character, worker psychology and its appropriate motivation through the right type and size of incentives might help us in bringing our cost structure within reasonable competitive limits. The American experience in this connection is more significant. The wages in American economy are high, but the wage cost per unit of output is low which makes that economy one of the most viable in the world.

### THE AMERICAN EXPERIENCE

We have been drawing here upon the American experience, which, of course, is full and rich in the application of incentives, but we have to bear in mind three major facts: (a) The American systems of incentive payments involve the cooperative working of many complementary disciplines: industrial engineering, sociology, economics and social psychology, as evidenced by the great attention now being paid to human relations in industry. (b) American industry has itself moved away from the rigidities of Taylor's Scientific Management towards making incentive *inbuilt* in the basic wage structure. The more important point however is that (c) *the American society is in a very broad sense an incentive society* where a man is rewarded for good and honest work and punished for bad and dishonest work. The success of American incentive schemes stems from this broad social philosophy. Management in American industries actually practises this philosophy, namely, that a man is worth his hire and that *a fair day's wage will result into a fair day's work*.

The USA is of course fortunate in developing a strong trade union movement organized to fight for economic rights. Organized labour in the United States, though disinclined towards incentive forms of wage payment, has by and large cooperated in the working of incentive schemes and substantial results have been achieved in terms of higher productivity and higher standards of living.

Incentives could be profitably employed to achieve the same objectives in India. Of course we have to think it out in terms of a large and growing population (400 million increasing at 2 per cent per annum) and the basic culture of the people of whom we are a part. *For my historical period, ours has been by and large a non-*  
*society. A certain caution is therefore necessary in the*

incentives, but at the same time, the exploitation of  
manpower potential through incentives by at least  
some of the same time, the MANPOWER POTENTIAL infinite possibilities. history  
in the *Economica*.

### MANPOWER POTENTIAL IN A NON-INCENTIVE SOCIETY

a manna  
has  
significant  
an economy

As early as October 1921, Mr D H Robertson, the noted British economist, stated the theory of incentives in an article in the *Economica*, probably one of the best pieces in the economic literature on incentives: "A high wage will not elicit effective work from those who feel themselves outcasts and slaves, nor a low wage preclude it from those who feel themselves an integral part of a community of free men. Thus the improvement of this element of the supply of labour is an infinitely more complex and arduous task than if it depended upon wage alone, but at the same time a task more possible of fulfilment by an impoverished world."

Probably this poses the difficulties as also the possibilities of the incentive system with particular reference to a poor but over-populated country, such as ours. In its report on the First Five Year Plan, the Planning Commission had emphasised how a large population had in it, if properly deployed, a large investment potential. In its reports on the Second and Third Five Year Plans, the Planning Commission has been at pains to point out how a broad egalitarianism can turn the Indian community into an incentive society. In fact the main idea behind the socialist pattern of society is to convert the present non-incentive economic structure and motivate the mass of people to their optimum levels of productivity.

Apart from these fundamental considerations, the studies made by social psychologists and industrial engineers, have established the following facts which are significant in the context of Indian economic conditions: (a) money is a powerful incentive when wages are very low, particularly during a time of inflation. JAC Brown in his *Social Psychology of Industry* has thus stated the converse of this proposition: "...except in conditions when wages are very low or during periods of inflation, money is one of the least powerful incentives..." The Indian economy at the moment fulfils these exceptional conditions.

It has also been established that (b) productivity increases most when originally before incentive is introduced, a low rate of output exists, on repetitive semi-skilled work rather than on skilled work; and where workers want money for some specific projects and have a high material 'aspiration' generally. Indian economy, Indian industry, Indian workers practically satisfy all these conditions of an effective incentive programme.

### TIME STANDARDS

It has to be realized that the problem in India is quite different from what it is in the industrially developed countries. In these countries incentives are largely based on time standards; and incentive payments become due only after a worker or a group of workers accomplishes more than the standard. Partly, of course, incentives are in-built, inasmuch as a fair day's work is computed at three-fourths of what is physically possible for an average worker; that is to say, if a worker fully exerts himself, he can earn 33 per cent more than the standard wage; or he may work three-fourths of the time and relax for the remaining period, it being understood that some normal allowance has already been made for recovery from fatigue. In India, the problem is quite different, for over a large part of



industry, we have hardly any time standards. The problem here is to raise sub-normal efficiency, popularly estimated at around 30 per cent of normal. Our first objective has to be to raise this 30 or so per cent to 100 per cent normal efficiency. Till time standards could be established, the more practical course in India would be to go by historical records and to reward labour on the basis of savings that they are able to accomplish in terms of labour time, materials etc. For quite a variety of reasons, the sharing of such economies should be as generous to labour as it is practicable, for labour has to be powerfully motivated to raise their standards of efficiency. Experience has shown that even in the advanced countries, firms which have experienced considerable difficulty with regard to time standards have resorted to some form of sharing of savings, *with labour at the long end of the division*: say, 70:30 instead of 50:50.

This sort of incentive plan also appears to be particularly suitable for our type of economy in a state of transition to a rationalised pattern of industry. One of our great handicaps is that most of our jobs have a high labour content; and increasing mechanization or rationalization is being resorted to in order to save labour. An incentive plan is suitable for both reasons. It is particularly suitable for jobs of high labour content; and it is particularly effective for persuading labour to change over to modern machinery and modern methods of production.

#### RATIONALIZATION OF THE BASIC WAGE STRUCTURE

Practically all the industrial consultants are of the opinion that a rationalization of the basic wage structure is an essential pre-requisite to the successful working of an incentive programme. At present, in India, a very large part (75 per cent or so) of wages are accounted for by dearness allowances, the basic wage being only 25 per cent or so of the total wage. Thus a 25 per cent incentive of the basic wage would work out to something like 6 per cent or so of the total wage. This is a point for consideration *whether a 6 per cent incentive would at all work as an incentive*. There is a consensus of opinion both among theoreticians and practical industrialists on this point that *an incentive payment, if it is to accomplish its objective of a material increase in labour productivity, must be sufficiently powerful to do so*; that is to say, it must be a sizeable part of the pre-incentive take-home-pay in order to motivate the worker to do his best.

In this best performance, a worker's family plays a substantial psychological part. If a worker is bringing home substantially more than what he was doing before, his family which has a powerful hold on his mind and shapes his attitude to work and life would be itself motivated to persuade the bread-earner to really put in his best for the firm which is treating him with such fairness and generosity. Since industry is really a part of social organization, it is well to bear these important social factors in mind; for wages and levels of productivity are really socially interdependent.

If these policies are followed, then we should expect that labour in India would not resist the introduction of wage incentive schemes, for it would not be in the workers' interest to resist them. There is no country

in the world whether capitalist or socialist where workers' real wages have gone up without a massive increase in labour productivity. But nevertheless, it would be essential to educate and train workers for the successful working of an incentive programme.

### INCENTIVES IN THE SOVIET UNION

It is significant from the point of view of the universality of incentives that the Soviet Union has overwhelmingly adopted the incentive feature of American industrial technique.\* It does not appear to have received sufficient notice that of all countries, the Soviet Union has made the most rigorous use of time and motion study and job evaluation. The following applications of incentives in the Soviet economy are significant: factory workers, specialists, truck drivers, janitors, clerks and executives in industry who *respond favourably* to the exhortations of the Soviet Government for more output, get their reward in the form of cash. In fact, there is a fairly large scale movement to galvanize the Soviet economy by getting co-workers to work better, faster and more efficiently. Whole shops and factories are rewarded on the basis of output in terms of recognition as well as monetary payments. Farmers who raise more peas or carrots than the standard output get a bonus. The following extract from the Moscow News Story, reprinted from the *Advanced Management* referred to in the footnote, is significant: "For over-fulfilling the quota, the workers get a bonus which is calculated as follows: for each one per cent over 100 per cent of his quota, the worker gets an additional two per cent of his earnings, but not over 25 per cent as a whole..." The Soviet planners have now introduced a new incentive plan; and workers in a large number of classifications are getting wages and bonuses instead of payment for piece-work as before. It has been estimated that when the new incentive system comes shortly into force, 60 million out of the 109 million working force of the Soviet Union will be on the new incentive. As against this, the United States Department of Labour calculation is that in manufacturing industries, 27 per cent or a little over 11 million production and related workers are paid on an incentive basis. Probably these statistics are not exactly comparable, but they do show that the Soviet economy employs incentives at least as powerfully as the American economy.

### INCENTIVE AND THE WORKING CLASS

It is a part of wisdom to understand the working class point of view with regard to wage incentive plans and the associated problems of time study and job evaluation.<sup>x</sup> The editor can do no better than quote authoritatively from the published programmes of the best organized among the International Labour Unions: The AFL-CIO of the United States:<sup>3</sup>

"... Wage incentive plans, that is, plans which offer more wages for more production, present a host of special problems which normally far outweigh any possible benefits... With few exceptions, unions are opposed to wage incentive systems,

2. Stevenson, S. Charles, *The Incentive System in the Soviet Union*, printed in *Advanced Management* (January 1961), a monthly journal of the Society for the Advancement of Management, New York.

3. AFL-CIO-Collective Bargaining Report Vol. 2 No. 12, December 1957.

both because of the *damaging past experience with the abuses under such plans* and because of the *difficulties and ill effects inherent in incentive plans*. . . . . *Time Study*, which is widely used for determining workloads and wage incentive standards, is an *imprecise tool and lends itself to easy abuse*. Of the whole field of so-called '*scientific management*', *time study is the area in which most of labour's distrust and suspicions are centered*. It puts a strain on the entire collective bargaining process, making it more difficult, more complex, more costly. . . ."

AFL-CIO standpoint shows that labour unions are *deadly opposed* to time study. They are also opposed to wage incentive plans, but they would at the limit *reluctantly accept* them (because individual workers are naturally attracted in the short period to higher earnings), and bargain for certain minimum guarantees regarding the base-rate, the setting up of and changes in work standards: in short a complete participation of the union as far as practicable in the evolution and application of any scheme of incentives.

THE FEAR OF UNEMPLOYMENT

While partly the opposition of the working class to incentives is due to its sensitivity to time study, basically or mainly, it is due to the fear of unemployment. In terms of a static analysis, if workers prove that they can do the same job in half the time or what is the same thing; twice the job in the same time, it would mean a 50 per cent reduction in the volume of employment, assuming no change in market conditions. This is how incentives, market limitations and employment are so vitally connected in the rather integrated thread-work of a modern economy. If the fear of unemployment can be removed, which can only be done through expansion of markets, workers' resistance to incentive programmes would be much less than what it has been. It is also an established economic fact that employers are more than willing, in a situation of expanding markets, to give the workers a fair share of the gains of productivity. Unfair sharing, rate cutting—the usual bad features of an incentive programme—do not occur due to any motiveless malignity, but they usually coincide either with a general recession in market conditions or an adverse turn of luck for a particular plant or industry.

In this respect, the conditions in India for the introduction of an incentive programme should be considered favourable. With an increasing outlay from one year to the next, from one Plan to the following one, a continuously increasing development programme, both on public and private account, should mean a larger volume of employment and booming market conditions, particularly in the context of scarcity of resources. Here is an economic situation, in which both management and workers have an incentive to maximise their contribution to the economy; and *managements are in a position to offer that degree of incentive, which would call from the workers their best continuous performance*. X

INCENTIVES: *Productivity Technique Par Excellence*

Etymologically, incentive originally signified the setting of the tune of a song. This explains references to 'traction' in incentives literature. Whatever that may mean, the primary objective of an incentive programme is to stimulate the worker's willingness to work by linking his earn-

ings to his productivity. This may be done on an individual, group or plant-wide basis, but the objective is to motivate workers to contribute their best to the jobs on which they are engaged. This 'best' is to be measured directly by quantity, quality and economy of output per worker or groups of workers, or measured indirectly and conversely by rates of absenteeism, turnover, accidents etc. among large groups of workers. Productivity may be considered more widely to include workers' adjustment to productive changes in method or organization.

In fact that is how usually an incentive programme is introduced. Many employers and industrial consultants introduce incentives for the very reason that they wish other changes such as new equipment or new work methods to be effective.

Researchers have therefore found it difficult to isolate and thus measure the purely incentive effect. Even conceptually, incentives are linked up in a very essential manner not only with the other productivity techniques, but with the whole economics and technology of industry. Incentives certainly mean the setting up of standards based either on time study or on historical records. This work measurement is again an integral part of work study. Thus we go on to methods study, methods improvement, improved plant layout, materials handling, inventory control, production planning, scheduling and *a'that*. In fact the most interesting part of an incentive programme is that workers in order to maximise their incentive earnings begin to demand from the management the application of these productivity techniques. In that sense, incentives may be described as *productivity technique par excellence*.

An incentive programme is again very obviously linked with job evaluation and merit rating, which have also been dealt with in this special issue. Again conceptually, incentives and job evaluation are complementary. Job evaluation has four main essential elements: (a) effort (b) hardship (c) responsibility and (d) skill. More refined systems of job evaluation include finer details, but these essential elements show how a complete system of economic rewards must include both job evaluation as well as incentives. Of course, it would not be fair to disregard a contradiction that often emerges in practice to which Sri Bhasin of the NPC has drawn our attention in a case study published in this Journal, namely, a distortion of the wages structure that follows a full application of an incentive programme with the result that the workers' total emoluments including incentive payments bear no recognizable resemblance to the differentials based on the job evaluation points score.

But there is universal agreement that whatever the defects and disadvantages—and they are not irremediable—incentives properly and appropriately designed and applied, contribute materially to increase in worker earnings and productivity. It has also been established that the increase in productivity is usually greater, sometimes much greater than the increase in worker earnings. This is a point that needs to be looked into carefully and objectively. If it were not so, that is to say, if the increase in productivity were not larger than the increase in worker earnings, *the management would have no incentive to introduce incentives* or, for the matter of that, any other productivity technique. Further,



Dr. Sarvapalli Radhakrishnan, Vice-President of India inaugurating Belgaum Divisional Productivity Council

Sri VV Giri Governor Kerala in Chair  
Sri K Sreenivasan President Sitra  
Speaking



Pandit Binodanand Jha Chief Minister Bihar inaugurating Composite Management Seminar Patna Productivity Council, 6 April 1961

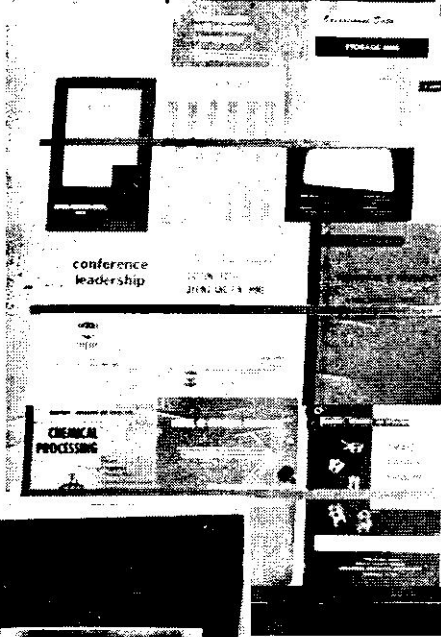




Productivity literature on display



Sri Singh Deo Minister Finance & Industry, Orissa addressing seminar organized by Calcutta Productivity Council



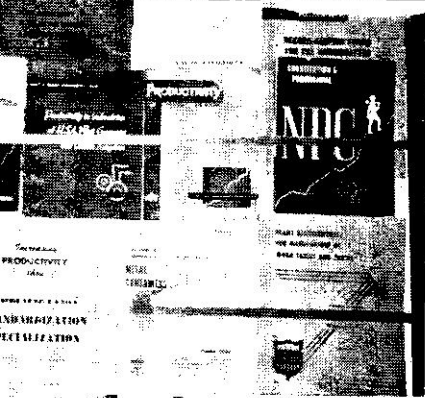
Prof RF Bruckart of TCM-NPC addressing Sonepat Productivity Council







Dr PS Lokanathan Chairman NPC  
addressing the LPC Conference



NPC Productivity Exhibition Kanpur



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**Srimati Sucheta Kripalani Minister of Labour UP  
inaugurating NPC Exhibition at Lucknow**

**Concluding Session of Top Management Seminar Calcutta**



the strengthening of the management position might mean—usually means—larger investment in plant capacity, improved methods of working, larger reserves that would mean greater job security due to the firm's stronger position in the context of market fluctuations.

A word may be said here about the necessity of quality control to be associated with incentive schemes, which are normally designed to increase output per unit of time, but if this leads to deterioration in quality, it will really work as an offsetting factor because defective products reduce output just as much as failure to make them in the available time.<sup>4</sup> Quality control therefore has to be an integral part of an incentive programme.

This again shows how a programme of incentives has very wide-spread implications: suggestions schemes on the Scanlon pattern involving everybody backwards and forwards from management to workers through labour unions, and the creation of a whole set up of creative communications throughout a plant as a living organism. Throughout this Journal, it has been emphasised that an incentive plan cannot succeed without the active cooperation of the working class, particularly in plants where good industrial relations do not obtain. Hence again, an incentive programme gets involved in the wide framework of industrial policy.

### THE OTHER SIDE OF THE CASE

While the NPC is for the right type of incentives, under the right type of conditions and safeguards, alongside the employment of other productivity techniques to facilitate labour doing its best, the other side of the case—disadvantages and limitations of incentive schemes—has also been presented. In fact, practically all the articles appearing in this issue of the Journal deal with both sides of the case, but the other side has been particularly well presented by Sri P D Malgavkar.

Probably the most interesting piece in this connection—as also statistically the most scientific and objective—is the Factory Editors' Survey summarized in the article on Truth About Wage Incentives: the changing concepts and patterns, the resort to synthetic time standards and the other hot problems that continue to trouble the installers of wage incentive planners. Probably one of the conclusions of the survey would bear repetition here: *the way you handle the rate affects the pull of the incentive...*

✓ Summary up:

### THE CONCLUSION

(1) Before we can usefully apply incentive schemes, we have to put our basic wage structure on sound engineering, social and economic foundations (2) There is no substitute for vigorous enterprise, scientific management and supervisory staff, trained both in techniques and human relations. If these conditions are satisfied, the possibilities of increasing labour productivity and welfare through incentives acquire an almost infinite dimension. ~~But this would necessitate the development~~

4. Desmond, DJ, Quality Incentives, printed in the *The Manager* (December 1959) Journal of the British Institute of Management.

of Personnel Management in an  
type from P491.

# Money and Motivation

WILLIAM FOOTE WHYTE

Below is a *precis*<sup>1</sup> of Professor William Foote Whyte's *classical* analysis of Incentives in Industry: Money and Motivation, written in collaboration with a number of university men and, what is probably more significant, a group of research workers who had actually worked on Incentives on the shop floor.<sup>2</sup> The editor of this Journal has taken the liberty of publishing this article under the name of the great Professor, for a variety of reasons: the book is a *classic* and its ideas like those of Aristotle or Plato must be associated with those of its author. It is of course only right that it should be so. Further the editor would also like to associate himself with the tribute paid to Bill Whyte as "teacher, colleague or friend" by his collaborators: "...for years his office and his home have been an open forum for the discussion of field tactics as well as research data...no comment on his contributions is needed. An examination of indexes in the literature of industrial relations, the field of sociology and related disciplines will suggest the influence of his work...Bill Whyte has few rivals in encouraging students to test out their ideas and their skills in the world of reality...In almost every instance, he has built enduring relationship with the people and institutions with which he has come into contact in research: whether they were management or union, initially, friendly or hostile...Simply put, Bill Whyte has never used his knowledge or contacts for personal aggrandizement...For these deceptively simple virtues then, the ones we talk so much about and practise so rarely, democratic leadership and communication, Bill Whyte has earned our gratitude and respect."

<sup>1</sup> The original intention was to publish a *precis* of the whole of Prof. Whyte's thesis. For reasons of space, only the first chapter, which raises basic issues regarding Motivation, and the concluding chapter, which sums up the major conclusions, have been printed in this issue of the Journal. The Scanlon Plan appears as a separate article.

<sup>2</sup> This is how the book was born: "...The first beginning came when I was at the University of Chicago on the Committee on Human Relations in Industry. Orvis Collins, Melville Dalton, and Donald Roy also were in or around the university at that time working toward their Ph.D's. Dalton was working as an incentive applier or checker in one department of a steel mill. Roy was spending his eleven months as an operator on the "drill line" in another nearby factory and Collins was a part-time production worker in a third plant. During this period Collins and Roy kept work diaries in which each day after work they recorded their experiences and observations of the day..."

**MONEY** incentives sometimes seem to work, in stimulating production, and sometimes show little effect. Why these differences? Even where the incentive seems to work, in most cases its success is only partial, for workers set a ceiling on production well below the limits of their physical capacities. Why this restriction of output? Often whether the incentive works or not, it seems to give rise to all sorts of worker-management and union-management conflicts. What is the fighting all about?

It is often assumed that high morale and high productivity go together. If we mean by high morale only that the workers are well satisfied with their jobs and think well of management, then high productivity does not necessarily follow.

If we are to find relationships between morale and productivity, we need to broaden our conception of morale. In effect, we need to put motivation into morale. Some have suggested that participation on the part of workers will provide them with the motivation to contribute to the organisation. But different people mean different things by *participation*. What sort of participation does in fact provide motivation toward productivity?

We shall concentrate upon money incentives. If we assume that man's goal in the factory is to make money, then it naturally follows that we can get him to produce more if we pay him in accordance with the amount he produces. Thus the theory of economic motivation leads directly to the development of a piece-work incentive system. The second major assumption is that each individual responds to economic incentives as an isolated individual. Under such conditions there would be no need to investigate the effect of fellow workers upon the individual under consideration. While most manage-

ment people realize that this individualism is never quite to be found, there is a tendency to think that people should respond in this individualistic fashion and that management should encourage them to do so.

The third major assumption is that men, like machines, can be treated in a standardized fashion. Does the fault lie perhaps with the use of poor techniques in administering incentive systems? If management just used the *right* methods of time study and rate setting, would the problems be solved? The fact that these problems have existed down through the years, in similar form, in a great variety of factories, suggests to us that the fault cannot lie solely with poor techniques. The persistence and generality of the problems suggests that there is something basically wrong with the policies and procedures on which piece-rate systems are based.

In the first place, we should recognize that scientific management theorists seem to accept without question an arbitrary assumption regarding man's motivation which economists themselves do not take to represent reality. It may be argued at this point that we are wasting our breath in destroying the straw man of scientific management. Does anybody really believe in this theory of motivation any more?

The engineer begins by rejecting economic man but ends by embracing him. He recognizes that money is not all-important and points to certain other factors that may operate on the worker. But then he immediately dismisses these other factors by assuming that they either cancel each other out or cannot be measured anyway. Finally comes a practical objection: even if these other factors could be measured, the task would require such a corps of specialists that top management would never be willing to make the effort.

# Problems of Human Organisation

Problems of human organisation have become intractable because we have so far lacked a valid system for thinking. In this connection, we must distinguish between an ethics of behaviour and a knowledge of organization. We are not saying that in the world of today the Golden Rule is an impractical maxim. Many people find in it an essential foundation for their approach to human relations. Certainly we can agree that the person who lacks an interest in other human beings is unlikely to build good human relations in industry today. But this is *no field for the man with a warm heart and a soft head*. Building sound human relations in the complex industrial organisations of today is a task that taxes our intelligence to the utmost. Besides goodwill, the man of action needs a systematic way of thinking about problems of human organization.

**T**HE first step toward a systematic way of thinking involves an *intellectual (and emotional) acceptance of reality*. It may seem *presumptuous to make such a statement to practical men of action*. However, in some circles in *industry today we find people apparently more concerned with passing judgment on what is bad and what is good than in seeking the causes for the behaviour they are evaluating*. The following example will illustrate the point.

An executive is faced with an incentive problem involving inter-group relations. If he takes the moral judgment approach, he tells himself that the problem would not exist if the workers had an understanding of what management was trying to do for them or if the time-study men had followed the proper procedures or if the foreman had adequately explained time study to his men, and so on. All such thoughts have this in common: they are pointed toward what might have been *if other people had only felt and acted as they should*. This sort of *thinking dodges reality* and provides no indication of an effective line of action.

On the other hand, the executive who accepts reality begins with the assumption that people and organizations being what they are, the inter-

group disturbance is a natural phenomenon. He will neither praise nor blame the attitudes or actions of the people involved in the problem. He recognizes that such attitudes and actions do not arise by magic. There must be some uniformities in human relations, as there are in the natural sciences. Even though knowledge of human relations is in a relatively primitive state, he feels that if he tries to discover the factors giving rise to his problem he will be better able to solve that problem.

In the field of moral judgments there are two intellectual traps. They are known in *semantics* as the fallacies of (1) two-valued orientation and (2) identification. The individual with a two-valued orientation assumes (unconsciously) that everything must be regarded as either one thing or its opposite. He cannot see *the world around him as an infinite and graded series of phenomena merging one into another*. Applied to industrial life the two-valued orientation means that union leader X (or workers Y) must be either good or bad.

The individual who commits the fallacy of identification assumes, for example, that union leader X is always union leader X: that is, that he will always behave in the same way in all situations and at all times.



Applying these two fallacies to the Inland Steel Container case during the conflict period, the executive would conclude that the union leaders and workers were all a bad lot. He would also conclude that they would always remain a bad lot. His only solution would be to get a new supply of workers and union leaders. This being impossible, there would be nothing left to do except defend his own behaviour and continue passing judgments on others.

Applying the same approach to the cooperation period, he would find that the workers and union leaders are a fine bunch of fellows—and must always have been so. This contradiction reveals the futility of such thinking.

The executive or union leader who avoids such fallacies takes a different view of the world. He recognizes that individual X behaves in different ways in different situations and at different times. This being true, he sees that there is nothing to be gained by placing X in a mental pigeonhole marked *bad* or in one, marked *good*. His problem is to determine the factors that give rise to these different types of behaviour so that, to the extent that he is able to control these factors, he can elicit the type of behaviour appropriate to the purposes of his organization. Instead of passing judgment, he seeks to understand causation.

As long as management views its problems in isolation and outside of their social context it will inevitably follow that some management programmes and procedures will be ineffective and some will even work at cross-purposes.

It is important to recognize that conflict does not arise accidentally or through poor management. The difficulty seems to be endemic in the piece-rate and suggestion systems, as ordinarily practiced. When methods of doing a piece-rate job

are substantially improved by the worker (or by anybody else), management must set a new rate on the job. If management did not so intervene, then some rates would get far out of line with other rates where no such improvements developed, and all sorts of intergroup problems would appear. Also, if management left to the workers the fruits of all the improvements they made, management would fail to improve its cost position in relation to its competitors. The only alternative to such a resetting of rates is for workers to restrict output so that their improvements all lead to less effort, more leisure, and no more production. Management will hardly be willing to accept this outcome.

Here we see management caught in a trap of its own making. The traditional approaches to stimulation of worker productivity or of worker ideas run afoul of each other and fail to tap the potential contributions of members of the organization.

Furthermore, the two approaches, taken either individually or together, tend toward an atomized view of the organization. Beyond the requirements of good engineering and time study, the standard piece-rate approach assumes that high production is the result of the skill and application of individual workers. Similarly, the usual suggestion system assumes that efficiency improvements come from individual ideas contributed by individual workers. On the contrary, a far greater source of improvement is found in the area of more effective organization. This approach includes the individual worker and his particular job, but places them in the context of the total organization. Achieving greater efficiency in this way means changing the relations of man to man, group to group, man to machine or process, department to department, supervisors to subordinates, and so on.

# Power and Participation

*The world of industry is full of executives who will sacrifice almost anything in order to maintain their "power" to give orders that will not be effectively carried out. Experience has however proved conclusively that the power issue can only be settled by taking a different approach, which avoids the power issue altogether. The parties solve their problems by finding ways in which each could help the other obtain its objectives. If you ask the principal management and union people to define management's prerogatives today, they would not be able to go beyond a general statement. On any specific point the parties work so closely together that it is impossible to state who has the power to do what. In fact, it seems characteristic of cases of union-management cooperation that the people are not able to state specifically what management prerogatives are—and are not interested in trying to do so. In this and similar cases it may be said that workers and union officers have become real participants in the enterprise.*

**T**HIS raises the key question: What do we mean by participation? We often hear management people say, "*We must make workers feel that they are important.*" The assumption seems to be that workers will feel that they are important in public speeches and in the company's house organ and if a foreman occasionally pats them on the back. At best, this approach seems to lead to a passive acceptance of management. This is a far cry from the enthusiastic cooperation we see in some other cases.

*Workers do not come to feel important just because other people tell them they are important. They get this gratifying feeling of self-importance when they feel that they are exercising initiative in shaping the development of the organization. They have a sense of participation when they are contributing more than their physical labour to the organization. For them to feel this way requires that they have opportunities to initiate activity up the organization upon management as well as responding to management initiations for them. The management that is not prepared to provide opportunities and encouragement for this sort of initiative had best stop talking about participation. Any other approach to participation is simply lip service.*

The widespread development of such initiative on production problems from the ranks of workers and union officers amounts to a veritable revolution in organization. *It requires that the manager think and act in terms of leadership instead of simply in terms of power and control. This does not mean that he has less control of the organization than he had before.* In the drill line situation described by Donald Roy, management refused to accept any initiative from the bottom up, and his description clearly indicates that the workers gave their attention to constant and relatively successful efforts to escape managerial control.

Effective leadership achieves control in the participation process through initiating activity, not only down the line in management but also to and through the union. In effect, the manager gets action by initiating through two channels instead of one. This type of leadership also stimulates initiation from the bottom up through the management organization and from the union to management.

Our analysis suggests that a plant-wide incentive may be helpful as a symbol around which to organize this pattern of participation. It shows, however, that such participation can be built up, as in the Inland Steel Container

Company case, without the use of a plant-wide incentive.

The new participation pattern also requires significant changes in the roles and functions of union leaders. The development of participation does not mean a cessation or decline of union activity. It involves a rechanneling of this activity. It seems significant, for example, that the top local officers in Lapointe Machine Tool are now coming up through the production committees rather than through steward-grievance channels.

It is a difficult adjustment for many union leaders to shift from fighting management to participating in a co-operation programme. However, we should emphasize that this adjustment does not involve agreeing with everything that management wants to do on the production front. Our cooperation cases show local union leaders taking a critical attitude toward management and arguing aggressively for changes in some cases. Nor does cooperation with management simply involve the union leader in selling the rank and file upon management decisions or even upon decisions jointly reached by union and management. Unless the top local officer is at the same time active in encouraging initiation up the line from the rank and file, he will find himself cut off from the membership and eventually replaced.

These observations suggest a new way of looking at power. Let us look upon it as the *ability to get things done as one wishes them to be done*. In that case we will not waste time and energy in asserting rights to give orders that will not be effectively carried out. Instead, we will seek to understand the conditions under which we can initiate activity for other people. We will then discover and utilize whatever interpersonal channels can be effective in

carrying out a line of action. Furthermore, we will learn that effective action programmes require reciprocity in the initiation of activity. The executive who fails to respond to his subordinates and union officers finds that his orders are resisted, evaded and sabotaged. The executive who gets things done is the man who learns to initiate and respond in his relations with both management subordinates and union officers.

The incentive difficulties do not arise simply because management meets opposition from workers and the union. They also arise because management is divided against itself. They arise because management has failed to develop an integrated approach to its organizational problems, because it has made an unsound distinction between problems involving things and problems involving people.

The setting of incentive rates has been traditionally considered a technical engineering problem. When difficulties arise, it has been customary to blame them upon failure to do the job according to accepted, technical standards. Now at last perceptive managers, engineers, and personnel men are recognizing that the problem has important human relations aspects that cannot be resolved through the enforcement of any technical standards. But *all too often the insights and analysis of human relations come in only to mop up the spilled milk of the incentive engineering activity*. At this late stage even the most skillful applier of human relations knowledge will be hard pressed to make a constructive contribution.

Management should recognize that financial incentives are both a technical engineering and a human relations problem. The two aspects are so intimately intertwined that it is impossible to separate them in action. Therefore, **management should not be satisfied with a planned engineering programme**

and a catch-as-catch-can human relations programme. These activities should be planned together and integrated in action.

It is no simple task to develop such a planned and integrated programme. However, when it is possible to predict behaviour it is also possible to develop a programme to deal more effectively with this behaviour.

We have been attempting to show that the behaviour of people in response to incentive systems is (in a large measure) predictable. For example, when the traditional approach to piece rates is carried out, we can make the following predictions:

1. Workers will restrict output to a point well below their capacity.
2. Workers will develop many inventions which they will keep secret from management.
3. When they are being observed for rate setting purposes they will use all their ingenuity in working slowly and yet giving the impression of working fast.
4. In spite of all efforts to compensate for such worker deception, time-study men will set some rates that are unfairly tight and others that are unnecessarily loose.
5. The coexistence of incentive jobs and nonincentive jobs and of tight and loose rates will create endless disturbances in intergroup relations.

There should be nothing startling about such statements. They will be accepted and even taken for granted by many experienced factory people. The problem is that such facts of observation are not accepted as the base upon which a new theory of incentives must be built.

The standard piece-rate theory assumes: 1. workers will make an all-out response to such incentives. 2. workers will work at a normal pace when they are being time studied. 3. when proper study methods are used, there will be no intergroup problems

because (a) there will be no tight and no loose rates, and (b) the nonincentive workers will accept the extra money received by incentive workers as compensation for extra effort.

When it becomes evident that the results obtained are not in accord with the theory, management seeks to make some adjustments that will bring results and theory together. For example, if workers slow down while they are being timed, then management develops methods to compensate for this slowing down. When intergroup problems arise, an effort is made to avoid them by improving the techniques of time study. And so on.

In this way management continues to follow a theory while acknowledging its inadequacy in the test of practical experience. *In effect, management is following a theory of how people should behave. We are proposing that management base its actions upon observation of the way people actually do behave.*

In pointing out the difficulties that can be expected to arise when individual incentives are applied we are not suggesting that such incentives should never be used. The difficulties can be overcome, as we have seen in the Inland Steel Container case.

What we are suggesting is that management recognize in advance the difficulties that are to be expected and develop a planned programme to meet those difficulties. For example, in the present state of our knowledge there is no excuse for a manager's being surprised when an intergroup problem arises out of the application of a new incentive rate.

Knowing what to expect does not automatically tell us what to do about it, but surely accurate prediction is the first step toward the control of human events.

# Scientific Management

FREDERICK WINSLOW TAYLOR

Printed below is an extract from the writings of Frederick Winslow Taylor, the father of Scientific Management. Though he had a sort of contempt for incentives, and thought that his system of scientific management was superior to a purely incentive programme, his approach except for its dogmatism—the One Best Way—has been in its essentials confirmed by productivity technologists, and looking somewhat deeply, also by sociologists and industrial psychologists, though probably not many would agree with his point of view. Nevertheless, the statement on Scientific Management, printed below, has despite its being 80 years old, has still a sort of freshness, fundamental truth and humanism in it, alongside a certain sense of humour, that is worth reading in the context of the analysis of incentives. It has so much bearing on the subject under discussion and it still is so modern in its approach and analysis that it has lost none of its essential worth. It cannot be forgotten that Taylor is the real originator of work study and work measurement (time study). What probably is more significant is that the passages printed below might acquire a new meaning if India and Indian industry are substituted in the context of Taylor's analysis. There is much that the modern world has still to learn from F.W. Taylor; and his writings have acquired a classic authority which is rather unusual in the field in which he practised.

**M**ANAGEMENT includes foremen and superintendents, who themselves have been in most cases first-class workers at their trades and yet these foremen and superintendents know, better than any one else, that their own knowledge and personal skill falls far short of the combined knowledge and dexterity of all the workmen under them. The most experienced managers therefore frankly place before their workmen the problem of doing the work in the best and most economical way. They recognize the task before them as that of inducing each workman to use his best en-

deavours, his hardest work, all his traditional knowledge, his skill, his ingenuity, and his good-will—in a word, his *initiative*, so as to yield the largest possible return to his employer. The problem before the management, then, may be briefly said to be that of obtaining the best initiative of every workman. And the writer uses the word *initiative* in its broadest sense, to cover all of the good qualities sought for from the men.

On the other hand, no intelligent manager would hope to obtain in any full measure the initiative of his work-



men unless he felt that he was giving them something more than they usually receive from their employers. Only those managers who have worked themselves at a trade realize how far the average workman falls short of giving his employer his full initiative. It is well within the mark to state that in nineteen out of twenty industrial establishments, the workmen believe it to be directly against their interests to give their employers their best initiative, and that instead of working hard to do the largest possible amount of work and the best quality of work for their employers, they deliberately work as slowly as they dare while they at the same time try to make those over them believe that they are working fast.

In order to have any hope of obtaining the initiative of his workmen the manager must give some special incentive to his men beyond that which is given to the average of the trade. This incentive can be given in several different ways, as for example, the hope of rapid promotion or advancement; higher wages, either in the form of generous piece-work prices or of a premium or bonus of some kind for good and rapid work; shorter hours of labour; better surroundings and working conditions than are ordinarily given, etc., and, above all, this special incentive should be accompanied by that personal consideration for, and friendly contact with, his workmen which comes only from a genuine and kindly interest in the welfare of those under him. It is only by giving a special inducement or *incentive* of this kind that the employer can hope even approximately to get the *initiative* of his workmen. Under the ordinary type of management the necessity for offering the workmen a special inducement has come to be so generally recognized that a large proportion of those most interested in the subject look upon the

adoption of some one of the modern schemes for paying men (such as piece work, the premium plan, or the bonus plan, for instance) as practically the whole system of management. Under scientific management, however, the particular pay system which is adopted is merely one of the subordinate elements.

Broadly speaking, then, the best type of management in ordinary use may be defined as management in which the workmen give their best initiative and in return receive some special incentive from their employers. This type of management will be referred to as the management of *initiative* and *incentive* in contradistinction to scientific management or task management, with which it is to be compared.

Under the old type of management success depends almost entirely upon getting the *initiative* of the workmen, and it is indeed a rare case in which this initiative is really attained. Under scientific management the *initiative* of the workmen (that is, their hard work, their good-will, and their ingenuity) is obtained with absolute uniformity and to a greater extent than is possible under the old system; and in addition to this improvement on the part of the men, the managers assume new burdens, new duties, and responsibilities never dreamed of in the past. The managers assume, for instance, the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating, and reducing this knowledge to rules, laws, and formulae which are immensely helpful to the workmen in doing their daily work. In addition to developing a science in this way, the management take on three other types of duties which involve new and heavy burdens for themselves.



These new duties are grouped under four heads: first they develop a science for each element of man's work, which replaces the old rule-of-thumb method; second, they scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could; third, they heartily cooperate with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed; fourth, there is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all work for which they are better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.

All of the planning which under the old system was done by the workman, as a result of his personal experience, must of necessity under the new system be done by the management in accordance with the laws of the science; because even if the workman was well suited to the development and use of scientific data, it would be physically impossible for him to work at his machine and at a desk at the same time. It is also clear that in most cases one type of man is needed to plan ahead and an entirely different type to execute the work.

The man in the planning room, whose speciality under scientific management is planning ahead, invariably finds that the work can be done better and more economically by a subdivision of the labour; each act of each mechanic, for example, should be preceded by various preparatory acts done by other men.

To summarize: under the management of *initiative and incentive* practically the whole problem is up to the

*workman*, while under scientific management fully one-half of the problem is up to the management.

Perhaps the most prominent single element in modern scientific management is the task idea. The work of every workman is fully planned out by the management at least one day in advance, and each man receives in most cases complete written instructions, describing in detail the task which he is to accomplish, as well as the means to be used in doing the work. And the work planned in advance in this way constitutes a task which is to be solved, as explained above, not by the workman alone, but in almost all cases by the joint effort of the workman and the management. This task specifies not only what is to be done but how it is to be done and the exact time allowed for doing it. And whenever the workman succeeds in doing his task right, and within the time limit specified, he receives an addition of from 30 per cent to 100 per cent to his ordinary wages. These tasks are carefully planned so that both good and careful work are called for in their performance, but it should be distinctly understood that *in no case is the workman called upon to work at a pace which would be injurious to his health*. The task is always so regulated that the man who is well suited to his job will thrive while working at this rate during a long term of years and grow happier and more prosperous, instead of being overworked. Scientific management consists very largely in preparing for and carrying out these tasks.

Those who are afraid that a large increase in the productivity of each workman will throw other men out of work, should realize that the one element more than any other which differentiates civilized from uncivilized countries—prosperous from poverty stricken peoples—is that the average

man in the one is five or six times as productive as the other. It is also a fact that the chief cause for the large percentage of the unemployed in England (perhaps the most virile nation in the world), is that the workmen of England, more than in any other civilized country, are deliberately restricting their output because they are possessed by the fallacy that it is against their best interest for each man to work as hard as he can.

The general adoption of scientific management would readily in the future double the productivity of the average man engaged in industrial work. Think of what this means to the whole country. Think of the increase, both in the necessities and luxuries of life, which become available for the whole country, of the possibility of shortening the hours of labour when this is desirable, and of the increased opportunities for education, culture, and recreation which this implies. But while the whole world would profit by this increase in production, the manufacturer and the workman will be far more interested in the especial local gain that comes to them and to the people immediately around them. Scientific management will mean, for the employers and the workmen who adopt it—and particularly for those who adopt it first—the elimination of almost all causes for dispute and disagreement between them. What constitutes a fair day's work will be a question for scientific investigation, instead of a subject to be bargained and haggled over. Soldiering will cease because the object for soldiering will no longer exist. The great increase in wages which accompanies this type of

management will largely eliminate the wage question as a source of dispute. But more than all other causes, the close, intimate cooperation, the constant personal contact between the two sides, will tend to diminish friction and discontent. It is difficult for two people whose interests are the same, and who work side by side in accomplishing the same object, all day long, to keep up a quarrel.

The low cost of production which accompanies a doubling of the output will enable the companies who adopt this management, particularly those who adopt it first, to compete far better than they were able to before, and this will so enlarge their markets that their men will have almost constant work even in dull times, and that they will earn larger profits at all times.

This means increase in prosperity and diminution in poverty, not only for their men but for the whole community immediately around them.

As one of the elements incident to this great gain in output, each workman has been systematically trained to his highest state of efficiency, and has been taught to do a higher class of work than he was able to do under the old types of management; and at the same time he has acquired a friendly mental attitude toward his employers and his whole working conditions, whereas before a considerable part of his time was spent in criticism, suspicious watchfulness, and sometimes in open warfare. This direct gain to all of those working under the system is without doubt the most important single element in the whole problem.

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# THE CONCEPTUAL FRAMEWORK

P SARGANT FLORENCE \*

In a field where emotion and dogma is inclined to befool observation and measurement it is important, first to define and relate the conceptions to be used in some sort of framework.

**P**RODUCTIVITY is here taken to mean the productivity of labour measured directly by quantity, quality and economy of output per worker or small group of workers, or measured indirectly and conversely by rates of absenteeism, turnover, accidents, etc., among large groups of workers. Productivity may be considered more widely to include workers' adjustment to productive changes in methods or organization, and mobility that ensures that labour is attracted and moves to occupations and industries most productive in national value. To be precise, such incentives to mobility should be distinguished at 'attractives'.

There are many ways of increasing productivity beside incentives; and many incentives beside economic incentives. Broadly speaking, labour productivity has been in the past and can be increased by (a) increasing labour's capacity to work (or move), (b) compulsion or (c) increasing labour's willingness to work (or move).

Incentive refers to an increased willingness, not capacity. As implied by

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its derivation of setting the tune for a song, compulsion is not involved. Capacity and willingness, however, may be deemed to shade off into one another like a spectrum.

The increase in productivity does not start as in a vacuum from zero. Workers have their own original and spontaneous inborn and inbred capacities and degrees of willingness to work, which have been found to vary widely, probably approximating to a normal distribution, with a slight skew. Moreover, a group of workers at any place or time may have certain traditional or accustomed habits to which the individual is expected to conform.

Ways of increasing labour's (original) *capacity* include putting more efficient equipment at labour's disposal, or a more efficient organization (possibly through a new division or deployment of labour), or making labour itself more capable by new working methods, by training or by higher wages which involve more efficient conditions of nutrition and living generally.

Schemes of incentives, however, plan to increase labour's (original) willingness to work. These schemes

may not succeed and a distinction must be made, wherever relevant, between incentive *scheme* and incentive *effect*. The effect may be negative and the incentive scheme a *deterrent* to productivity or a cause of immobility, or of moving unproductively to a job or industry of less national value.

Incentive schemes may be called *economic* if they involve giving a worker an opportunity to earn something more in exchange for more productivity: either more money earnings with which the worker can attain higher standards of living; or, indirectly economic, give the worker promotion or economic security. Economic incentives to move productively include a wage-structure and wage-differentials now often based on *job evaluation*. Incentives to productivity or mobility that are not economic but of great influence in industry include interest in the work itself, the need to satisfy one's conscience or a '*sense of order*' and responsibility and, probably connected with this need, the desire for status, prestige and respect, among the group with whom one works and lives.

Normally a worker's productivity will not depend only on one form of incentive but, together with conditions conducive to his *capacity*, such as hours of work, training, air conditions and also organization (including standardization and skill of management), will depend on a multiplicity of incentives and the conditions affecting his *willingness*. These include not only the economic incentives, but non-economic background conditions that may affect interest, loyalty, sense of order and so on, such as the type of work, the size of the group, methods and degree of supervision and record-keeping, or the procedures in establishing incentive schemes.

Our enquiry concentrates attention

upon the effect of schemes of economic incentives on the productivity of labour, but must consider under which of the various conditions schemes of economic incentive are the most successful, and how far, in the '*multiple causation*', any increase in output is attributable to these schemes of economic incentive.

This attribution is only feasible where changes in other conditions besides schemes of economic incentives are at a minimum. The first stage in the enquiry was, therefore, to isolate the factor we wished to measure by considering case-histories where productivity and especially output had been recorded before and after the changes that involved only economic incentive schemes. It was surprising how few business men ever tested, by measuring output or cost before and after, the efficiency of the schemes they introduced. But naturally, since changes are liable to upset personnel, employers tended to introduce them in a '*packet*' together and not separately at more frequent intervals. The ideal laboratory situation, with isolation as well as measurement of factors, was therefore not easy to find.

In deciding what failure in isolation was '*tolerable*' we ruled out cases where more productive machines or equipment had been introduced or where different and often easier methods of work had been inculcated by the management. On the other hand, if the new incentive had moved the workers to change their methods of work (as Stakhanov is reputed to have done) or made them more insistent on prompt delivery of materials (so that piece-earnings would not be lost), then the case was not ruled out. Any such increase in productivity could be attributed (though at one remove) to the incentive scheme. If an incentive scheme was coupled with some deployment, that is a change in the division

of labour within a group of workers without change of equipment or new, inculcated, methods of work, the case was not ruled out, either. But the fact of the deployment is duly noted.

'Incentive effect' excludes increased production directly due to changes (usually introduced by the employer) in (a) equipment and its lay-out, (b) organization and methods of work, (c) selection and training of workers, (d) physical environment; and to changes (usually introduced by some form of collective bargaining) in hours of work and such changes in wages as result in better food and material conditions as will make the worker more physically capable of production. An incentive is, in short, some scheme which aims to increase willingness but not necessarily capacity to produce. It is thus correlated to 'morale' which also refers to human willingness rather than capacity.

The adjective 'economic' narrows down the reference of incentive and gives it a still more specific meaning by excluding such social factors in increasing willingness as the policy of appointing special interviewers and supervisors along the lines indicated by Elton Mayo. If supervisors set up quotas or norms of production, however, and failure to achieve them is visited by dismissal and consequent loss of earnings, then the incentive is, indirectly at least, economic.

Economic incentives are not in the academic world now thought to be of prime importance.

Social psychologists, like JAC Brown, when he declares that '*except under conditions when wages are very low or during periods of inflation, money is one of the least powerful incentives,*' are thinking of motives to work, not incentives to work *more* productively. Our framework accepts Dr. Brown's

thesis that there are few people who are *not* more unhappy without work than with it, when we exclude the financial reward altogether.

Many of the economic incentive schemes we examine are a composite of time-and of various piece-rates. It is usual today for a minimum basic time-rate to guarantee the worker security for a living wage, and for earnings to be increased beyond the basic time-rate only when a certain standard output or performance is exceeded—a pace often denoted by 60 or sometimes 100 along the scale of the work-study engineer, when 80 or 133 is the target pace which an average worker should be able to achieve if given a piece-rate incentive.

This assumption that a worker will, under an economic incentive, increase his output by about a third is not new. A glance at the Ministry of Labour's *Time Rates of Wages and Hours of Labour* shows that in most industries collective agreements with trade unions stipulate that piece-work rates are to be such as to enable workers of average ability to earn a certain percentage minimum above the basic hourly rate.

In the picture of economic incentives but not, perhaps, at its centre, are conditions when a time-rate may rank as payment for a certain quota or norm of output. Work done under a time-wage may be carefully supervised and recorded and workers dismissed the pay-roll if the norm is not attained or if output is more than satisfactory a higher merit (time) rate may be paid or promotion may raise the worker to a higher grade of time-pay.

A further dimension in economic incentives is introduced by paying whole groups of workers, rather than individuals, for their output, either because the contribution of a single member of a team is not physically distinguishable or because the group spirit,



*esprit de corps*, or so-called 'morale' is thought to benefit. Profit-sharing is an extreme form of group payment where the group is the whole factory. The size of the group, whether it is the whole factory, a whole department or a gang working in common, is certainly an important factor in itself and also in making economic incentives less or more effective.

Restriction of output objectively measurable has been found associated with degressive piece-rate systems. The shape of the hour-by-hour output or work curve was found to be different on time—and on piece-rates, suggesting monotony as a major problem of the time-rate, fatigue of piece-rate schemes.

We pursued as far as was possible the principle of the isolation of the factor under enquiry—a principle fundamental to the scientists' work in the laboratory where the other disturbing factors can be eliminated. In the industrial world disturbing factors are legion; some of them random, some biased. Random events can largely be eliminated by averaging over as many workers for as long a period as possible; but case-histories subject to biased events must be 'selected out.' Factors introducing a bias include the frequent practice by industrialists of introducing other large-scale changes at the same time as they introduce new economic incentives. Statements of an increase in productivity following the introduction of incentives must be viewed with some doubt—unless we are sure that no simultaneous changes, or at least major changes, were made in organization, methods of work and equipment.

In its report on *Payment by Results* issued in 1953 the International Labour Office quotes effects on output of the introduction of incentive schemes in Australia, Belgium, the Netherlands, India and the United States. Except for the Indian experience no informa-

tion is given whether or not other factors were introduced. For this reason the considerable increases in output that are reported after piece-rates or incentive schemes were introduced cannot be assumed as the net results of such schemes. Many employers and industrial consultants told us that they introduced incentives for the very reason that they wished their other changes such as new equipment or new work methods to be effective and pay for their installation costs. Isolated introduction of economic incentives is therefore rare and some people may argue that such cases are therefore not worth seeking out for study. This contention we consider a *non-sequitur* due to a misconception.

We are not advocating that incentives should as a policy be introduced without other changes; but we are trying to discover how much truth there is in the industrialist's contention that without economic incentives the new equipment or methods of work may be ineffective. For this purpose we must be sure about the exact difference in productivity before and after introducing new incentives while either the old equipment or methods, or better still the new equipment or methods, are, during both periods, in force. In short, we must, for the scientific evaluation of the alleged strength of certain incentives in the midst of other factors, have exactly measured instances where incentives alone have been changed.

Luckily for this evaluation, enough cases were found where physical output was exactly recorded for the purpose of paying wages, and isolation of the incentive factor occurred, either because no changes in equipment or methods of work were possible or because they were not considered worth carrying out. Here the experiment is realistic in the sense that it can be translated immediately into action, and may be



commended to firms who have no capital to spend on new equipment or (even if they have the capital) do not think such equipment would help in their types of industrial operation. But in the majority of manufacturing operations, at least, economic incentives are claimed as the most effective when applied on new work-methods and new equipment. The fact that our observation has found them also effective on traditional methods and equipment serves as the basis of an *a fortiori* argument. If incentives are effective on old methods, they are likely to be more strongly so on the new!

Evidence has recently been accumulating on the wide variation in productivity on similar jobs as (i) between averages in different countries, (ii) between the average of a group of workers under different managements in the same country and (iii) between different workers under the same management. The first two categories of variation are only indirectly linked with incentive schemes and need be illustrated but briefly.

This variation in the outputs of individual workers on the same job under the same management is of great practical importance. Not only does it indicate the possibility of improvement but the width and form of distribution of the outputs may indicate how far an incentive scheme has overcome any restriction of output.

All these variations on productivity between countries, between factories and between individuals give hope that

most levels of productivity can be improved upon. The causes and conditions for the variation can be broadly divided into those acting through the 'human factor,' that is the worker's capacity or willingness, and those that 'by-pass' the human factor altogether as when an accident occurs purely for technical or mechanical reasons, or outputs rise with changes in material conditions such as speeded-up machines, or with altogether new types of equipment, without any reference to human intermediacy.

Many of the great discrepancies in productivity between countries are the result of different degrees of mechanization; but the discrepancies between factories in the same country and especially between workers within the same factory are usually the result of different conditions affecting the 'human factor,' and among these conditions we must now proceed to enquire how far the economic incentives can raise productivity. The auxiliary verb 'can' is used advisedly since it has a double *entente* and carries the notion not only that it is possible to increase productivity by means of economic incentives but also that those particular means are commercially feasible. It is, for instance, possible that the continued presence of young research associates observing them will increase the output of a group of girl operatives, as happened in the Elton Mayo experiment. But this method is expensive in salaries and fees and is not likely to be adopted as a permanent feature of any factory's policy.





## from the seed...

In the steel blaze of noon,  
men of the earth 'drag the sun upon their backs',  
toiling in the furrowed fields.

For a tomorrow, when the seed will burst to plant, flower and fruit.

For the fruits of tomorrow then, the striving, the effort.

For a world that offers a little more —  
a little less of the care, a little more of the joy.

**Today**, as in the past, our products help to make homes cleaner, healthier, happier. But today we are also working for . . . **Tomorrow**, when the evergrowing urge for better living will demand still greater efforts. And we shall be ready with wider service, new ideas, new products . . .

**Today and Tomorrow... Hindustan Lever serves the home**

# Payment by Results\*

Systems of payment by results are now widely used in many countries and increasing recognition of the need to raise the productivity of labour has led to a growing interest in the possibilities of such systems. It is however well to remember that the essential characteristic of payment by results—the direct linkage of earnings to output—is regarded by some workers as inherently objectionable and by others as inherently desirable. Some men set a higher value on a relatively unhurried tempo of work and on equality of earnings than they do on the opportunity to raise their individual earnings or to earn more than their less proficient or less energetic fellow-workers; others take the opposite view. These are value judgments which each individual must make for himself. Where one or the other view is strongly dominant in any group, that in itself may determine both the desirability and the practicability of operating a system of payment by results.

**T**HERE are many different systems of wage payment under which the worker's earnings are related directly to some measurement of the work done either by himself or by the group or working unit to which he belongs. Such systems, known as payment by results, can, however, be classified in four main groups according to whether the worker's earnings vary (1) in the same proportion as output (2) proportionally less than output (3) proportionally more than output, or (4) in proportions which differ at different levels of output.

The chief characteristic of systems of payment by results under which the worker's reward varies in the same proportion as his output is that any gains or losses resulting directly from changes in his output accrue to him (leaving to the employer any gains or losses in overhead costs per unit of output). In contrast, when the worker is paid by the

hour or by the day all gains or losses resulting from changes in his output accrue to the employer.

The successful operation of this type of system of payment by results requires however that the measurement of standard and individual outputs must be extremely accurate. Inaccuracy in these matters gives rise to inequities and may lead to the ultimate failure of a scheme due to worker dissatisfaction.

## The Straight Piece-Work System

This is the most common system of payment by results and was the earliest system in use in most countries, having long been common in the textile industry. Frequently, however, the exact proportionality of this system is modified in one respect: the workers' time rate is guaranteed. This rate is set usually at a level which will yield earnings below the expected average earnings on piece-work in average conditions. It is designed to protect the wor-

\* From the ILO publication on the subject

ker against unduly low earnings due to causes beyond his control. This guarantee of earnings is normally applied so that high earnings in one period are not set off against low earnings in another period.

Under the straight piece-work system, which may be applied either to individuals or to groups of workers, the worker is paid at a specified rate per unit of output measured in terms of, for example, tons of coal, number of pieces of garments or pounds of yarn. Direct labour costs per unit of output thus remain constant as output increases above standard, but total unit costs decrease because fixed and semi-variable overhead unit costs decrease. This decrease results from the fact that, unless capital equipment is increased or decreased, fixed charges remain the same no matter what the output is, while such semi-variable costs as selling and administrative expenses remain fixed for moderate increases in output.

With a guaranteed time rate the earnings curve for rates of output below standard is horizontal upto standard output, at which it becomes a straight line having a slope of unity. This means that a 1 per cent increase in output results in a 1 per cent increase in earnings. Since earnings are constant upto standard output, unit labour costs fall continuously until standard output is increased. For rates of output above this standard, unit labour costs remain constant.

### The Standard Hour System

This system, which is sometimes also known as the *standard time, time piece-work* or *100 per cent gain sharing system*, is essentially the same as the straight piece-work system and is becoming increasingly popular. Both systems reward workers in direct proportion to their output. In the case of the standard hour system, instead of a price being allowed for each unit pro-

duced as in straight piece-work, a *standard time* is allowed to complete a particular job, and the worker is paid for the standard time at his time rate if he completes the job in standard time or less. Thus, if a man completes in eight hours a job for which the standard time is ten hours, his earnings for this job will amount to ten times his time rate. If, on the other hand, he takes more than the standard time to complete the job, he will, if he is guaranteed his time rate, be paid at this rate for the time he actually spent on the job. But if he is not guaranteed his time rate, he will be paid only for the standard time.

### Systems with worker's earnings varying proportionally less than output

The chief characteristic of systems of payment by results under which the worker's earnings vary proportionally less than output is that the worker shares with his employer the gains or losses resulting from changes in output.

These systems are often applied in cases where it is not possible to set standards or to measure the worker's output accurately. Under some of these schemes it is possible for a worker to earn more for certain levels of output than he would under piece-work when production difficulties are encountered. But, of course, if no such difficulties are encountered and the worker is able to increase his output significantly, he receives under these schemes progressively less for such output than he would if he were working on straight piece-work.

All these systems, except the Barth, guarantee a worker his time rate if his output does not reach a specified level. Consequently, direct labour costs are, except in the case of the Barth system, the same as under straight piece-work for rates of output upto this level. Further, under all of these systems unit direct labour costs above standard out-

put are lower than under straight piece-work. As overhead costs per unit also decrease under these systems, to the same extent as under straight piece-work, profits are higher in most cases than under straight piece-work for significant increases in production.

### The Halsey System

Under the Halsey system, a standard time, which is usually set from past production records, is allowed for the completion of a certain piece of work or job. If the work is done in exactly, or more than, this time the worker is paid a wage equal to his time rate for the time actually spent on the job. The worker is thus guaranteed a minimum wage even if his output falls below standard. If, however, the job is completed in less than standard time, the worker is paid at his time rate for the actual time taken and, in addition, receives as a bonus a payment at his time rate for a specified percentage of the time saved. In practice, this percentage varies from 30 to 70 per cent of the time saved, the most usual proportion being 50 per cent, the other 50 per cent representing the employer's share of the time saved. For example, if a worker's hourly rate is 0.96 money units and the standard time for a job is ten hours a worker who complete it in seven hours receives a payment of 6.72 money units ( $0.96 \times 7$ ) and, in addition, (in the case of a sharing in the proportion of 50 and 50 per cent, a bonus payment for one-and-a-half hours (50 per cent of the three hours saved) at his hourly rate (i.e., a bonus of 1.44 money units), or a total of 8.16 money units for seven hours' work (1.16 money units per hour as compared with his basic hourly rate of 0.96 money units).

The earnings curve is horizontal until standard output is reached. Thereafter it becomes a straight line having, in the case of 50-50 sharing, a slope of one half, that is, a 1 per cent increase

in output results in a 0.5 per cent increase in earnings; and, in the case of 30-70 sharing, a slope of three tenths, that is, a 1 per cent increase in output results in a 0.3 per cent increase in earnings. For rates of output below standard, unit direct labour costs are the same in both cases as for straight piece-work. When output exceeds standard unit direct labour costs continue to fall instead of remaining constant as under straight piece-work.

### The Rowan System

Under the Rowan system a standard time is also allowed for the completion of a certain job, and a bonus is similarly paid for any time saved. The bonus takes the form of a percentage of the worker's time rate. This percentage is equal to the proportion which the time saved forms of standard time. For example, if (as in the last case) a worker's hourly rate is 0.96 money units and he completes in seven hours a job for which the standard time is ten hours, the bonus percentage is 30 per cent, since the time saved (three hours) is 30 per cent of the standard time (ten hours). The worker is paid for the time taken to do the job (seven hours) at his hourly rate (0.96 money units) plus 30 per cent. He will thus be paid 1.25 money units per hour; and his total pay for his job will be 8.75 money units. The worker is guaranteed his time rate if he fails to reach standard.

For low task, the earnings curve often starts at 62.5 per cent of standard output rising with increases in output sharply at first and then more and more slowly. At comparatively high rates of output the earnings curve approaches but never reaches 200 per cent of basic wage. For certain ranges of output above standard the earnings are, for low task, higher than under piece-work.

For standard task the earnings curve, which starts at the 100 per cent output level, rises rather sharply at first but

more slowly at higher rates of output. For standard task earnings are thus always less than they would be for straight piece-work.

### The Barth Variable Sharing System

This system is similar to the Halsey and Rowan systems. It is also based on standard time, but does not provide for a guaranteed time rate. The worker's pay is ascertained by multiplying the standard hour by the number of hours actually taken to do the job, taking the square root of the product and multiplying by the worker's hourly rate. Thus, if a worker's performance and hourly rate are the same as in the example given in the case of the Rowan system, his wage for completing the job will be  $(\sqrt{10 \times 7}) \times 0.96$ , or 8.06 money units.

Since the Barth Variable Sharing System does not guarantee the worker his time rate for levels of output below standard, the earnings curves for both low task and standard task start at zero and rise steeply but at a decreasing rate, until for high rates of output they become almost straight lines. For levels of output above standard the worker's earnings under the Barth system are always lower than under straight piece-work for standard task, but are, for low task, higher than under straight piece-work at certain levels of output above standard.

### The Bedaux System

Under the Bedaux system, the standard time for a job is determined by time and motion study. Each minute of allowed time is called a point, or B, thus making in all 480 points in an eight-hour day. A standard number of points is specified for the completion of each job. The worker receives, in addition to his hourly or daily rate, a bonus which is, under the original Bedaux system, equal to 75 per cent of the number of points earned in excess

of 60 per hour multiplied by one sixtieth of the worker's hourly rate. Thus, if the standard time and a worker's performance and hourly rate are the same as in the example given for the Rowan system above, the standard number of points for completing the job is 600. The worker thus earns 600 points in seven hours. His bonus will, therefore, be 75 per cent of  $180 \times 0.96 / 60$  which is equal to 2.16 money units. Since his time wage for seven hours' work is 6.72 money units his total wage will be 8.88 money units. If a worker does not reach standard he is paid at his time rate.

The Bedaux system is really more than an incentive system, since it enables the management to record the output of any worker or department in units which show at once if production is upto the standard the management desires. In recent years, the percentage allowed to workers has, in some cases, been raised from 75 per cent to, or almost to, 100 per cent. If 100 per cent is allowed, the worker's earnings become the same as under straight piece-work but in all other cases his earnings are, under the Bedaux system, always less than under straight piece-work.

With a guaranteed time rate the earnings curve has, in the case of the original Bedaux system, a slope of three quarters for rates of output exceeding standard—that is, for each 1 per cent increase in output there is a 0.75 per cent increase in earnings. Direct labour costs fall at a nearly constant rate, the direct labour cost curve being somewhat the same as the corresponding curve for straight piece-work.

### Systems with worker's earnings varying proportionally more than output

The chief characteristic of systems under which the worker's earnings vary proportionally more than his output is that, since under most of these systems direct labour costs per unit increase for



levels of output above the standard (which is usually set quite high), the worker also shares the savings in overhead costs which result from increased output. The amount of this share depends on the size of the increments in earnings which are payable at different levels of output. If these increments were large enough and increased progressively with output, it is obvious that the workers could obtain all the savings in overhead costs. This is not, of course, the case where the increment in earnings remains the same for each successive increase in output, that is, where the earnings curve is a straight line as in the high piece-rate system described below.

### High Piece-Rate and Standard Hour

Under the high piece-rate system the worker's earnings are in proportion to output as under straight piece-work but the increment in earnings for each increase in output is greater. For example, there may be a  $1\frac{1}{3}$  per cent increase in earnings above the worker's time rate for each 1 per cent increase in output above standard as compared with a 1 per cent increase in earnings under straight piece-work for the same percentage increase in output. A  $1\frac{1}{3}$  per cent increment will yield earnings  $33\frac{1}{3}$  per cent above the time rate when *normal* or standard production is reached save for the fact that it provides in all cases for a guaranteed time rate. The standard hour system described above, with the increment in earnings larger than the increments in output, is in effect the same as the high piece-rate system.

### Systems with worker's earnings varying in proportions which differ at different levels of output

A great variety of systems of this type has been developed. These systems can best be explained by describ-

ing how earnings vary from minimum to maximum at different levels of output. Earnings for part of the range may vary proportionally less than output and for another part proportionally more, or more usually in the same proportion as output. It is, therefore, not possible to classify any of these systems with any of the three other types described above although many of these systems closely resemble some of the systems of these other types. The main features of the most important systems of this type are the following:

#### The Taylor Differential Piece-Rate

This system, which was developed by FW Taylor in 1880, has a low piece-rate of output below standard and a higher piece-rate for output above standard with a large bonus of 50 per cent of the time rate when standard output is attained. This system therefore penalises the slow worker but rewards handsomely workers with a high output.

#### The Merrick Differential Piece-Rate

This system is a modification of the Taylor system, with three instead of two rates. The one large step is broken into two so as to encourage new and average workers. Straight piece-rates are paid up to 83 per cent of standard output, at which a bonus of 10 per cent of the time rate is payable, with a further 10 per cent bonus on reaching standard output. For output above standard, high piece-rates are paid.

#### The Gantt Task System

Under the Gantt system the worker is guaranteed his time rate for output below standard. On reaching standard output of task, which is set at a high level, the worker is paid a bonus of 20 per cent of his time wage. For output above task, high piece-rates are paid. The Taylor, Merrick and Gantt systems

are, it will be noted, based on a similar principle—that of rewarding workers for reaching task which is set at a high level.

### The Emerson Empiric or Efficiency System

Under the Emerson and other similar systems, which are mentioned below, a standard time is established for each job, and during each pay period a record is made of the number of hours each worker takes to complete the job or jobs.

The efficiency of each worker is then determined by dividing this number of hours into the standard time. Thus, if a worker takes ten hours to complete a job for which the standard time is eight hours, his efficiency is 80 per cent. Up to 67 per cent efficiency the worker is paid at his time rate and from this point up to 100 per cent efficiency a bonus is payable. This bonus is equal to certain specified fractions of 1 per cent of the hourly rate for each additional 1 per cent of output until at 100 per cent efficiency a bonus of 20 per cent is payable. Thereafter an additional bonus of 1 per cent is added for each additional 1 per cent efficiency. At first sight it would appear that from 100 per cent efficiency the system becomes one of straight piece-work. Actually this is not the case. Thus, if output increased from 100 to 101 per cent, a bonus of 21 per cent of the hourly rate would be payable under the Emerson system. With straight piece-work the bonus would be 21.2 per cent of the hourly rate.

Under the Emerson system, direct labour costs fall rapidly in the range from 67 to 100 per cent of standard output but that these costs fall only slowly for increases in output above standard.

Various other systems, such as the Wennerlund, Knoeppel, Bigelow, Bige-

low-Knoeppel, Atkinson and Allingham systems, are simply modifications of the Emerson system. The Wennerlund system has a somewhat different empirical curve from the Emerson system and applies straight piece-rates for increases above 100 per cent efficiency. All the others have steps in the earnings curves to encourage workers to reach the high task which is set in all these systems. For example, in the Knoeppel system, for 98, 99 and 100 per cent efficiency the bonuses are equal to 18, 19 and 25 per cent of the basic wage respectively. There is thus at 99 per cent efficiency a jump of 6 per cent in bonus for a 1 per cent increase in efficiency.

### Accelerating Premium

The principle of all the numerous possible accelerating premium systems is that, for low and average levels of output, there are only small increments in earnings, but that for above average output there are increasingly larger increments in earnings. The earnings increments are thus different for each 1 per cent increase in output. For low output the differences are small and therefore scarcely apparent to the worker, but at high output the differences are significant and, therefore, provide a powerful stimulus to the worker to increase his output more and more. Earnings under most accelerating premium systems are, however, only slightly different from those under high piece-rate or high task systems with a guaranteed minimum wage payable for levels of output below standard. But the accelerating premium systems have the considerable disadvantage of being much more complicated and difficult to understand.

### Group Systems

In some cases it is impossible to apply individual systems since, where several workers are required to perform a single operation, as in the case of a

steel melting furnace in an engineering works, it is obviously impossible to measure the output of individuals. If it is desired to introduce a system of payment by results for such workers this can only be done on a group basis. All of the various individual systems may be applied to groups of workers, although piece-work is most common.

The earnings of each member of the group are determined first of all by measuring the amount of production which passes inspection as it leaves the group. The total earnings for the group are then determined and if all the members are of equal skill these earnings are usually divided among them equally. Frequently, however, the members of the group are not of equal skill. In these cases the total earnings of the group may be divided among the members in proportion to their individual time rates, or according to specified percentages, or in some cases among only a certain number of the members of the group. Where, for example, the group consists of some highly skilled workers and some quite unskilled workers, or *helpers*, the unskilled workers may receive their time rates and the skilled workers share the remainder of the total earnings.

### Department or Plant Systems

Systems of payment by results may be applied to a department or even to a whole plant. Such systems differ from group systems in that the requirement of interdependence of operations does not necessarily apply, and in that whereas under group systems the amount of production is measured and the earnings of the group are calculated at short intervals, under department or plant systems the measurement of production and the calculation of bonuses may be carried out at relatively lengthy intervals, generally once a month. In some cases, a certain time is allowed for standard output to be produced and special

bonuses are paid if this is achieved, or a standard output per man-hour is laid down for the department or plant and a bonus is declared in the proportion by which the actual output per man-hour exceeds the standard. In other systems bonuses are declared according to changes in the value of output at factory cost, or in the value of sales. The bonuses are frequently paid to the individual workers in proportion to their time rates. Thus, provision can be made for not only direct but also indirect workers to participate.

### Systems for indirect workers

Brief mention may be made here of the systems of payment by results which have been applied to indirect workers such as maintenance workers, cleaners, inspectors and packers. Bonuses may be paid to such workers either on the ground that they contribute to any increased production which the direct workers may achieve, or on the ground that their work is increased because of increased production, as in the case of inspectors. Such payment may also be designed to avoid the dissatisfaction and dissension among the workers in a plant, or even strikes, which may result if indirect workers are paid at their time rates while direct workers are receiving substantial bonuses. For these reasons, arrangements are sometimes made to reward indirect workers in some way for their increased efforts. For example, floor sweepers are sometimes allowed a standard time to sweep a specified area of floor, and if they complete the job in less than this time they are granted a bonus according to the time saved. Packers can be paid a bonus for the number of units packed above standard. A similar method can be adopted for inspectors. No such direct methods can, however, be applied to maintenance men and certain other workers. For this reason, and on the grounds of equity, a single system of

bonus payments is often applied to all or most of the indirect workers in a plant even though it would be possible to measure accurately the output of some of these workers such as inspectors. In some cases the bonus is calculated according to some agreed principle on the output of the plant or of a department. In others the bonus is a specified percentage of the bonuses or total earnings of all or some of the direct workers. Many managements, however, prefer to apply a merit-rating system to indirect workers which rewards these workers for other qualities in addition to their output.

#### **Comparison of the earnings and direct labour cost curves of the most frequently applied systems**

The systems compared are the Halsey (50-50 sharing), the Rowan, the Barth Variable Sharing, the Bedaux and the piece-work systems.

Rates of output above standard earnings are greatest for the piece-work system, followed by the Bedaux, the Halsey (50-50 sharing), Barth and Rowan systems. It should be noted, however, that for levels of output between 100 and 130 per cent of standard, a worker is able to earn slightly more under the Rowan system than under the Barth variable sharing system.

The differences in earnings between the various systems increase gradually at higher rates of output. At 200 per cent of standard output the difference between the highest and lowest earnings is 87.5 per cent of the time rate

(the earnings under piece-work are 250 per cent of the time rate, while under the Rowan system they are 162.5 per cent of the time rate). At  $133\frac{1}{3}$  per cent of standard output this difference is 23 per cent of the time rate.

For output below standard the position is more complicated. It can be seen that between 75 and 100 per cent output earnings under piece-work are the lowest, and that the Barth variable sharing system, which does not guarantee a time rate for levels of output below 65 per cent of standard, enables the worker to earn more than under any other system in the range of output between 65 per cent and 100 per cent of standard.

If the whole range of output above 65 per cent is surveyed, it can be seen that earnings under the Bedaux and Halsey (50-50 sharing) systems are intermediate between the earnings under the other systems.

For rates of output above standard the piece-work system has the highest direct labour costs, followed by the Bedaux, Halsey (50-50 sharing), Barth and Rowan systems all of which yield falling direct labour costs at higher levels of output. Again it should be noted that from 100 to 130 per cent of standard output, the Barth variable sharing system has the lowest direct-labour costs of all five systems.

For output below standard, the piece-work system has the lowest, and the Barth variable sharing system the highest, direct labour costs.

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#### **FIRST LAW OF SOCIO-PSYCHOLOGICAL MOTION**

*"Every person continues in his state of rest, or of uniform work in a straight line, unless he is compelled by impressed incentives to change his state."*

# The Scanlon Plan

The most spectacular and certainly the best publicized plant-wide incentive plan is that which goes under the name of the Scanlon Plan. The new approach to productivity and industrial relations that bears the name of Joseph Scanlon, formerly of the United Steelworkers of America and then a lecturer at the Massachusetts Institute of Technology, has been reported upon in *Life* and *Fortune*. The Plan has attracted the enthusiastic interest of many management and union people.

**T**HE Scanlon Plan consists of two basic parts: (1) a social process whereby suggestions for productivity improvements can be made and carried out (2) a formula for sharing the fruits of productivity improvements on a plant-wide basis.

Scanlon and his associates argue that there is really no such thing as the Scanlon Plan in the sense of a universal formula that is applied to every plant. They point out that the sharing formula must be devised to fit the particular operating conditions of the plant in question. They also argue that *the formula by itself produces no results. It is the reorganized activity of people that pays off.*

The Scanlon Plan objective is to devise a formula which will most adequately reflect the productive efforts of workers and management people as a whole. It may help us to concentrate on one example, the Lapointe Machine Tool Company, in illustrating one possible formula based upon a ratio of labour costs to sales value of products produced. But it is the other characteristics of the Scanlon Plan, which are most important:

1. At Lapointe the Plan grew out of the initiative of the local union presi-

dent and his committee, who sought out Joseph Scanlon and persuaded him to meet with them and management to propose a new cooperative approach. The possibility of re-examining and even changing the formula from time to time provides a further field for union involvement even in this narrow area involving the financial formula.

2. *"For each 1 per cent of increase in productive efficiency as reflected in production value, a 1 per cent participating bonus will be paid to each employee working under the Plan."* Thus 100 per cent of the labour cost improvement is paid out to participating members. Management expects to make its gains through spreading its overhead over increased production.

3. All employees of the company, with the exception of top management share in the bonus. This means that foremen, superintendents, engineers, and other managerial people have a recognized part in the Plan.

4. The many workers who had been on piece rates were guaranteed their regular hourly rate plus their average incentive earnings prior to the time that the Plan went into effect. In other words, the company was gambling that these men would produce at least as

much as they had under piecework even after the direct individual incentive was withdrawn.

5. The Plan provides for possible changes in the ratio of labour costs to production value. The agreement envisages several possible conditions that may make such a change desirable. Management might introduce substantial technological improvements that would lower labour costs "*without any increase in productive efficiency on the part of the participants*". Increase in wage rates might justify a change. Increases or decreases in sales prices would affect the ratio. A major change in the product mix might affect the ratio, and so on. The agreement makes no attempt to anticipate all such possible conditions. It simply opens up possibilities for union and management to negotiate a new ratio.

6. The Lapointe Plan established a reserve fund to meet fluctuations in labour costs. It was therefore agreed upon that one-half of the first 15 per cent of any bonus earned in any month should be set aside as a reserve. Any unusual portion of this reserve by November of the given year should be paid out in December and a new reserve fund established.

### **Suggestion Plan: Scanlon Style**

The Scanlon suggestion plan is a marked contrast to traditional system. In the first place, there is *no individual payoff*. This means that the Scanlon approach relies on a completely different type of motivation. The individual is expected to contribute his ideas for the benefit of everyone. He is rewarded of course, but in terms of recognition from fellow workers, union officers, and management; and of course, the Scanlon Bonus, already mentioned.

Furthermore, the Scanlon suggestion system is not left to the initiative of isolated individuals. A definite

structure is set up for the development, and implementation suggestions. The structure through union and management, every department a union production committeeman is appointed or This committeeman and the foremen constitute the production committee of the department. They meet at least once a month to discuss suggestions for improvement. This suggestion activity is separate from grievance handling.

Above the departmental production committee level there is an advisory or screening committee composed of three management and three worker representatives. It is hoped that suggestions brought by the production committeemen to the foremen will be put into effect within the department without further discussion. There will necessarily be other suggestions which require higher consideration. These are referred to the screening committee which reports to the management. This advisory procedure however is not a material part of the arrangement. A more significant part of the Scanlon Plan is that it is really a cooperative system, which aims, in the instance, at eliminating the physical resistance to change and involving the whole body of workers and supervisors in the improvement of production plans. All the costs involved in reacting to the workers' subterfuge in policing the whole industrial plant are eliminated. We have many examples to show that the system works to the advantage and satisfaction of everyone. In a printing plant where workers were wasting a lot of paper, actually combined to salvage quite a good deal of waste paper, suggesting how it could be used. In another case, where a conveyor could not be installed, workers and supervisors themselves designed



talled with the help of the expert staff, a new conveyor system which increased the productivity of the department by 20 per cent. In another case, where a press was losing an order of two million books to another press, the workers and supervisors themselves worked out the costs to show how 100 copies could be produced at 17.65 dollars against the planning department's calculation of 21.55 dollars. The workers themselves suggested how unnecessary operations could be eliminated and saving in time on other operations could be effected.

In a time of depression or slump, the Scanlon way of involving workers in the business of the firm and giving them the intimate knowledge of its working are of great significance. Workers can devise cheaper ways of turning out products because it is in their interest to keep their jobs. In a number of instances, the Lapointe workers have actually done this. In a big order concerning the making of broaches at a time when business was losing, it had been practically decided to give up the order as unprofitable. Managers, supervisors, workmen met, because it meant less profits for the management and less jobs for the workers. The Chief Mr Prindiville announced the giving up of the order.

The gloomy gathering that listened to Mr Prindiville's pronouncement was then electrified by a question from Jimmie McQuade, skilled grinder and one of the most outspoken members of the screening committee. "Who says we can't make those broaches at that price for a profit?" Mr. McQuade wanted to know, "if you'd give the men in the shop the chance to go over the blueprints before production starts and to help plan the job, there are lots of ways of cutting costs without cutting quality." The idea grew, and the next day the suggestion ran around the shop like wildfire. The order was taken at the old price, this time with a profit of 10 per cent—a total gain in efficiency of 20 per cent.

In these cases we see that the workers and union representatives are not simply concerned with problems of improving a particular machine. They

become involved with management in problems that go to the heart of the business: the relationships between productivity, costs, prices, and profit.

There are quite a number of cases where workers and supervisors have organized team work on technical improvements. Shultz and Crisara report a case study from Lapointe where a worker and a supervisor, working in collaboration with an electrician, worked out a new and highly productive device at an insignificant cost to the management. There is another case study again from the printing plant, which shows how the workers and foremen helped in so scheduling the time that very considerable savings were effected. The best part of the Scanlon Plan therefore is that workers and foreman no longer need to protect themselves against higher management. Hence it becomes possible to achieve a degree of management control of the production process that is not otherwise possible; because the total organization is involved as a community of purpose. In a case reported to us the engineers volunteered to postpone their vacation in order to devise a new product that would keep the workers jobs.

We can therefore conclude that *the Scanlon approach taps a reservoir of ideas that would not be reached with the traditional approach at all.* Perhaps reservoir is not a good simile because it assumes that the ideas just lie there waiting to be tapped. The cases described clearly indicate that for the most important suggestions this is not the case. *People contribute much more in the way of valuable suggestions when they are stimulated to shoot for new goals by a social system that makes such activity possible.*

We also see a contrast in the actual number of suggestions and particularly in the number of acceptable suggestions made. In the first four and a half years of the Scanlon Plan's existence in

the Lapointe plant, 1506 suggestions were made. During this period the plant grew from 294 employees to 1085. Shultz and Crisara point out that new employees have fitted into the system and are contributing suggestions at a surprisingly rapid rate. 80 per cent of the 1506 suggestions made at Lapointe have been accepted and put into operation. Another 5 per cent were still under consideration and only 15 per cent had been rejected.

How can we explain this striking contrast between the usual 70 per cent rejection percentage and 80 percentage acceptance in this case? An examination of the suggestion-making process in the two cases gives us a clue. The Scanlon suggestion programme involves a good deal of informal discussion among workers and between workers and management people. It is probable at this stage that impractical suggestions are weeded out. The man who has an idea checks with other workers and perhaps tries to get advice from management people. At this point he may either get the help he needs to put his suggestion in practical form or else he may decide that it is not worth submitting. In case of the individual suggestion plan, on the other hand, the employee is not likely to have the benefit of this consultation. He feels he better keep the idea to himself in order to retain possession of it. Under these circumstances it is natural that a large proportion of the suggestions coming up in such a programme will be impractical.

The limitations and advantages of the Scanlon Plan may now be summarized:

1. *The growth of cooperation.* The union was organised at Lapointe in late 1944. Toward the end of the first year of its existence there was an 11-week strike. During the next several years, relations between the parties improved, but there was still a good deal of diffi-

culty over some grievances. With the institution of the cooperative programme at the end of 1947, worker-management and union-management relations changed markedly in the direction of cooperation. Shultz and Crisara report that grievances have practically disappeared.

2. *Strengthening of the company's competitive position.* The company not only has grown on a scale that might have been impossible without the cooperative programme, it has improved its competitive position in a most impressive manner.

3. *Elimination of output restriction.* On the basis of previous studies, we have been accustomed to assuming that restriction of output exists anywhere and everywhere. Apparently in some of these Scanlon cases it has been well-nigh eliminated. The union president cites an example of a grinder at Lapointe who had been averaging \$76.40 a week on his incentive rate. In four days after the Plan was instituted he turned in enough work so that it would have amounted to \$184 under the preexisting incentive plan. This is only a single example and is certainly not enough to allow us to assume that no restriction remains at all. However, it does suggest that the tight ceiling on production has been eliminated. With no more individual incentive rates there is no longer any threat of rate cutting, and the worker can contribute to the goal of the total organization without incurring the enmity of fellow workers.

4. *A new management approach.* Success of an activity such as is involved in the Scanlon Plan requires a veritable revolution in management's conception of its functions and in its behaviour in relation to workers and union representatives. *The management preoccupied with protecting its prerogatives had best not consider the Scanlon Plan at all.* The following il-

illustration is presented by Shultz: Not too long ago, a group of about eight workers and their union business agent came to see Scanlon. They were worried people. Their company owned five plants, and the one they worked in was the oldest, the least efficient. As one of them put it, "We've seen these other plants and we know that we're the worst. If business gets bad, we're sure to go." The president of their company had made a number of widely-quoted speeches emphasizing the need for giving workers a *sense of participation*. These particular workers thought that they had something to contribute, and they had heard that Scanlon talked about *participation* too. Would he help them?

Well, he might, but what did they have to contribute? Were they just talking or could they be more specific? Raising this question was like opening the floodgates. The rest of the morning was spent listening to them discuss the mistakes that management made, the unnecessary waste of materials, the possible improvements in methods. The stories were detailed and convincing. Surely they would startle and inspire any company president who talked about participation. They did not inspire this one, though they may have startled him. He stated, in effect, that it was his job to manage this business and that he was paid well to do just that. He was sure the foremen would be glad to get these suggestions, but neither he nor the foremen could discuss them

further. After all, he could not give up his management prerogatives.

It is fashionable for management people to say that participation on the part of workers is important. But often they give themselves away by saying that the worker "must be made to feel he is participating." This *synthetic sense of participation* they seek to provide perhaps by distributing financial statements to workers and in other ways telling them how the business is getting along. But real participation involves changes in the behaviour and activity of people. It involves getting workers to initiate changes in the behaviour of management people. If management is unwilling to make any significant changes, then it is futile to start on such a programme.

5. *Ability of management to make changes.* The programme requires not only a receptivity on the part of management people but also an ability to make changes. The two do not necessarily go together. We have fragmentary information on one case where the Scanlon Plan failed probably for this reason to achieve the sort of spectacular result noted at Lapointe and in some other cases.

6. *Involvement of the total organization.* The Scanlon approach provides for a remarkably widespread involvement of people in the discussion of production problems. Workers become involved, but not only workers. We see engineers, production schedulers, accountants, and so on contributing their specialized knowledges.

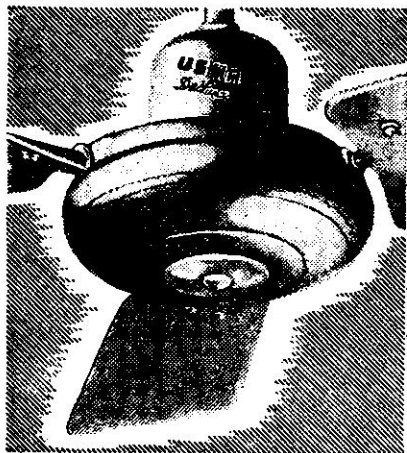
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#### THE LAW OF REMOTE CONTROL IN INCENTIVES

"Local pressures", says Mace, "are much more potent than pressure propelled from a distance (like the sermons on productivity of national leaders). One might almost say that the power of an expectation at any place varies inversely with the square of the social distance of that place from the point of emission."



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# The Rucker Plan

ARJAN VASWANI \*

The Rucker plan outlined here is similar to the Scanlon plan with this difference that while the latter is based on the total sales value, the Rucker plan operates on the basis of what is known in this country as "value added", with which the readers of the Census of Manufacture in India would be familiar. More precisely, the incentive is based on total sales value minus the payments made to outsiders for purchase of materials and components. The author of this article found the Rucker plan operating in an alloy iron foundry in the USA. He has elaborated it in the article printed below, as it impressed him deeply as a plan that may have some possibilities in India.

**MR.** Eddy Rucker spent more than three years analyzing the extremely comprehensive census of manufacturers (1899-1929), covering as many as 3,000,000 manufacturing establishments in the USA, with a view to discover a link between productivity and wages. He made three negative discoveries: (a) physical volume of output (wages and pay rolls rise irregularly and much faster than the index of production) (b) industry's profits (c) total sales value of output.

Mr. Rucker also made some positive discoveries (all related to one another), the principal being that factory pay rolls are directly proportionate to factory *production value* the two rising and falling in a simple percentage relationship. Hence production value output per a rupee or regular wages input would be a near constant. This production value was arrived at by deducting from the sales value of the plant's output, the cost value of bought out mater-

ial and components, which were really not the production of the plant under consideration but of outside producers. This internal production value is really the only true measure of the plant's production however and the only income available for payment of internal operating expenses and profits. Mr. Rucker discovered that as an average for the entire manufacturing industry in the United States, the relationship between internal production value and wages has remained a near constant. He found out that for a dollar of wages, the corresponding production value was dollars 2.54, which is referred to as the Productivity Ratio (the variation being 1.663 per cent). Productivity Ratio varies according to each industry, but the relationship between pay roll and the production value for each industry remains a constant. For example the Productivity Ratio for typical industries in the USA is as follows: tobacco (4.726) chemicals (4.433) paper (2.711) electrical machinery (2.560) machinery (2.353) fabricated metals (2.291) furniture (2.104) textiles (1.859) etc. This relationship of pay rolls to Production

\* Managing Director, The Wesman Engineering Co. Pvt. Ltd., member of the NPC Productivity Team which visited Europe, USA and Japan in 1960.



Value exists in all competitive private enterprise regardless of the industry or the country.

The Rucker plan is the *Engineering* application of the Share of Production Principle to the individual plant and business. Productivity Ratio for any individual plant is established by a study of several past years' operation and a detailed study of approximately two years, broken down by monthly operating results. Once this Productivity Ratio for any plant is established, management has two tools for ensuring economic efficiency, namely (a) determination of scientific sale value of the plant production relative to pay roll (b) ability to measure improvement in economic productivity on the basis of which sound incentive can be established. Assuming a Productivity Ratio of 1:5, that is labour share to production value, labour would be entitled to 20 per cent of the production value. If in a given month payments to labour amount to only 15 per cent, workers would be entitled to 20 per cent of the production value. If in a given month, payments to labour

amount to only 15 per cent, workers would be entitled to another 5 per cent according to the Recker plan; and these would be distributed in the proportion of their respective earnings. The following table is illustrative:

#### ADVANTAGES OF RUCKER PLAN

It is easily understandable, and once understood makes sense to everyone concerned. It covers all categories of workmen in a plant and is not restricted or over-favourable to direct production workmen only. It eliminates the need for time and motion study or setting up of standards of work performance which are more difficult to establish in some types of manufacture than other. The unavoidable controversies which arise in setting up standards are successfully bypassed. The system is based on non-arbitrary factors which result wholly from impersonal forces of the competitive market. The system brings the interests of employees and managements into balance by the inter-play of the competitive forces affecting a particular business. Once the Productivity Ratio is determined for a particular

Title of Account		Period—I	Period—II	Period—III
1. Total Regular Payroll (a)	..	110.192	113.595	110.706
2. Productivity Ratio (Standard) (b)	..	3.728	3.728	3.728
3. Standard Production Value	..	361.166	372.321	362.851
4. Actual Prod. Value	..	408.227	404.561	441.850
5. Gain (Loss) from standard	..	+47.061	+32.240	+78.999
6. Employees Share at 31.51%	..	14.358	9.837	24.102
7. Co's share 69.49%	..	32.703	22.403	54.879
8. Employees gain per cent to Regular Payroll, line (1)	..	13.03%	8.66%	21.77%

(a) includes, shift differential, premium, overtime and fringe benefits.

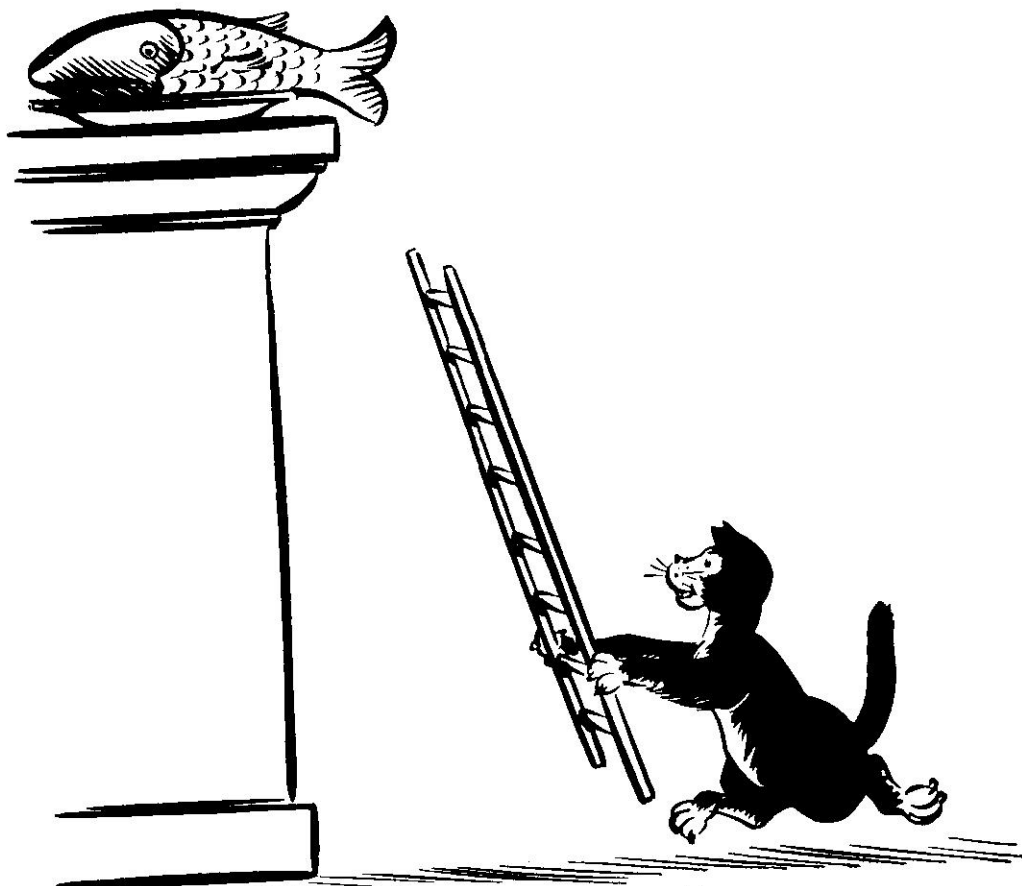


business it assures labour a constant percentage in the improvement in productivity over the standard and also assures management a constant percentage share. Rucker plan gives management a new tool for achieving higher productivity with active cooperation from employees to the mutual benefit of both.

From employee's point of view the Rucker Plan does away with causes for internal jealousies and imbalance in the earnings of less skilled over the skilled workmen. By virtue of being based in direct proportion to each workman's gross earnings including fringe benefits,

premiums, and overtime etc., it represents an equitable share to each man's effort.

A notable feature pointed out by the Foundry visited was the resultant high quality, reduction in material cost, wide scale operational improvements brought about by employee's initiative. This is easily understandable in view of the fact that all these factors go towards raising the actual production value above the standard fixed. In fact it was reported that Rucker plan was installed to offset many disadvantages which had accrued due to lower quality, high rejection and greater material wastage from the piece-rate system.



Incentive

# Incentives in Railway Workshops

## A Case Study

MM LUTHAR\*

In 1957, the Railway Board of the Government of India took a firm decision to introduce a system of payment by results in mechanical workshops of Indian Railways employed on repairs of rolling stock and manufacture of duplicates for maintenance of locomotives, carriages and wagons. This article deals with the preparatory work that was necessary to introduce incentives in a bolt and nut manufacturing section with 42 men chosen to be the first section in one of the workshops to go on incentives. The choice was influenced by the repetitive nature of the work done and the comparative ease with which it was anticipated to ensure sufficient workload and raw material for this section under incentive conditions. This section was brought under incentives with effect from October 1, 1960. The scheme is being extended to other sections and subshops till all the direct workers except, for the present, those in the service departments, like millwright shop, tool room and yard are brought under the proposed scheme of payment by results.

### Salient features

The scheme of incentives had the following salient features:

- (i) time is a yardstick for measuring work and productivity is based on that unit.
- (ii) (a) the allowed times will be computed from basic data built up by analytical method and will include allowances for general handling, gauging (where necessary) and fatigue, and an overall allowance so that a workman of average ability is enabled to earn 33-1.3% over and above his basic wages in respect of the period spent on piece work jobs.
  - (b) for the purpose of calculating the piece work profit the dearness pay and dearness allowances are to be excluded.
  - (c) instead of the actual basic pay of the employees, a standard basic wage will be assumed for each category of staff.
  - (d) ceiling limit on profits is fixed at 50% of the standard basic wages earned in respect of each piece-work job.
  - (e) hourly rates of pay of artisans for purpose of calculating piece work profit will be based on 208 working hours per month throughout the year.
- (iii) supervisors and essential indirect workers (in the shops in which piece work system is working) would participate in piece work profits; mis-

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tries will earn the average percentage of profit earned by direct workers in the particular shop; chargemen and essential indirect workers will get profit at 80% of that figure.

- (iv) the basic wages of an artisan are guaranteed irrespective of his piece work result, but losses incurred during any particular month are to be adjusted against profits made during the same month.
- (v) only that work which conforms to laid down standards and passes inspection will be paid for.
- (vi) when losses are being frequently incurred or when profits nearabout the maximum are being earned consistently by the majority of workers, the causes contributing to this result will be analysed, and defects discovered, if any, set right.
- (vii) the Administration reserves the right to vary the standard timings if improved machine tools are installed or other time saving devices are introduced and also if there is any error in computation or in printing.
- (viii) in case an operator changes the method of manufacture on his own initiative resulting in quicker production and intimates the new method to the Administration, he will be compensated by the grant of a reward equivalent to the expected saving in terms of his standard basic wages for six months if on investigation the new method is found to have the advantages claimed, and the allowed time will be revised accordingly; in cases, however, where the methods are changed by the operator resulting in quicker production, without bringing the same to the notice of the Administration, he is not entitled to this reward; in such cases times can be suitably changed by the Administration.

### Preparatory work

Successful introduction of incentives involves simultaneous preparatory work in different fields. Some important aspects of the preparatory work for introduction of the scheme of payment by results in general and in the bolt & nut section mentioned above in particular, are given below.

## WORK STUDY

### Selection & Training of Rate Fixers

When it was decided in 1957 to introduce incentives in the mechanical workshops, no trained Rate Fixers were available. It was felt that selected workshop supervisors properly trained would make good Rate Fixers particularly on account of their being keenly aware of the background and methods of working. Supervisors in various trades were selected keeping in view the following qualities which were considered essential for a Rate Fixer: (i) integrity (ii) honesty of purpose (iii) intelligence (iv) tactfulness (v) knowledge of trade (vi) resourcefulness (vii) patience with others' point of view, (viii) ability to sell new ideas.

They were then put under the charge of an experienced Rate Fixer for a period of three months. The time studies carried out by them during this period were created as exercises and were not used for arriving at allowed times to prevent errors creeping in due to inexperience and lack of sufficient knowledge of rate fixing.

### METHOD STUDY & WORK MEASUREMENT

Method studies were first carried out to improve procedures and select spots for stacking raw material. Method studies also revealed that early in the morning, time of direct workers was wasted on account of the oil burning furnaces not being ready for heating bars. To eliminate this waste of time, a furnaceman was detailed to come to work one hour earlier than the forging machine operators and to light the furnaces so as to keep them ready for heating bars when the operators came to work.

The bolt & nut manufacturing section deals with a large number of various types of bolts and it was decided in the very first instance to build up

standard data for each of the forging machines and make computation sheets to enable quick calculation of the allowed time for any job carried out on these machines being done without resorting to a new time study. Allowed times were computed for the various jobs to be done under incentive conditions and were double checked by taking time studies for a few jobs and comparing the time studied allowed time with the computed allowed time.

### JOB ANALYSIS

#### Direct workers

A job analysis was made of the work done on the various machines with a view to distribute the type of work to be done by the two categories of direct staff working on the machines: skilled and semi-skilled. The heavier and more difficult jobs were allotted to the machines on which the skilled men were required to operate and the balance of machines were distributed amongst the semi-skilled workmen to operate.

#### Indirect staff

Besides the direct workers working on the machines it is apparent that other staff would be necessary to keep the flow of production. This type of staff was divided into two categories viz :

- (i) Essential indirect staff without whose assistance it would be impossible to complete the process of manufacture. The essential indirect workers in this case were the furnacemen for lighting the furnaces and the unskilled men who had to assist in cutting the bars for forging bolts. This category of indirect workers who took part in the incentive schemes are being paid at the rate of 80% of the average percentage of earnings of direct workers in the section.
- (ii) Indirect workers: this category of staff included unskilled staff who were only employed in handling material and did not assist at any stage in the completion of the manufacturing process. This category of staff is not in

the first instance being brought under the scope of incentive schemes.

A complete analysis had to be made for working out the number of essential indirect workers who would be required by making studies of their work and making multiple activity charts to ensure their maximum utilisation.

#### Inspection organisation

In order to ensure that increase in productivity does not result in lowering of quality standards, personnel from shop floor were selected to work as inspectors. They were explained the specifications to which the work was to be inspected and provided with suitable gauges. Even though the work was heavy, 100% inspection was carried out on the bolts which were manufactured in the month preceding the introduction of incentives and as the quality of work was ensured, the inspection of bolts & nuts manufacture based on a random selection was limited to 10% of the quantity. A complete record was kept of the inspections carried out.

### PRODUCTION CONTROL ORGANISATION

#### Planning of workload

Production control essentially includes the aspects of planning and controlling the work being done in a workshop. The outturn of a section might increase to anything above 50% as a result of introduction of incentives. If the workload is fixed, the number of men in the particular section would have to be reduced and arrangements made to employ the surplus staff in other sections where either the load is excessive or by finding additional lines of production. In the case of the bolt & nut section, however, it was decided that additional work of manufacture of bolts and nuts of sizes and types other than those sizes that were being manufactured before would

be procured to employ the full strength of men on these machines. This was done partly because it was comparatively easy to obtain the load and partly for psychological reasons to ensure that discontentment did not arise as a result of a few colleagues being left out of the scope of incentives.

In the first instance a detailed analysis was made to find out what outturn could be expected from various machines under incentive conditions allowing for the men earning 33-1|3% bonus. Based on these calculations, a sufficient workload for a period of six months was ensured before starting incentives. In order to be on the safe side, no allowances were made for machine breakdowns in these calculations and in order to ensure that the idle time of men was the bare minimum, no leave reserves were provided for. It must be clarified, however, that this was done only in the preliminary stages and in order to eventually increase the machine utilisation to the maximum, sufficient staff of suitable categories was proposed to be employed on these machines.

### **Raw material**

After having worked out the details of the work which was required to be done for a minimum of six months from the date of inception of incentive schemes special steps were taken to procure raw material for the next six months to avoid any break in the working of the incentive schemes and the consequent discontentment in labour and loss in productivity.

**Sub-stores:** An investigation into the method of supply of raw material revealed that some raw material was stacked at a great distance from the point of their utilisation and some rationalisation in the stacking of raw material was done to ensure minimum lead from the point of stacking to the point of use. A sub-store was also opened and in this sub-store was kept raw

material to be used in the section for a minimum of a week's work. It was the responsibility of the Stores Department to ensure that the sub-depot was continuously fed while the shop supervisors drew the raw material only from the sub-depot and not from the main depot.

In order to enable the men to realise every day the monetary value of their day's work, men were supplied with ready reckoners, in which the amount of bonus or loss in rupees is shown for different figures of daily outturn on each machine for each size of bolt and nut. Arrangements were also made that from the morning of October 1, 1960 all staff working under incentive conditions would take in hand new orders.

### **Anticipated savings**

Before actually introducing incentives, the economics of the introduction of incentives in this section were worked out by calculating the anticipated monetary gain both to the men and the administration.

### **Establishment of rate fixed outturn and reactions of staff**

Inevitably there were doubts in the minds of the men when faced with the incentive schemes, the chief amongst them being whether the money they would get as a result of the increased outturn would be proportionate to their efforts. In this particular case the outturn being obtained before rate fixing was approximately 50% of the rate fixed outturn, which in other words meant that in order to earn any bonus they would have to increase their outturn by 50% and it was only if they went beyond the rate fixed outturn they would start earning bonus. Psychological as well as practical aspects of this cannot be underestimated and the concerned men had to be convinced that the rate fixed outturn was a fair assessment of a

day's work. This had to be done not so much by persuasion but mainly by encouraging the men to see for themselves that increasing the outturn to the rate fixed outturn did not certainly mean any undue strain on their physique and in majority of cases was mainly as a result of reduction in idle time by ensuring that the correct and sufficient raw material was made available in time and that there were no other hold-ups in their working. It must be said to the credit of the men that by and large the staff were responsive particularly when they could see for themselves that if raw material is made available they could achieve the rate fixed outturn easily, and what is more, they could turn out more than the rate fixed outturn in order to earn bonus. In some cases it was necessary to demonstrate the work by utilising men of a calibre equivalent to that of the direct operators in the section that the outturn expected was not unfair.

Well before the introduction of incentives it was necessary to find out to what extent the various individuals were either working to or were making an effort to work to allowed times. For this purpose a complete record of the outturn done by each individual on each machine was kept and a comparison made with the rate fixed timings. This record was also displayed on the machine so that the operator was aware of his shortfalls.

The incentives were introduced in the section only after it had been ascertained that the men had not only got used to turn out the rate fixed outturn but were convinced of its fairness. That was not all. The supervisors who had never had any experience of incentive conditions had to be explained their duties and responsibilities to make sure that the men got all reasonable opportunities to earn bonus. They were asked to make sure that the material was made available, that the equipment was

in proper working order, that the methods followed were as laid down in the method cards, that all reasonable facilities were given to the men to rest and refresh themselves when the need arose. The workmen were encouraged to discuss their difficulties and their doubts with supervisors and officers and were given all facilities to convince themselves of the advantages of incentive schemes to them both individually and collectively. Steps were also taken to acquaint the representatives of the staff with full details of working of the incentive schemes and their willing concurrence to the steps to be taken for making the scheme successful was ensured.

#### **Time booths & maintenance of punching clocks**

A time booth to accommodate at any time two clerks, one rate fixer, one progress supervisor besides providing room for racks to stock job cards as well as other records including the factory forms for pending & completed orders, was provided. A punching clock for recording attendance of workmen as well as for punching job cards and other cards was installed in the time booth. Since punching clocks were being introduced for the first time with the revised procedures, arrangements were made to maintain these punching clocks to avoid any disputes on account of their not running correctly.

Arrangements were made to provide one Rate Fixer during the day and one Rate Fixer during the night to check the job cards with a view to see if the actual time taken was either far in excess or far less than the allowed time to enable subsequent investigations to be taken in hand and also to make alterations in the allowed time on job cards as a result of either additional or less die setting work involved, or in any other case in which the quantum or method of work is not the same as en-



visaged in the time study or computation.

### **Training of timekeeper & accounts staff**

The new procedures of time keeping as a result of introduction of gate attendance cards, of accountal of work done and money to be paid for it also involved training of timekeepers and clerks in this sphere. Arrangements were made well in advance to train the accounts staff in the proper accountal of all documents for correctly working out the bonus earned by the men.

### **Maintenance of machine tools**

It was anticipated that as a result of increased outturn on the machines, break-downs might increase and specific millwright staff were deputed to work during day and night shifts continuously to attend to minor break-downs and also to make arrangements for dealing with major break-downs when necessary. A particular case of interest was the frequent breaking of safety studs. It was noticed that safety studs used to break every 3 or 4 hours and investigations revealed that the material used for making the safety stud was not of sufficient strength and a change in the raw material by using scrap tyre steel resulted in each safety stud lasting for approximately 100 working hours.

### **Tools and drawings**

As in the case of machine break-downs, it was apparent that an adequate supply of tooling material would have to be made available to cater for in-

creased wear and tear and to some extent increased breakages on account of the anticipated enthusiasm of the workers to earn more bonus. In the case of this particular section, a sufficient stock of dies and punching tools was ensured and arrangements were also made to match the rate of supply of tools with their anticipated demand. Similarly arrangements were also made to keep all drawings of components to be manufactured easily available to avoid any idle time as a result of their not being at hand.

### **Key statistics**

Steps were taken to make sure that the men who were brought under incentives were not made to work on day work, that no day workers were asked to perform any work on machines brought under incentives and of course in general, nowhere in the shops was similar work to that brought under incentives being done as day work. To keep a double check on this aspect the shop concerned was asked to specifically indicate these aspects in monthly statements. The following important monthly statistics concerning incentives were under constant scrutiny: (i) total idle time booked (target less than 1%) (ii) percentage of bonus earned by the direct workers in the section (target 33-1/3%) (iii) amount of bonus money paid to direct and indirect workers separately (iv) outturn from section in each month (v) machine hours lost for machine repairs (vi) idle time for want of operators (vii) absenteeism of direct workers (viii) machine hours spent on die setting, (ix) net savings as a result of rate fixing and incentives.

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"...On piecework I hear that time clock behind me go 'clock 'click, 'clicking off the minutes. But on daywork I know it's no use looking around to see what time it is, because the hands won't have moved any...."

# A Case Study in Cotton Textiles

GD SOMANI

It is impossible to over-emphasise the importance of raising productivity in our country as the Planners have pledged themselves to take every step possible to raise materially the per capita income in our country in as short a period as possible. Every industry, old and new, has therefore to take steps calculated to increase labour productivity by introducing a scheme of incentive payment and revising the wage structure with a view to encouraging the workers to materially improve the output.

**T**HE cotton textile industry has been taking steps during the last few years to revise the wage structure wherever possible and to introduce new schemes where the basis of payment would be on scientific assessment of workloads. The standardisation of wages in the Bombay Cotton Textile Industry as well as in other centres has a long history. The first positive step was taken in 1946-47 when a Scheme of Standardisation of Wages based on a minimum wage of Rs. 30/- on the pre-war price level was introduced in all the cotton mills in Greater Bombay. The standard rates of wages for different occupations were not evolved on the basis of workload, skill required etc. As a matter of fact no effort was made to assess these factors and standardisation of wages really meant standard rate of wage for a particular occupation irrespective of the fact whether the workers belonging to that occupation were under-loaded, properly loaded or overloaded in different mills. In other words, the industry had a Standardisation of Wages Scheme based on a wage

structure which was unscientific and unrelated to productivity.

Since 1947 efforts have been made by the industry to rationalise the wage structure wherever possible and particularly with regard to *rationalised occupations* or at the time of introduction of efficiency methods of working. Some progress with regard to increasing productivity was made by (i) allotting more machines to workers and (ii) introducing modernised machinery. Consequently there has been some improvement in the labour productivity during the last 10 years.

A number of mills introduced one or more of the following systems of working wherever they were able to create necessary conditions of work:

1. Allotting four ordinary looms to a weaver in place of two.
2. Allotting greater number of spindles in the ring spinning department from 450 to 900 or in some cases upto 1200 spindles per piecer.

# Incentive in TISCO<sup>1</sup>

The Tata Iron and Steel Company Limited, at Jamshedpur, India, operates a plant-wide scheme which applies to all production, maintenance and service workers in the plant, and various departmental schemes which apply to the workers in the different departments.

**I**N the case of the plant-wide scheme, the bonuses payable are based on the average of the production of a 12-month period consisting of the current month's production plus the production of the preceding 11 months. By mutual agreement, and having regard to past production, a tonnage was agreed upon at which 50 per cent above basic wages would be paid to all production workers and 40 per cent to all maintenance and service workers throughout the plant. Higher bonuses are paid for tonnages above, and lower bonuses for tonnages below this target of 61,200 tons of finished steel per month. The bonus paid to production workers is 10 per cent higher than that paid to maintenance and service workers.

The bonuses earned under the departmental schemes are in addition to the plant-wide performance bonuses. The departmental bonuses are based on the measurement of the work required to obtain the best production with an adequate number of workers. A bonus of 80 per cent above the basic wage is

paid for reaching 100 per cent performance. All machines have a capacity output which is expressed as production per hour or per shift. If they are well looked after and worked without loss of time over that allowed for unavoidable delays, the capacity output can be reached and maintained. In determining the capacity output for each of the various machines, detailed time study of all the factors influencing production is made and due allowances for permissible relaxation and personal needs are incorporated in the time standards.

On the basis of these time studies, bonus is paid on the efficiency of equipment utilisation. This bonus is referred to as the *equipment utilisation bonus* and 50 per cent above the basic wage is paid for reaching capacity output of the equipment.

The workers' capacity to earn more is dependent mainly on their own productivity, but that in comparison with modern steel works elsewhere in the world, the labour force at Jamshedpur is about three times<sup>2</sup> what it should be; allowing for the greater mechanisation of similar plants abroad and for climatic and other factors, there is, in the Company's view, obvious scope for a considerable reduction in manpower and for a corresponding increase in the workers' earning capacity without caus-

<sup>1</sup> From ILO's *Payment by Results*. For a proper perspective of TISCO operations, this article has to be read alongside Sir Jehangir Ghandy's article on *Management Responsibility for Industrial Harmony* published in this Journal (Vol 2 No 4). This will serve as a corrective to the conclusions of this study, based on pre-expansion position.

<sup>2</sup> See preceding footnote.

ing any undue strain on them. A labour utilisation bonus is therefore paid in an effort to improve this situation. This bonus amounts to 30 per cent above the basic wage for 100 per cent labour utilisation. It is computed by applying to the bonus earned for equipment utilisation a multiplying factor which varies from 1 to 1.6 in accordance with the degree of labour utilisation. For 100 per cent labour and equipment utilisation the total bonus earned, therefore, is  $1.6 \times 50 = 80$  per cent of the basic wage. This particular part of the scheme is so devised that the greater part of any savings in wages which result from the reduction of the number of men employed goes to the benefit of the remaining employees.

In the major producing units, such as the cogging mill, the sheet, bar and billet mill, and the sheet, plate and rod mills, where the efficiency of equipment utilisation is an important factor, the 80 per cent bonus above the basic wage which is payable to producing and maintenance labour is split into two parts: an equipment utilisation bonus of 50 per cent of the basic wage and a labour utilisation bonus of 30 per cent. The bonuses are awarded on the principles mentioned above. In all other units, where the turnover is dependent on manual operations or on machine operations with manual operations predominating, the bonus of 80 per cent is incorporated in a combined equipment and utilisation bonus.

The following is an account of the way in which the scheme is applied in steel melting shop No. 3 which works three continuous shifts with a standard labour force of 1,655 operating, mechanical and electrical workers.

#### Principles of payment of bonus

The bonus earned by the workers attached to individual furnaces is based on the furnace utilisation index of each furnace. The bonus earned by the

workers who are responsible for the mechanical and electrical equipment of the furnaces and accessories is based on shop performance as measured by the shop utilisation index.

#### Method of calculation

$$(a) \text{ Furnace utilisation index} = \frac{\text{total standard furnace hours}}{\text{total available furnace hours}} \times 100$$

$$(b) \text{ Shop utilisation index} = \frac{\text{total standard furnace hours in the month}}{2.7 \times 24 \times \text{number of days in the month}}$$

#### Method of awarding bonus

(a) Each furnace operating staff, including corresponding gas producer staff, is awarded a bonus according to the furnace utilisation index each month. The bonus percentage earned above basic wage is 3.2.7 times the bonus as given in the bonus table for furnace equipment utilisation.

(b) The operating staff common to all the furnaces is paid bonus on the bonus of each individual furnace and on the number of shifts.

#### Example

Furnace	Number of shifts	Bonus	Bonus $\times$ number of shifts
A	90	25	2,250
B	90	20	1,800
C	60	15	900
D	30	0	0
Total	270		4,950

The bonus earned by the common operating staff therefore =  $\frac{4,950}{270} = 18.3$

per cent of the basic wage.

(c) The staff responsible for the mechanical and electrical equipment of the steel melting shops is paid a bonus based on the shop utilisation index.

(d) Supervisors responsible for other departments in addition to the steel melting shop are paid bonus on the degree of responsibility and manpower of the department under their supervision.

# Bhadravati Bonus Scheme

S CHANNABASAPPA \*

This article gives details of the production bonus scheme of the Mysore Iron and Steel Works, Bhadravati. Starting in 1923, with a blast furnace of 60 tons daily capacity, wood distillation plant etc., it has now grown into a major producer in the public sector. Criticized in the beginning as a white elephant, it is now a profit-making firm, employing over 8,500 employees, compared to only 800 in 1923.

**I**N this study there are two important dates: 1942 and 1952. Prior to 1942 there was no Labour Act in the State of Mysore. Anxious to raise productivity, the management had introduced a quota system in its Pipe Foundry Department. Each crew was assigned a certain quota of work, after completion of which the crew could take rest, but there was no financial incentive for higher output. This quota system was abolished in 1942. Further, in this year (1941-42) an annual bonus varying from 1 to 3 months according to profits has been paid to all employees. This, however, is not an incentive, properly speaking, being paid only once a year and not related in any direct way to the efforts of employees.

Bhadravati has not found it practicable to introduce a piece-rate system based on time-study due to the opposition of the Iron and Steel Works Labourers' Association. However, it has been operating a piece-work contract system, which is rather peculiar because *tenders are invited from among employees* for the manufacture of such things as ingot moulds, railings etc., processed in general foundry, steel

foundry, pattern foundry, etc. Management supplies the materials. The employees, whose tenders are accepted, are permitted to take up the work and they can also get the assistance of other employees, whose absence is counted towards annual increments, leave, provident fund contribution etc. It has been found that the contracting employees are able to earn 3-4 times their normal wages. Further, the management is able to get the work done in 1/4 to 1/3 of the time otherwise taken and the management would be making some savings in the costs of supervision.

The production bonus which is the subject of this article, was introduced on 1st July, 1952. The entire work was classified into production, semi-production, service and non-productive departments. Generally, the departments making finished products for sale have been classified as production departments and those producing for processing in other departments have been classified as semi-production departments. Of course, there is some mix-up here, as also in the service departments, mines being included in the latter, probably on the ground that labour employed in mines is mostly contract labour. Accounts,

\* Personnel Manager, Mysore Iron & Steel Works, Bhadravati

sales, personnel, welfare and administrative officers, tenders, hospitals etc. have been classified as non-productive departments. For the earning of bonus, certain production targets were fixed on the basis of output during five years prior to 1st July, 1952. Probably it will be more precise to say that a series of targets were fixed with a bonus percentage attached to each target according to an ascending scale. In the electrical pig iron furnace, for example there was a bonus of 12% corresponding to a monthly target of 2200 long tons rising to 20% for 2750 long tons. There were corresponding targets for the blast, the furnace, pipe foundry, etc. This 12 to 20% bonus (percentage of basic wages) was applicable to production departments. The semi-production and service departments were on the other hand to be paid a bonus at the rate of 75 and 50% respectively of the average percentage of production departments taken together. Only persons with a status of superintendents and below working in production, semi-production and service departments were entitled to production bonus, which was calculated on the basis of the preceding 11 months.

The production bonus system instituted in 1952 was revised in November 1956 as a result of agreement between the management and the Mysore Iron and Steel Works Labourers' Association. The new production bonus scheme made three important changes in the whole pattern: (a) Production bonus scales were raised from 12-20 percent to 12-40 percent (b) The lowest target in electrical pig iron furnace which had a 12% production bonus was raised from 2200 to 4400 long tons, the production bonus percentage remaining the same. Workers in the same line could earn a production bonus of 40% at a target of 5720 long tons. (c) The non-productive departments were to be paid a

production bonus of 25% of the average of production departments.

The bonus actually earned upto date has been tabulated in a subsequent paragraph. Here, probably it would be worthwhile to point out certain anomalies which arise as a result of the shut-down or re-lining of certain departments like the cement plant. These anomalies detract from the incentive value of the bonus but are due to certain unavoidable factors.

The following table gives a broad idea of production bonus earned from time to time in the various departments:

	<i>Production bonus as percentage of basic pay</i>		
	1-9-52	1-11-56	1-11-59
	to 31-10-56	to 31-10-59	to 28-2-61
electrical pig iron			
furnace	7	11	14
blast furnace	6	13	5
pipe foundry	13	13	32
open hearth	15	23	31
rolling mills	12	13	31
strip & rod mills	10	24	12
ferro silicon plant	15	24	32
cement plant	3	7	15

This table is illustrative. It shows that the production bonus percentage has risen very considerably, since it was first introduced. Of course in certain cases it has fallen since 1959; but by and large it gives a picture of very general and considerable rise. The average percentage of production bonus (per month) of the production departments has except for a break in 1954-55 risen continuously from 11.6 per cent in 1952-53 to 22.9 per cent during 1960-61 on the basis of reports received till 30 September 1960. In the first year, the Bhadravati works paid less than Rs. 1 lakh (that was of course for 9 months), as the scheme started from 1st July 1952. In 1959-60, on the other hand, Bhadra-



# Incentive in The Enfield

S SANKARAN\*

Incentive Scheme was first started in The Enfield India Limited during April 1960 in a small section in sheet metal shop and is being gradually extended to various other manufacturing assembly sections. The objective of management in introducing incentive schemes is to promote better labour relations, provide more opportunities for labour to earn and at the same time increase productivity, the gains of which can be shared by workers, investors and consumers. Essentially the incentive scheme in operation is a group incentive scheme designed to suit the low productivity conditions prevailing in the country in general. To start with, the scheme is made applicable to only workers who are directly engaged in the production assembly of motor cycles, three wheelers etc. It is the intention of the management to cover gradually the supervisory personnel in the direct departments and personnel working in other departments by developing suitable plans.

## Pre-requisites

(a) *Labour relations:* An essential requirement in the administration of a sound wage incentive scheme is to have good labour-management relationship. In Enfield India various agreements have been entered into with labour union in regard to several matters including incentive. The incentive scheme developed has been discussed in detail with the labour union and an agreement has been entered into between Management and the Trade Union for the successful operation of the scheme. An important feature of the scheme is that any worker who is surplus as a result of rationalisation and introduction of incentive in any particular group/department is transferred to different group/department where the same trade is applicable (as far as possible) and will not be discharged.

(b) *Work study:* Before introduc-

ing an incentive scheme, rationalisation of the procedures, methods, tools etc., and establishing time standards to carry out the specified tasks through time study under the specified set of conditions has to be undertaken. In the Enfield India Ltd., before we undertake to introduce incentives in any group/department all the jobs/activities carried out in the group/department are subject to work study techniques. The accepted recommendations arising out of the work study conducted will be implemented in each of these groups/departments. The procedure and methods in which any task has to be carried out will be clearly specified on process sheet and the copies of such process sheets which will be adhered to on shop floor will be supplied to all persons concerned. Where machine tool operations are involved, special studies are conducted in order to determine the condition of the machine and its capability which will be one of the influencing factors in fixing time standards. These prelimina-

\* Managing Director, Enfield India, Madras

ries are carried out in each group before establishing the time standards.

### Details of the Scheme

Time standards are set either based on synthetics which have been developed for machine tool operations or by regular time study where it is not possible to develop synthetics. The time studies and fixation of standards are being carried out by industrial engineers.

The time standards so developed are made up of the time required to carry the given task at normal performance level and the relaxation, personal, interference and other allowances demanded by the nature of the job. These standards will be published at the time of introducing incentive scheme in any department and copies will be supplied to both management and trade union representatives. The standards will be valid so long as the conditions and methods under which they were fixed remain unaltered. In order to acquaint workers with the time standards, the published standards are incorporated on cards and displayed near each incentive group.

### Calculation of Incentive Bonus

Incentive bonus is calculated based on each group's performance index which is obtained by multiplying by 100 the ratio of the total output of the group in standard man-hours to the input in actual man-hours for the group.

No bonus is paid upto a performance index of 55% and any improvement above 55% will result in bonus earnings to the workers. For every one percent improvement in performance above 55%, two percent of basic wage of each worker in the group is awarded as bonus subject to a maximum of 90% bonus at 100% performance index. Bonus earnings of each individual worker will

be arrived at by the application of bonus percentage to his basic hourly rate and the number of hours he was present during the month in the incentive group/groups.

*Coverage:* Currently the incentive scheme has been extended to about 300 workers (divided into 20 groups varying from 4 to 30) roughly above 40% of the direct labour engaged in production jobs in the manufacturing/assembly departments. The intention of management is to progressively reduce the size of groups to as small size as economical. It is hoped that during the course of the year almost all the direct workers would have been brought under the scheme.

### Results

*Increase in performance:* The scheme introduced has so far enabled the workers to earn a maximum of 67% bonus which means a performance index of about 90%. Our experience shows that in order to reach a performance level of about 80%, a time limit of three to ten months is needed. But in specific cases, the time needed might be more than this also due to a number of extraneous reasons which are difficult to control.

*Effects on quality of articles produced:* With the introduction of incentives, the workers have become more quality conscious as they know that the rejected pieces will reduce the bonus earnings. We can safely say that there has been an over-all improvement in quality and the incentive has in no way brought an adverse effect.

### General Conclusions

For the success of an incentive scheme, enthusiasm and effort with proper understanding of the scheme on the part of workers and provision of all facilities by management at the right

time and place are essential. Apart from sound industrial relationship, co-operative efforts and adjustments (both physical and mental) between the various individuals who comprise the group are necessary. Due to lack of adequate education and background, it will take time for the workers to develop the necessary team spirit.

Facilities, to be afforded by management are subject to certain extraneous factors, beyond the control of the management such as (a) the availability of uniform quality of raw material of proper specifications in time (b) the availability of the various special cutting tools, gauges etc., difficult to obtain within the country at short notice and in some cases even after long notice, and (c) inability of various indigenous manufacturers who are not able to adhere to their delivery schedules etc.

However, management on their part are making the best of efforts to see

that every facility is provided to the workers at the right time with a view to help them in achieving a higher performance index by eliminating the bottle-necks. In order to make workers understand the scheme well, before the introduction of the scheme, a detailed discussion is held with all the members of the group participating in the scheme. In addition, a constant *liaison* on the shop floor is maintained to ensure that the scheme is understood by the workers and at the same time clear their doubts which might arise subsequently after working with the scheme for some period.

It is hoped that with the increased understanding of the incentive scheme by the workers and development of better skills over a period and improvement in the flow of material and facilities, the performance index of 100% will be achieved. This means an earning of 90% bonus by each worker on his basic earnings.

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"... If I come out here and be a mule for eight hours, I want something to show for it... I'd like a little bonus. But they don't give it away..." I'm out here to make money... I mind my own business and look after my job. I'm always on time. I never lay off and I don't sneak out early. The company can count on me....

# A Case Study in Incentives

YP BHASIN \*

This case study in the application of incentives in the foundry department of a company was undertaken with a view to ascertain and to establish the impact of incentives on labour productivity, absenteeism, earnings, wage structure, unit costs etc.

**T**HE foundry department in which the working of incentives was studied was semi-mechanized, non-heavy casting foundry. Prior to July 1959 the Department had in operation a Rowan scheme: the minimum weightage to be produced was 2.6 lb. per man-hour and any extra production was the worker's incentive. Thus their extra earnings were:

Total tonnage produced—minimum tonnage  
total tonnage produced

With this scheme, the workers were getting only 30-40% incentive bonus.

At the time of study, the number of workers in the foundry department was 182. Machinery and other equipment were in good order. Working conditions were normal: light was sufficient, atmosphere not stuffy, ventilation good etc. Management-labour relations were not bad. Usually, agreement with labour was amicably arrived at. Management was making good profits. Demand for their products was increasing and higher profits could be made, if the output could be increased. There were either of two alternatives: (a) increase in labour and/or equipment, with Rowan

Plan in continued operation, or (b) change over from the Rowan scheme to direct piece-rates based on time study.

This study was undertaken with a view to find the correct answer. It was found that the capacity of the foundry was sufficient to meet the demand for increased output; also the same working force if properly motivated, could in association with the existing equipment, produce the increased quantities desired.

The time study was made, standards established and a piece-rate incentive scheme was introduced, section by section, till the whole of the foundry department was working on the new incentive system. This study covers the period April 1959 to April 1960: April to June 1959 being the period preceding the introduction of the new piece-rate incentive.

The Department was divided into two categories in what were called the parent sections (machine moulding, core making, fettling). Piece-rates based on time study were settled on an individual basis. In the other sections, the piece-rate was on a group basis. Foremen were to be paid on the basis of the average earnings of their respective units. Miscellaneous workers and other

\* Industrial engineer with the NPC

helpers who took the place of absentees or did odd work in case of breakdown etc. were to be paid on the basis of average earnings of the fettling section, that is, the finishing section.

The Figure 1 printed on the following page shows the statistical working of this incentive scheme.

In this scheme, the basic rate is guaranteed, but the workers get a 100 per cent incentive over and above the basic rate, if they work up to the standard output based on time standards: that is, a standard day's work would mean double the basic wage. On this basis, piece-rate worked out as follows:

$$\begin{aligned} \text{Rate/piece} &= \frac{\text{basic rate} \times 2}{\text{standard production, day}} \\ &= \frac{\text{basic rate} \times \text{standard time (in minutes)} \times 2}{480} \end{aligned}$$

Labour productivity in this case study has been calculated by dividing the output measured in standard hours, divided by input measured in actual hours worked. Multiplying this output: input ratio (both measured in terms of time) by 100 gives us the measure of labour productivity as a percentage of the standard. When the output measured in standard hours and the input measured in actual hours would be equal, labour productivity would be hundred per cent. Figure 2 shows the actual trend in labour productivity during the period under review, incentive commencing, say, from July 1959.

It will be seen that labour productivity went on rising from round about 40 per cent of standard to a little over 70 per cent (by December 1959) when it plateaued off, the presumption being that the workers set a ceiling at this point due to the fear of rates being cut. A worker with a basic rate of Rs. 1.75 was making Rs. 4.33 in December 1955. This is just an illustration of the level of worker earnings to which we shall revert later.

Figure 3 shows that incentive

earnings had also a good and immediate effect on absenteeism, which declined from over 16 per cent just before the introduction of the new incentive to a little above 6 per cent by September 1959, apparently, when more normal, personal and seasonal factors probably came into play. Up to April 1960, the percentage of absenteeism was between 6 to 9 per cent as compared to 12 to 17 during the quarter preceding the introduction of the new incentive.

Probably the most marked result of the application of incentive was the shooting up of the earnings curve, as shown in Fig. 4 which shows the average earnings of the indirect workers also went up; the bonus in the moulding section rose as high as 178 per cent as compared to 40 per cent under the Rowan Plan. Taking both direct and indirect workers together, average earnings increased by about 50 per cent.

With an increase of 50 per cent in the total wage bill compared to a 100 per cent increase in labour productivity materials costs rising in proportion to output and overall overhead costs remaining more or less constant, a substantial reduction in unit costs has only to be taken for granted.

The only and substantial disadvantage of the new incentive plan was a considerable distortion of the wage structure with all the usual consequences with which we are familiar. Of course, the wage structure prior to the introduction of the new incentive was far from perfect, as the table on page 439 does not show correspondence between the job evaluation point score and the basic rate.

The table shows that the already present imperfections in the wage structure do not compare to the distortions that took place after the introduction of the new incentive (columns 4 and 5). A semi-skilled worker (job title 10, felt-

A CASE STUDY IN INCENTIVES

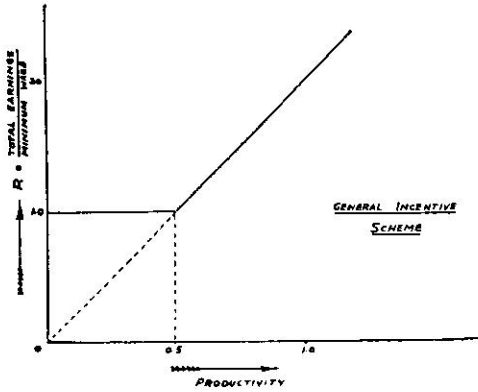


Fig (1)

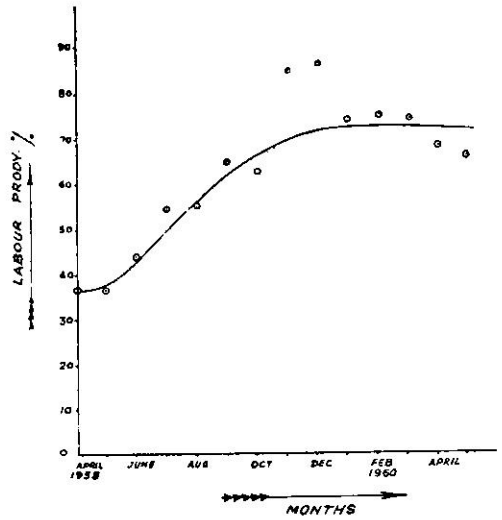


Fig (2)

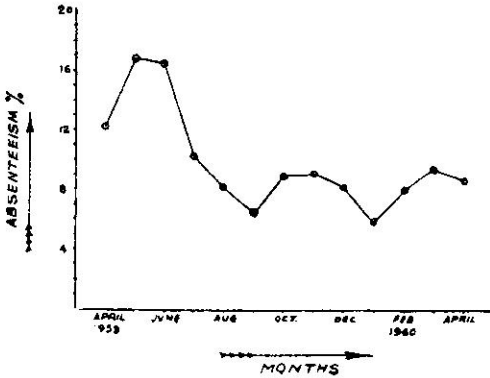


Fig (3)

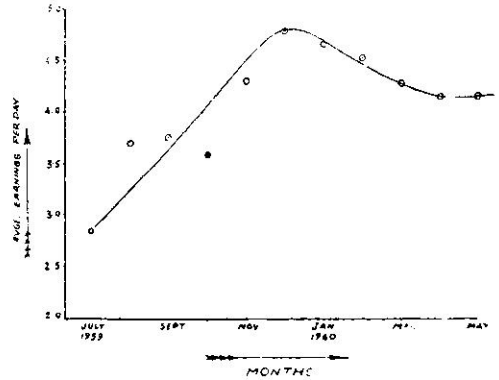


Fig (4)

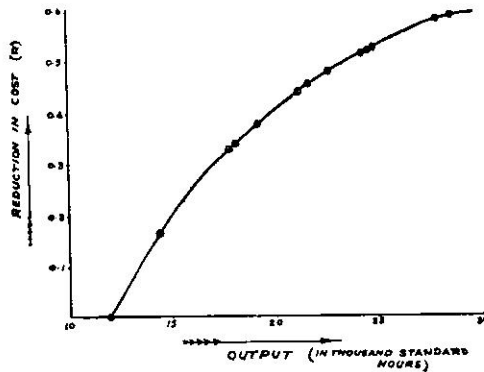


Fig (5)

(17)



## EFFECT ON JOB STRUCTURE

job title	job evaluation point score	basic rate Rs	month's earnings including bonus	average daily rate Rs
1 pouring metal .. ..	590	2.75	133.87	5.82
2 core sub-assembly .. ..	530	3.00	117.23	4.56
3 core inspection & examination .. ..	530	3.00	86.26	4.06
4 core-making supervisor .. ..	530	2.62	126.62	5.28
5 core assembly to moulding .. ..	530	2.50	89.81	3.74
6 core making turn-table .. ..	510	2.62	126.63	5.28
7 core making by-hand .. ..	510	2.25	103.62	4.32
8 cupola charging, tapping .. ..	465	2.00	105.50	4.22
9 fettling cylinder block .. ..	460	1.87	44.69	4.47
10 fettling others .. ..	460	1.87	141.50	5.66
11 cylinder head moulding .. ..	450	3.37	183.79	6.90
12 cylinder block moulding .. ..	450	3.28	202.30	7.80
13 box closing .. ..	450	1.87	82.96	3.33
14 core making machine .. ..	450	1.75	90.86	3.63
15 moulding clutch housing .. ..	450	1.75	111.62	4.30
16 knock out worker .. ..	440	1.75	76.90	3.04
17 grinding .. ..	430	1.87	140.81	5.42
18 core sand mill .. ..	420	1.87	76.75	3.07
19 moulding sand mill .. ..	420	2.00	85.80	3.30
20 core baking & drying .. ..	390	2.00	64.28	2.47

ing others) with a basic of Rs. 1.87 began to earn under incentive Rs. 5.66 per day, compared to Rs. 3.74 for a skilled job (job title 5, core assembly to moulding) or Rs. 4.06 for a supervisory job (core inspection etc., job title 3). What happened as a result of this dis-

ortion of the wage structure is not a part of the case study, here presented.

The good points of the new incentive plan may now be summarized: a substantial increase in output, labour productivity, worker earnings, alongside a considerable reduction in unit costs.

# Incentives in Sugar Industry

**T**HE Central Wage Board for the Sugar Industry, whose Report\* has just been published, was required, *inter alia* to "bear in mind the desirability of extending the system of payment by results; and in applying the system... the Board shall keep in view the need for fixing a minimum (fall-back wage) and also safeguard against over work and undue speed". The Board attempted to collect information regarding the incentive schemes, if any, in force in the sugar mills and suggestions from the employers and the employees for the introduction of such a scheme. Out of the 171 working sugar mills, 122 responded to these questions. It appears that only 19 factories have incentive scheme in some form or there is the system of paying rewards or increments for good work. 103 factories have no incentive schemes of any type. An analysis of replies shows that only 9 factories have regular incentive scheme of some sort. In one of the factories (Mawana) an incentive scheme for higher crush of cane remained in force for three years only from 1953-54 to 1955-56. In two mills, viz. Modinagar and Mansoorpur, incentive is paid on higher crush to all workers. In Raza and Buland sugar mills of Rampur, incentives are given to workers at certain stations like cane carrier, filter press, centrifugals, evaporators and heaters, and not to all workers. In Hardoi only truck drivers and cane carrier coolies are entitled to incentives at certain rates. In Plassey Nadia of West Bengal incentive bonus is given only to centrifugal mates and workers. In Sehere, Bhopal, a scheme for incentive to workers in motor transport department is in force. In Nizam I and II and in Andhra Sugars, some incentive schemes have been recently introduced for a few operations. Only six sugar mills viz. Khatauli, Mawana, Lauriya, Guraru Gaya, Pithapuram and Salarjung have made certain suggestions for incentive bonus. Khatauli suggests incentive bonus on crush, Mawana on production, Lauriya and Guraru Gaya on surplus profits, Pithapuram on attendance and Salarjung to workers in certain specified sections, depending on savings in labour charges.

In view of the peculiar features of the sugar industry where it is not possible to measure the contribution of individual workers, piece-rate system prevails only in a few units and that too in a few operations. The Indian Sugar Mills Association states "Piece-rate of wages forms a very small part of the wage system in this industry. Piece-rate wages are usually given for packing of sugar, baling and stacking of bagasse, loading and unloading of sugar, sugarcane, stores and shunting of wagons etc. where it is possible to separate and measure the individual contribution of workers". The Madhya Pradesh Sugar Mills Association does not favour the extension of piece-rate system. The central organisations of workers agree that there is little scope for piece-rate system in sugar industry.

\* Published by the Ministry of Labour and Employment, Government of India

# Case Studies from Better Ways

The British Productivity Council has in its classic publication on Better Ways (nineteen paths to higher productivity) published some case studies on Wage Incentives and Job Evaluation. These are printed below as showing significantly how advantageous these productivity techniques are to the working class.

## *For Maintenance Workers in a Paint-Works*

**A** MAINTENANCE workers' bonus scheme at Mander Brothers, Wolverhampton, paint and varnish makers, cut maintenance costs by eight per cent during the first six months, and the workers averaged 15 per cent more pay.

All maintenance work is split up into four classes: Class 1. work for which standard values have been established from time studies. Class 2. work for which values have been established from estimates. Class 3. work for which no values are available and which has to be classified on the normal daywork basis. Class 4. rectification of faulty class 1 or class 2 work resulting from workers' negligence.

All standard values for class 1 work are expressed in maintenance units (MU's). Value for class 2 work are expressed as estimated units (EU's). Both EU's and MU's are built up on the same basis as for rate-fixing in the production departments. An average operative on daywork is expected to produce 60 MU's or EU's an hour; an average operative working on bonus is expected to produce 80 such units an hour.

Weekly bonus is the average number of MU's and EU's produced per hour during the time the worker has spent on class 1 and class 2 work for the week. It is calculated as follows:

$$\frac{\text{MU's} \quad + \quad \text{EU's}}{\text{Cl. 1 hr.} + \text{Cl. 2 hrs} + \text{Cl. 4 hr.}}$$

The resultant figure is known as Bonus Rating (BR). Nothing is paid for a BR of less than 60, nor, in the interests of health and efficiency, for a BR of over 100.

Reference is next made to a separate chart showing the appropriate rate of bonus per hour according to the bonus rating. The bonus rate increases as the bonus rating rises. For instance, a BR of 65 shows a bonus of 3d an hour for class 1 and 2d an hour for class 2, while a BR of 80 gives 1s 1d an hour for class 1 and 9d for class 2.

Class 4 work counts against bonus. Faulty work has to be rectified by the operative, the works engineer judging whether the class 4 penalty is to be invoked. Class 1 work is rated at a higher level than class 2 because it is established from time studies, while class 2 work is from estimates, which means a far greater degree of accuracy for values issued under class 1. The two bonus scales are the same for all

operatives, skilled or unskilled, from the age of 18 upwards. For youths under 18 the bonus rates per hour are less.

At present the bonus is affected by a stabiliser, which has the effect of increasing the bonus of a worker with a BR less than 80, and lowering that of workers whose BR is over 80. This is to be reviewed after a trial period.

Obviously, there are many exceptions in the scheme but so far an answer has been found to them all. Allowances are made for men working with apprentices or with mates, and adjustments made for inexperienced mates. Daywork, overtime and night rates and existing merit awards are not affected.

A separate scheme is operated for five maintenance workers who are paid on an *overtime in reverse* basis. Every hour of overtime means lost bonus; the earlier they finish the greater their bonus. Although the men get lower bonuses for overtime they still receive the usual overtime pay, and exceptions are made for special circumstances.

It may seem paradoxical that the firm's maintenance costs have gone down although wages are up. This is because quality has improved and productivity increased. Men who retire need not be replaced. No worker has been dismissed.

#### *In a printing composing room*

Krisson Ltd, printers, of Fouberts Place, London, have developed an effective individual incentive bonus scheme for compositors engaged in a very wide variety of typesetting work. Bonus pay averaged £5 a fortnight for good workers.

The basis of the scheme is a standard work unit, representing the amount of work which can be completed in three minutes—the time taken to hand-set an average line of type. This work

unit was calculated after trials with three operatives who between them typeset 287 different types of job, working at a good speed but without undue exertion. Each job was timed and the total times were divided to give an average figure.

This worked out at 28 units an hour. It was decided to pay bonus to any worker setting more than 20 units an hour, at the rate of 2d a unit, plus 7s 6d *merit money* if he set over 27 units hourly for a working period of 36 hours. Thirty-six hours was reckoned as an actual working week—exclusive of tea-breaks etc.

During this 36-hour period, therefore, a compositor is required to set 720 units before bonus is paid. An average worker can set 972 units and earn a bonus of £2 2s. A good worker can set 1080 units, earning £3 bonus plus merit money.

A unit is regarded as equal in value to one line of type, irrespective of its length, or to a block or to five brass rules. On some jobs the lines may be very long and on others short. Type-faces may vary from 36-point to 6-point. This miscellaneous collection of typesetting work embodies jobs of all kinds.

Bonus is assessed and paid fortnightly. Over this period the value of the work is quite stable, as the law of averages has ample time to operate, ensuring a fair workload.

No job is valued at less than five units, so that adequate allowance is made for the initial set-up of chase and other preliminary work.

No limit is set to possible earnings, and however high these may be, basic rates are never affected. Each worker has his own bonus card, on which the start and finish of a job is registered by

time clock. Units are marked, together with a description of the job. By comparing work units registered with the number required it is simple to calculate bonus.

The scheme is kept flexible by frequent review of the representative collection of work upon which it is based. The collection can be inspected by members of the staff at any time. Six monthly reviews are held, a new collection of work being made and timed. Re-timing is not used as a means of rate-cutting, but of keeping the scheme uptodate. Every worker has the right to appeal.

A rigid system of inspection was introduced to ensure that quality would not suffer.

In the binding room, where the work is of a more repetitive nature, for every new job output is assessed over a ten-minute period and then doubled to provide the basic rate for an hour's work. This 20 minutes' output is then used as the basic rate for an hour, and any output over this earns a bonus. A good worker can, therefore, treble the basic rate for 60 minutes' work and earn one shilling an hour bonus. Slower workers can double the basic rate and earn six pence an hour extra.

#### *In a Soapworks*

A well-tried and proved system of Job Evaluation is the basis of the wage structure for over 1,000 process and ancillary workers at Newcastle, Manchester and London factories of Thomas Hedley & Co Ltd, manufacturers of soap, synthetic detergents and edible fats. The system covers operators and manual workers.

As in all evaluation schemes, the purpose is to determine the relative importance of various jobs performed in the plant by the objective measurement

of their differentials. This scheme enables jobs to be graded in order of their value to the company and paid according to the grade into which they fall. Workers are classified in three operative grades, plus a fourth for general labouring. There is a minimum and a maximum rate for each grade, and advancement from minimum to maximum is based on recommendation by departmental managers, who review each employee's progress at regular intervals.

When a new job requires to be graded, or an old one re-graded because of changes in the work, the departmental manager takes the first step by providing a precise and factual description of the job, which is shown to the employee concerned to ensure that nothing is overlooked. Broad statement such as *a very responsible job* or *involves heavy manual labour* are not used. The description must clarify the exact requirements and duties of the job as they relate to the ten evaluation factors. These evaluation factors are:

1. *Time to learn:* This means the whole period of instruction until a new operative can do the job without help, assuming no previous knowledge. Time needed to attain high proficiency is not considered except in the case of machine-paced production lines.
2. *Physical coordination and dexterity:* Need for muscular skill or coordination, smoothness and accuracy of movements required, and agility.
3. *Complexity of job:* Number and relative difficulty of tasks in the job; number of different tasks to be done concurrently.
4. *Possibility of loss inside factory:* Probability and extent of damage to equipment; danger to personnel or loss of materials due to error in operation.
5. *Quality requirement:* The effect of an error in operation on customer's goodwill; effect of the job on the quality of the finished product. Could a mistake on the job cause dissatisfaction to users?
6. *Mentality required:* Intelligence needed to do the job, proportional to knowledge

- of special equipment, materials or processes.
7. *Possibility of operating emergencies:* Extent to which the job might pose problems calling for quick thinking, resources or ingenuity.
  8. *Working conditions:* Dirt, oil, odours, dust, heat, cold, temperature variation, light, exposure to weather.
  9. *Concentration required:* Need for sustained alertness on the job, continued mental concentration or mental direction of physical effort.
  10. *Physical effort required:* Amount of physical effort and continuity of its application on the job.

Copies of the job description are then circulated to a committee of five members of supervision who know the job well: normally, the works superintendent, the department manager, his supervisor, the personnel supervisor and the industrial engineer. Working independently, the committee rates the job on a scale from 10 to 100 on each of the ten factors.

To achieve consistency a descriptive sheet is provided indicating what level of activity is implied at different points on the scale. For example, a job involving little manual work, such as inspection, would probably be rated at 10 or 20 on the physical effort factor, whilst a coal trimmer would be rated at 90 or 100; the ratings would probably be reversed, however, on the quality requirement factor.

The committee considers any discrepancies in the scores awarded. A spread of 20 points on each factor is acceptable, but wider divergencies suggest that some aspect of the job has been overlooked or improperly understood. Further detailed study usually results in close agreement being reached. Where unanimity is not reached, however, the members' final ratings are averaged.

The final evaluation is obtained by adding the average ratings for each of the ten factors. To this is added a basic

allowance of 500 points. The theory behind this allowance is that it recognises minimum physical and mental requirements for employment with the company. A maximum score, therefore, would be 1,500 points, although in practice, for obvious reasons, 1,200 is rarely exceeded. The cut-off limits used to determine grades are—upto 850 labouring; 850 to 1,000 grade three; 1,000 to 1,100 grade two; over 1,100 grade one. The system is regarded as highly satisfactory by management and workers.

The actual level of the wage rates for each grade is determined by a technique known as the *wage survey*. Periodically an exchange of information on wage rates is made with other companies in the area engaged on comparable types of work. The general level of wages is based on the results of this survey.

Many process and ancillary workers in the Hedley factories also have the advantage of a time bonus scheme first introduced in 1932. This means payment in full for work done in excess of standards which have been carefully established by job study. Ten-and-a-half standard hours of work turned out in an eight-and-a-half clock-hour day, for example, entitle the employee to two hours' bonus at the same rate. Full clock-hours are paid regardless of bonus, the latter being in addition to basic rates of pay. For manual workers, bonus depends on the actual amount of work done, but bonus plans for operatives usually depend partly on manual work and partly on adherence to quality and cost requirements.

A pre-requisite for the successful operation of these policies is that the employees concerned should know all about them. To ensure this, each man or woman recruit takes part in an induction course at which Job Evaluation and the company's wage policy are explained and illustrated with films.



*Throughout the divisions of a multi-factory organisation*

Simplicity is the keynote of a job appraisal method devised by ICI Ltd and successfully applied to general worker jobs throughout the organisation's eleven divisions.

The method is based on the work of a headquarters committee set up in 1945 to examine the wages structure of the company. It embodies the advantages of many known methods, including a form of points rating introduced at the company's Billingham factory before the war. One of the major differences between the ICI scheme and many others is absence of *ceiling* figures.

There are four main heads—mental requirements, physical requirements, acquired skills and knowledge, working conditions. Their number was deliberately limited to avoid confusion of thought through overlapping. There are, of course, subheads and detailed descriptions of factor to be considered under each main head, but such elaboration is solely for the guidance of the assessors who have to give a comprehensive rating of each main head. Assessments are expressed in terms of points in proportion to the values of jobs above the datum line. This datum is defined by reference to jobs performed by basic labourers.

The rating of a job under each main head is obtained by averaging the individual ratings of a number of assessors who have an intimate knowledge of the job. Generally, a team of assessors includes the works engineer, work study officer, labour officer and a chemist. When the average rating has been agreed, weighting factors which are common throughout the company are applied to the points under each main head.

The standard method of assessment stipulates that it is the job and not the man who is being rated. The six steps in the process of making an assessment are common to most appraisal or evaluation systems: study the job, discuss the study, rank and rate, disclose and discuss ratings, revise the ratings, complete the marking.

An impressive feature of the ICI scheme is the all-embracing and personal way in which the embryo plan fanned out from London to all divisions to take in opinion at local levels.

The original standards which determine the weighting factors were set by a team of seven interdivisional assessors. Teams of divisional assessors were appointed to collaborate in setting interdivisional standards. Finally, assessors were appointed in each factory or location to cooperate with the divisional assessors.

In practice the break-down worked as follows: a sufficient number of jobs were selected by the division management to give under each mainhead as wide a range of markings as possible. From this list the interdivisional assessors selected approximately 20 jobs for detailed examination. This involved a study of the written description of the job and direct observation, with the appropriate officials in attendance to answer questions and discuss details. Care was taken not only to see all the current features of the job under normal running conditions but also to elucidate other features calling for special requirements under one or more of the main heads; in this task the assessors worked jointly.

First markings were reconsidered and modified as the range of comparison between jobs studied became more comprehensive. To get the scale of relative values started, the interdivisional

assessors selected under each main head a job which they considered merited a very high marking under the main head. To each of these examples they allotted 100 points although it was recognised that some jobs might need above 100 later.

When it was certain that all relevant job facts were understood, ratings were made individually by each assessor. After comparisons and further discussion to make sure no point had been overlooked and when each assessor was finally satisfied with his own ratings for a job under each main head, the weighting factors were applied, marks being added to give the total for the job.

The ICI scale for the conversion of

marks to money is in half penny units providing a differential rate per hour above the basic minimum hourly rate. There is no differential for a weighting upto and including four marks. Five to 14 marks equal  $\frac{3}{4}$ d; 15 to 24,  $1\frac{1}{4}$ d; 25 to 34, 2d; 35 to 44,  $2\frac{1}{2}$ d—and so on. The wage structure for all the many thousands of general workers employed by ICI (except in the Metals Division) is based on this single system.

The scheme as applied to women and juveniles has one modification. The datum line for Main head B—Physical Requirements—is lower than that set for men. Before the scheme was applied anywhere in the ICI group it was discussed in detail with trades unions involved.

\* \* \*

With great misgivings, the foreman had a control with a dial marked "low, medium, fast" installed at the booth of the group leader; she could now adjust the speed of the belt anywhere between the lower and upper limits that the engineers had set. The girls were delighted, and spent many lunch hours deciding how the speed of the belt should be varied from hour to hour throughout the day.

# Productivity and Economic Incentives

Based on research sponsored by the Department of Scientific and Industrial Research, Medical Research Council and Joint Committee on Human Relations, a number of case studies were published in **PRODUCTIVITY AND ECONOMIC INCENTIVES\***. A summary of these case studies, along with their methodology and broad conclusions have been printed below.

**W**HETHER as end or means, money is wanted, and most workers appear unwilling to work more productively without the economic appeal. Certainly we found few attempts to increase the efficiency of labour by work study that did not include some scheme of economic incentives. To disentangle multiple causation, industrial operations were studied as case-histories where, as far as possible, economic incentive schemes were introduced apart from changes in other possible factors. As a first line we obtained case-histories where output and earnings had been recorded before and after the introduction of economic incentives when no other major changes had occurred, and where it was possible to interview workers individually. A total of fifteen different operations were found suitable for forming such well documented case-histories in five factories involving about 130 workers, of whom 118 were interviewed. The investigation was intensive and concentrated on the output of individuals or small teams where comparative turnover, absence or accident rates would not be significant, but the turnover was in all cases small and few workers changed jobs in the course of the study.

The detailed case-histories thus bas-

ed on measurable data provided evidence of success in the use of economic incentives, however much doubt there may be occasionally about the actual size of the improvement in productivity. From the diversity of examples there emerges a common pattern of change. Productivity improved considerably more than usually expected; earnings per man-hour increased; direct wage-cost per unit output decreased. The change in output a worker was found to vary among the different operations all the way from an increase of 7.5 per cent to one of +291 per cent, about half the cases falling between +43 per cent and +76 per cent. Such increases in output, most of them large, from our first-line case-histories, and from additional evidence, were found not to be just a *flash in the pan*, but were sustained over the whole period of study. Moreover, the individual differences in productivity change suggest the absence of many concerted or traditional restriction of output. The main reason for the wide variation in the effect of incentives applied to the several operations is probably the difference in the original working tempo. *Many jobs appeared to be performed extremely slowly on the time-rates paid previously to introducing incentives.*

The economic incentive schemes which were studied did not include the

\* George Allen & Unwin Ltd., London.

premium bonus either of the Rowan or Halsey formula. Earlier research had found these degressive schemes (where piece-rates fall as output increases) to lead to output restriction and they appear to have gone out of fashion. Nor did we study merit-rating schemes, the effects of which must vary so greatly with the character of the merit-rates and the criteria of merit which they use.

Increase in earnings on all the fifteen operations varied from 12 to 49 per cent with over half between 18 and 38 per cent. *Thus earnings increased, in general, less than output* and the direct cost of labour fell. With increased output per machine, overhead costs must also have fallen.

If increases in the productivity of labour can be regarded as primary effects of the use of economic incentives, secondary effects can be seen in the opportunities they gave to deploy labour and to reduce the amount of overtime that was needed to produce a given volume of output with a given labour force. In one notable example of deployment the labour force was reduced to 40 per cent of its former size and the deployed workers were used to relieve shortages of labour on other jobs. In operations where the labour force was not reduced, there was a tendency both to raise total output and to reduce the number of man-hours worked.

The examples of the effects of economic incentives suffer in usefulness to some extent in that *we found no sufficiently detailed case of unsuccessful attempts to raise productivity by such means*, but the range of success covered by the survey helps to remedy the defect. From the near failure of operation E to the extreme success of operation D.3 it becomes obvious that attention must be paid to previous and existing conditions before effective changes can be expected, and that existing con-

ditions include the attitudes of the workers involved. One of the objects of the survey was to relate the experience of the workers to the results obtained in order to focus attention on the factors which appeared to be important to them.

The interview programme was specifically designed to test the effect on worker's attitudes of the introduction of incentive schemes. Each interview was conducted informally and privately at the workplace. Answers to questions given in the same sense by a majority of the 118 workers interviewed may be summarized. Sixty-five were satisfied or partially satisfied, the cause of dissatisfaction being that fluctuations in bonus were disliked. Eighty-one of those interviewed thought there was less need for work supervision after the application of incentives than before. Forty-seven expressed opposition to the use of incentives before the change, but seventy-one of those interviewed after experience of the systems had very little criticism to make: they liked the method of earning bonus and thought the bonus was fair.

In a few cases there was a wish to work on time-rates in order to avoid incentive disadvantages, but most people were prepared to accept the disadvantages so long as the bonus was satisfactory. On the one hand, satisfaction was expressed with the level of earnings associated with the various incentive systems even though increase in earnings was proportionately less than increase in output. There was an associated feeling of satisfaction that the systems gave the workers some control over the level of earnings. There was also an apparent increase in job-satisfaction and an improvement in relationship with supervisors. On the other hand there was a tendency to be dissatisfied with the amount of overtime worked. Some workers wanted more when less was available than

there had been before the change. Other workers wanted less overtime than before the change, because more money was being earned during normal hours. Dissatisfaction was also expressed when there were large fluctuations in pay after the change, when there was uncertainty about the effectiveness of price guarantees or agreements about redundancy, and also when the firm and the union had combined to impose economic incentives against the will of the people on the job. *Nearly all the people interviewed were conscious of an increase in tension in personal relation after incentives were introduced.*

The form of the measure of workers' reactions or attitudes was clearly less

**Distribution of Workers According to Change in Earnings and Output**

Earnings Change	Output Change			Total of Workers
	67% & over	34-66 %	0-33 %	
41% and over	29	16	0	45
21 to 40	12	12	3	27
0 to 20	9	1	6	16
Total of Workers	50	29	9	88

exact than the measures of *outward* changes in earnings and output, and the method used in correlating the latter was inappropriate for testing the relationship between attitude and these outward results. This relationship was, instead, tested in *contingency* tables and for this reason the earnings and output relationship must also be tested in this way. In the above contingency table the eighty-eight items forming the *total of workers* fall short of the total of 118 workers interviewed mainly because of absence of data on earnings and uncertainty as to

exact output change which had been expressed in the work-study engineer standard minutes.

There is a clear trend for the large proportion of workers with the higher output changes (e.g. twenty nine out of fifty with +67 per cent output) to form a similarly large proportion of workers with the higher earnings changes (e.g. twenty-nine out of forty-five with +41 per cent earnings). The coefficient of contingency was 0.32, thus agreeing with the more exact coefficient of correlation, and was statistically significant.

Before proceeding to test the associations between the various reaction or attitude factors and output and earnings, the factors themselves were associated in contingency tables. Associating economic with psychological and sociological factors, no significant relationship was found between any pair.

The association between satisfaction after introduction of incentive and increase in productivity was found statistically not significant. It might have been supposed that with more output, and presumably greater effort and fatigue, the correlation between a worker's change in output and in his satisfaction would have been negative; the more work, the less satisfaction. This proved not to be so. With the higher productivity there was, in fact, on average a slightly, though not significantly, greater satisfaction. The association between satisfaction after the introduction of the incentive and change in earnings was found positive and statistically significant.

The analysis as a whole, however, makes it clear that *the most consistent source of satisfaction with incentive systems that have been studied is the workers' control over and increase in earnings that goes with them.* Other aspects, except that of greater freedom from supervision, produced appreciable dissatisfaction with the work situation.

### Additional evidence on incentive effect

Though workers' reactions to economic incentives could not be so rigorously analysed, the same full record of output, earnings and interviews was found possible for twenty-one workers in one laundry and also twenty-one sales assistants grouped in the shops of one Co-operative Society. The increase of output per worker in the separate departments of the laundry ranged, after one to three years' use of the incentive, from +50 to +370 per cent. The average for the whole laundry was an increase of 100 per cent in output per worker, of 23 per cent in earnings per worker and a fall in cost per unit of output of 27 per cent. In the cooperative grocery and dry-goods branches considerable savings were effected in use of manpower; earnings per salesman rose on average by 18 per cent with a range from 10 to 35 per cent; and wage-cost per unit of sales value fell by 24 per cent with a range of 4.8 to 35 per cent. In the course of the interviews two-thirds of the laundry workers expressed a liking for the incentive scheme adopted. Specific uses were found on which to spend the additional earnings and *no one wanted to go back to the days of the time-rate*. The shop assistants on group bonus were found to be opposed to taking on new hands if not really necessary and thus identified their own and the national interest.

In addition to the full *first-line* information on the operations in factories where conditions other than the incentive were unchanged and interviews granted, data were obtained on eleven operations in three factories where some smaller change occurred (and in one of the original five factories) without the chance of interviewing any of the sixty operators involved. After the incentives were introduced the increase on these individual opera-

tions of output and of earnings was of much the same range (about 60 and 20 per cent) as the *first-line* operations. Estimates for some whole departments of factories appeared to agree with the extent of these changes.

Where production was standardized and, associated with chemical processes or conveyor belts, almost automatic, instances were found where high time-rates dependent on a fixed output quota were effective; but the full effect in keeping up high productivity required accurate recording of output and strict supervision and discipline.

The most important and interesting results on output and earnings, without interview, were, however, obtained from services such as housing maintenance, factory painters and delivery men, where, as in shop sales, piece-rates have not hitherto been usual. Here we found on piece-rates a saving in manpower of 25 to 33 per cent: an important contribution to the national economy at times of full employment. Except for the skilled crafts the applicability of individual economic incentive schemes, and the degree of the success when applied, appeared greater than recent writers on the subject, with their stress on group relations, have led us to suppose.

### Conditions for success of economic incentives: the question of procedure

The conditions of maximum success for incentive schemes in increasing productivity may be summed up as conditions of the original situation; conditions inherent in the scheme itself; and conditions of the procedure and organisation of the scheme.

Productivity will increase most when originally, before the incentive was introduced, a low rate of output existed; on repetitive semi-skilled work rather than on skilled work; and where workers want money for some specific



purchase and have a high material aspiration generally.

Undoubtedly, the procedure and the personalities concerned may make or mar an incentive scheme. The method of approaching men and women with the idea of a change to an economic incentive system was found to be much the same in all our case-histories. There was an effort, more or less elaborate, to consult workers and their representatives about the proposal before any definite steps were taken to introduce a specific scheme. In the examples drawn from manufacturing industry the responsibility for introducing changes lay either on consultants specially called in or on a workstudy department set up for the purpose. In laundry A the introduction was the responsibility of the manager. In the cooperation shops the introduction and running of the systems was very much a matter of the departments concerned, with little reference to outside experience.

An approach that was almost standard was found in the factories and in laundry A. The first step was to persuade workers who were to be directly affected by proposed changes to consider the proposal. In every case the first step had the backing of the official trade union representative and in some cases the official had been consulted before the workers were approached. If opposition was raised the next step was more intensive persuasion and exhortation by both management and trade union officials. At some stage there was a voting procedure to discover whether there was a majority in favour

of acceptance. If this failed a number of solutions were possible. One was to reduce the scale of persuasion and work on a smaller group, usually of less favourably placed workers, until it agreed to give the scheme a trial. At this stage the work-study engineers were usually generous with their rates in order to ensure that earnings increased sufficiently to tempt other workers to try the scheme. This practice usually also led to difficulties with the wage-structure some time later, when workers who were late in accepting incentives observed that there were disparities in earning opportunities between jobs.

Another solution when persuasion failed was to confront workers with an ultimatum which threatened to impose unfavourable conditions if the system was not tried. But whatever the method of persuasion, if the workers concerned are not convinced that they are getting fair deal then there will be trouble at some stage.

In short, our research found that though large increases in productivity—larger than is commonly supposed—can be obtained by introducing payment by result based on work study this introduction bristles with problems in industrial democracy, communication and group psychology. Engineers, business managers and practical economists can certainly hope greatly to increase the national product by economic incentives but only if they take account of the social climate, particularly its liability to storms.

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"I'm more friendly with the people working for me now than I was before. Before the Plan came in, people didn't want to work and you had to keep after them all the time and that made the foreman a son-of-a.... Now they have some interest in working so you don't have to push them so much."

# Sample Interview

The Department of Scientific and Industrial Research of the Birmingham University arranged a number of sample interviews with workers in order to ascertain their attitudes and reactions to Incentive. The purpose was to find out what *the effects of bonus schemes are on output, earnings and worker welfare generally*. Below is one of these sample interviews. 'I' stands for interviewer and 'D' for operator, who is in this case a working chargehand, shop steward and relief man. Large parts of the conversation have had to be telescoped for reasons of space.

D Physically, I think we do put more into it than we ever did before, like...naturally we are a little tired when we go home, because I think we concentrate more when we are on the job. We are only working eight hours just the same as we used to do, but in those eight hours we actually concentrate 100 per cent. For instance, I'd say 90 per cent of us do; I'm not saying everybody does...anyway, *I don't think we were working, to be quite honest, before the incentives came into being*...Financially well, there is no doubt about it, we are far better off...this week, just roughly speaking, I worked twelve hours overtime and I've got £18 to pick up, which is quite a lot of money, and £4 10s 0d of that is incentive earnings, which is a great deal of money. Well, personally speaking, *I've got a home that my father's never had*. I'm not in debt. I've television, radio...incentives have helped to get this. And of course I have other plans, when I...as I save up...

But, incentives, there's a lot for and against...there's a big demand now...while we are on this output...on this particularly peak output...we do wonderfully well...lower output...brings problems...people start grumbling... "£4 last week; how is it I only got £2 this week?" They don't appreciate the fact that they are still a lot better off than they were before the incentives came into being. Now... you will find in this factory that you probably will find in a lot of factories: we talk about each other's docket. But I think it's a

good thing. Some people, of course, never divulge what they earn, but here we boast about what we earn... I think it helps the incentive scheme an awful lot...

I As you say, overtime should finish when the incentive starts. The thing is, of course, it hasn't finished in this case...?

D 'No... that, I think why it hasn't finished is possibly because Planning Department haven't got on top of their own job yet, or Planning and Buying Department, or Selling Department I should say... At one time I used to think... not think, but look forward to a bit of overtime... Now if there wasn't any overtime, well, I personally, would say... very good.

I 'You don't really want it?'

D 'I wouldn't well, I'd never turn it down, you see, but I don't particularly look forward to doing it. I mean, a five-day week suits me admirably now; I'm quite happy with it...Now, I've had a number of shifts working for me, since I've been in this department, and this particular shift...I'd like to mention them they were all very keen on overtime; before incentives came into being, they'd work at the drop of a hat...But now, quite often I have to beg them...The idea was, of course, to get more work done, packed into forty-two hours, than was being packed into sixty hours, if you like, just for a figure. And, of course, people who were not really included in the incentive scheme—it's found very difficult to include them in incentive schemes—are

people like storekeepers, who are only handing out things all day, if you like, and a certain amount of greasers and as I say fitters' mates, electricians' mates, and all the craftsmen's mates generally. Well, these people have found it very hard, because even the craftsmen's overtime has been cut down because they've found more time to be able to do repairs during the week, whereas it always seemed to be done at week-ends, and, of course, these people are definitely feeling the pinch against productivity. Of course, the answer to this, in my opinion, is to get them on productivity. Find them a way of doing things. Get them into the department. If they haven't got enough work where they are, well, let them do the job they are doing, and something else. That will create problems with these people, of course that's...there you are.'

I 'I think you'd agree that the storemen are doing more work because you are doing more work; for instance they hand more material out.'

D 'Yes, but I think if you remember what I said, like, around the beginning of this interview, that *before incentives I didn't think we were doing a fair day's work*, in other words. So what it boils down to now is that the storeman, if you like, is merely doing a fair day's work.

I "Without any change in pay."

D 'Really, I think...well, of course, change in pay, well, that's what I said, like, you'll have to arrange for them to be introduced into the incentive scheme, whereby he's got other jobs to do with his storekeeping, if you like, or greasing, or...'

I 'It is, in fact, one of industry's big problems to include all these people.'

D 'Yes, yes, well of course, the day will come in this factory whereby they will have what I think will be merely a stable staff... I suppose they must be carrying a surplus staff at the moment... it does happen now that they are not taking many people on, only in new plants which are springing up.

I That suggests another problem now. When the bonus scheme was first suggested, was there any talk amongst the men about possible redundancy?'

D Oh, yes, yes. Of course, we were guaranteed that. Our trade union, of course, naturally, looked into it very carefully... Well, of course, the firm gave us this guarantee, and a very good guarantee I think, that

*nobody would be sacked because of productivity...the firm was prepared to carry a certain staff for a number of years, until eventually they whittled down to just the amount they wanted.*

I It seems a fair arrangement.

D Yes, yes, I suppose it is really. The only unfair side of it would be if there was a lot of unemployment outside the gates, like, people were trying to get in. Well, of course, at the moment they're not. But if ever conscription stopped...

I Has there been any great change on the job? I mean, comparing past with present.

D No, no. No great change at all. Changes in personnel that's all... The job's just the same actually... The method is set and we work to that method. We cut corners off...

I I see, you cut the corners off.

D We make it easier. They say that we should walk from A to B, B to C and so on all the time all day doing the little duties, various things during this perambulation round, but, of course, we cut a corner off, just now and again we walk straight over from A to C, just now and again like, and that all saves time, occasionally. But...the job hasn't altered at all, it is still the same. I should think that the job is better for productivity, from the firm's point of view. *I think the machines are in better condition now than they ever were...* That's not because the men look after them. They don't look after them. It's just that they tend to get the fitter there and get him away quicker. They'll see a job coming up, and they'll try and anticipate how long it's going to be off.

I Apart from the changed attitude to the machine working, have you noticed any change in the men themselves since the bonus scheme began?...That is, did they, for instance, get fed up with the machines before the bonus schemes; did they tend to lose time on that account?'

D Oh, I see what you mean. Well it was...*before the bonus scheme started, machines would be off for nothing. That was the attitude, they'd knock the machine off for anything at all; they'd just, well, they'd leave it off an hour and think nothing of it, like...well, I've seen machines off for hours and hours and hours...* But now the idea is to get the engineer on the running order. And they do, they look and see if they can keep the machine running for the

whole shift, like. Because they'll say, "Only an hour and a half to go. I'll make last the whole shift, it'll last out." And this often tends to bad work, you know. This has got to be watched very much, like...productivity scheme has put a clause in about that, but, luckily enough, we haven't been penalised on this score yet...*most of them, they'll keep a machine going if they've got to tie it together with string, like. That's because of the money.*

I Now, on the money side, continuing on work directly, it is nearly always the case on bonus scheme that some jobs pay better than others. Is that the case on your job?

D ...Some jobs. Well, of course...each of my operators has two machines to work, as you know. And, if one machine is broken down he can earn bonus on the other machine...But other people down the room, like those winders down the bottom end, of course, if their machine is off, they are earning nothing. They've only got the one machine. We were the first line of men to be put on productivity... they used us as a shop window, a little. They were a little lax here and there, which, if ever the occasion arises whereby they introduce just a small new method of working, and they decide, well, that is it, we can time these people again, I think that they would tighten up a great deal.

I Do the men on the job think that?

D Oh yes, they are quite sure of it. They are quite sure of that in their own minds. But they are very careful, I might tell you, about this matter.

I And do you find that the men...there are five presses there...do they work as a

group? Do you think... I mean, do they regard themselves as a group?

D Oh yes, yes. Even though they are quite individual as far as earnings go. They of course, those people control my earnings, you can see that. They control my earnings, so I control them, ha, ha. Well, we have a service operator, and of course, they control his earnings, too. So he sees it that they are supplied, and well supplied.

I With regard to materials, it is very thin tin plate, and they use protective clothes. Now, does that protect them fully?

D Oh, good grief, no, no. Actually, I dare say that if I could design a glove, suitable with all the qualities needed for the job, I could make quite a bit of money out of it, because they've spent pounds and pounds and pounds on this business and they just don't get anywhere at all.

I And the men themselves, I suppose they do suffer some damage?

D Oh, they get an enormous amount of cuts. Yes, yes.

I Does it mean much loss of time?

D They don't lose time.

I You mean...Do they disregard cuts?

D Small cuts they do tend to disregard; big cuts which they do get now and again, you'll always find that if a man says, I am going to the surgery, either myself or the service operator will immediately take over off him and he hasn't lost any time at all, and we haven't lost any time, that's the sort of bonus that's on.

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"...Man is naturally an active animal who is happier when he is doing something than when he is just standing around and doing nothing... complete idleness is not rewarding at all and... an unnaturally slow pace can be fatiguing..."

Prof. William Foote Whyte

# The Incentive Royal

G RAMANUJAM\*

We live in a utilitarian society. It is therefore natural for us to undertake those activities, which have useful results, direct or indirect, immediate or ultimate, in a material sense. Incentive is thus in-built in human nature, for man has to be motivated to act. An external incentive presupposes that individuals are unlikely to act on the lines desired or to the extent expected, except through the stimulus offered by appropriate incentives. It assumes a certain amount of indifference or reluctance or even opposition from individuals or groups, to overcome which incentives are prescribed. There is thus a presumption that people are by nature inclined to be lazy or indifferent and will not come forward to do their best, unless they are either teased or tempted to do so and such goading and coaxing appear to be understood as *incentives*.

**I**N a society, based on enlightened self-interest where a man is inclined to do his best in his own interest, it is obvious that incentives in the sense in which modern industrial engineers understand them would be superfluous. If, therefore, it is found that incentives are necessary in any particular project to enable a section of the people engaged in it to give their best, it means that left to themselves, the individuals concerned will not take interest in the project; and they will have to be goaded or coaxed to do so. This need not necessarily mean that there is something wrong with the project itself. It only means that the relations between the project and those engaged in it are not ideal. It means that the project has not been so designed as to elicit the best from the persons working on it. The project may be in itself a good one and

may in fact lead to the good of others. Yet people are not inclined to give of their best.

This position needs fundamental analysis, for men are by nature self-centred. They are steeped in materialistic considerations. Unless therefore the project offers what they consider a sufficient material reward, it fails to enthuse the people engaged. Incentives are necessary to make those men work who otherwise will not work at all. Incentives are further necessary to make people give their best which otherwise will not be forthcoming. Man, being essentially a selfish being—and in many cases not even knowing how to be rightly selfish—requires an incentive if his services are to be successfully commandeered to serve others.

These generalisations are also valid in industrialisation. When a man is asked to work for another—an employer—he begins to calculate how it will

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benefit him. What will he get in return? What is the incentive? The incentive that was first offered to him was in the shape of wages. But in due course it came to be realised that wages alone did not provide sufficient incentive. For, the worker soon began to realise that he was only a wage-serf, hired to work for somebody. When a weaver weaves a cloth he must not wear, and the mason builds a house he cannot live in, the utility in the very acts of weaving and building is not direct to them. The relation between them and their work is merely monetary which is not wholly satisfying. The more he realises that he is only a labourer hired to work for the master of the means of production who stands in the way of the enjoyment of the fruits of his labour, the worker's enthusiasm begins to wane. As a consequence, there is unwillingness to put in one's best. When this fact was realised by the employers, they began to introduce incentives in addition to cash wages. Some of these incentives were in terms of money and others computable in terms of money. This had some effect, but only a temporary effect. These additional monetary incentives worked till their novelty faded. Later on, with the worker becoming accustomed to these incentives, their capacity to enthuse the worker or keep up his enthusiasm at new heights gradually fell, with the result that employers were compelled to think of further and newer incentives, again mostly in terms of money. Thus it has been an endless process and has not so far produced sustained results.

The lack of enthusiasm on the part of the worker cannot always be traced to the absence of adequate monetary incentives. So long as the worker is really working for someone else, it will be impossible to generate in him a sense of genuine love and enthusiasm for his work. All the time he will be feeling

that he is holding somebody's baby and not his own. All that makes him go baby-sitting is the money that he gets for it. That money can no doubt make him hold the baby for the stipulated time, but it will not make him develop a sense of devotion and love towards that baby. He will be only waiting for his work-period to be over so that he can thrust the baby on his reliever and walk out. The baby was in fact a nuisance to him which was just tolerated for the money it gave.

It is obvious that if the industrial worker has this feeling of a baby-sitter, the work he does will be soul-less. Work for him will just be a nuisance tolerated for the money it gives. Any improvement in the wages of the worker or the baby-sitter will not make the child his own, nor produce sustained love or enthusiasm for the work: for, all along the feeling will be persistent that he is only a hired labourer.

This however should not be taken to mean that money part of the incentives is not necessary. *Indeed it is both necessary and important.* But what is even *more necessary and important is the status of the worker.* The best incentive therefore is to raise the status of the worker in the industry, so that from the position of a wage-serf, he becomes a partner in the industry and indeed a part of the industry itself.

There are unmistakable indications today that this need for providing incentive to workers by raising their status in industry has begun receiving recognition. The Labour Policy Statement in the Second Five Year Plan has already accepted the need to let labour participate in management and thereby lift its status to that of a partner in the industry. The employers too, both in the private and public sector, have accepted, in principle, labour's right to participate in management. Already there have been some starts made



# “Over-Tooling”

OR

# “Under-Tooling”

## TIME STANDARDS



OMAR L. DEWITT \*

**O**VER-tooling in mechanical engineering usually refers to providing in excess, or ultra-refinement in tools, fixtures, equipment, materials and supplies. It refers likewise to going to extreme in the matter of fitting, sharpening and positioning tools and equipment at an ir-recoverable cost.

*Under-tooling* conversely has reference to lack of completeness in design, specifications, tools, (improper design, sharpening, poor angles and cutting edges) and so forth.

In an analogous sense, the industrial time and motion study engineer is often called upon to do work, submit opinions, and form decisions on many factors relating to his work, which likewise can be *under-tooled* or *over-tooled*—to the detriment of his work,

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and to the excessive cost to the organization which uses his services.

In this respect we encounter the so-called *law of diminishing returns* which influence him as well as the production executive in the determination of optimum lot sizes. Because the size of the lot must pay for the tooling needed for the job, management must determine if the returns will justify the expenditure. In a like manner the industrial engineer must determine if the lot size will pay for and justify the set-up and clean-up to be charged against the job.

Further considerations will require the engineer to determine the type of *study* needed for the job. In the majority of cases the engineer's data will be obtained with the stop-watch under routine time study procedure. Less often he will take a detailed motion analysis of the operation, and still more seldom he will use all of the tools at his command for the ultimate refinement technique which can be used in industrial engineering.

Frequently we run across the operation which is here today and gone to-

morrow. Yet for purposes of cost control many of them must be timed, and must have the standard set in hours, units or money. In such a case the engineer uses little time in preparing for his work, for taking voluminous readings or for changing the methods under which the work is done. In general he will take from six to ten cycles of the operation, select and supply his rating factor to the job elements, and will quickly calculate his standard. *He purposely spends little time on such a job because it is unjustified!*

In another case we have the so-called permanent operation for which a time standard is required. For purposes of cost control the engineer may find it necessary to provide a *temporary* rate with the object of doing a more thorough piece of work when the operator is completely trained and the methods have been organized in accordance with correct motion study and analysis principles. This is contrary to the best principles of correct time and motion study. Yet there are numerous cases in which it is inexpedient to use a material amount of time in setting a standard that must shortly be changed for any number of reasons.

If the cost control or incentive feature is not an essential one in voluminous manual production, the correct procedure is of course to follow the principles for analysis, standardization, training and rate setting, each in order. There is no object in using valuable time in setting a temporary standard, if the job can be done right the first time.

The engineer who insists on using micro-motion study for every job that comes to his attention is also *overtooling*. Micro-motion study has its proper place in the research laboratory—it has its proper place when the subsequent films are used for operator training. But it is invariably too costly

both in time and money to use this tool indiscriminately for standard setting.

When we encounter work which requires a great deal of manual work annually and which answers the description of a *permanent* job, we under-tool if we use anything but motion analysis. We find in industrial practice that time study does not offer us in itself, the tools needed for large volume labour cost control. The same is true in obtaining the maximum improvements, or minimum cost if anything is used but the finest technique in motion study. Motion analysis in the greatest detail may well be justified.

When we assume an operation which is done repetitively by twenty or more girls, for two shifts the year around, it can be seen that a very small saving in improved technique may provide a considerable saving. We *under-tool* here if we stop short of very careful analysis, standardization, training, and rate setting. Work of this magnitude may justify from several weeks to several months of the engineer's time and may result in savings of thousands of rupees.

The engineer must decide for himself the amount of time he can profitably spend in standardizing and timing an operation. He must decide this in the same manner he determines whether a mechanical installation costing a certain sum is justified. From the proposed annual production and a rough estimate for time per piece he will determine the annual man-hours to be used. He will subsequently determine from past experience that a saving of a certain amount can be realized if he spends additional time in refining the operation. This will give him an indication as to what additional time he may profitably use.

*Much needless time is often spent by the engineer in gathering useless*

*"Standard Data" which once obtained and filed is forever after entirely disregarded.* The engineer must of necessity spend a great deal of time in gathering information for such data. He will be found to chart, graph and tabulate time values on end without full comprehension that when his information is complete and ready for use, it will consistently be called upon.

It is seldom wise to provide standard data of any work until we know from experience that such information once obtained, will be repeatedly used. It is much wiser to take additional time studies which naturally fortify the information already in the files than to take numerous detailed and comprehensive time studies needed for standard data until its use is fully justified in the engineer's mind.

Conversely, however, the engineer often does much costly time study work long after he should have determined the necessity for standard data. We know that *time values in the form of standard data will save endless hours of repetitive observations when it is wisely used.*

Careful analysis must always decide what degree of measuring technique is justified by the range and volume of work to be done. Also we must consider the purposes for which standard times and time standards are to be used; whether for estimating, planning, scheduling, rate-setting, measured day-work, as the basis of wage incentive or profit-sharing plan.

At the modal point between over- and under-tooling in time and motion study, *properly arranged and correctly established standards can be compared to a universal jig or fixture.* A complete range of values classified and indexed becomes a highly composite time and motion study if used. Or a useless

waste of time and effort on the engineer's part if unused.

*Under-tooling* in time and motion study permits over-lapping generalities—too many variables left to individual judgment, inconsistencies caused by insufficient time study, and broad classifications which do not correctly identify the minor variations in the work studied. Odious comparisons and incomplete coverage are usually the result of under-tooling in time study practice.

Over-tooling may consist of too many classifications; too many or too meticulous calculations which increase the possibilities of error.

Proper tooling of standards will reflect correct results according to recognized variables. As in all phases of the engineer's activity, proper tooling will result in the greatest amount of good usable time study work applicable to the company needs. The right amount of time study, applied as needed; motion study always where it will be effective; process and control charts where they will provide more and in greater detailed information; micro-motion study as and when needed for research and training; motion analysis where the volume of work warrants and when judgment in rating and normalizing is difficult.

In the final analysis, industrial time and motion study is a far-reaching profession, and the engineer who will be worthy of the title must be effective: *he must be effective in eliminating waste and fatigue, reducing costs and increasing earnings—all aimed at improved and lower cost of production. But as he does his work he must find the half-way point in his own efforts: he must neither over-tool nor under-tool.* He must by example show the correct attitude and engineering ability and do his work most effectively at the lowest cost!

# Incentives and Productivity

PD MALGAVKAR\*

This study presents the other side of the case in respect of incentive schemes. Advantages of incentive schemes are not denied. They are only too obvious. But the disadvantages and limitations of incentive schemes have not been sufficiently realised in the enthusiasm to provide incentives and to do nothing else. It is this aspect of the problem that has been analysed here.

**I**NDUSTRIALISTS and administrators are anxious to increase productivity through incentive schemes. So tasks are estimated, time studies are undertaken and incentive schemes introduced accordingly. There is a happy feeling that workers have been given an opportunity to earn more and the management has also the advantage of getting a larger output. These are generalisations which need to be closely examined. It has been argued here that the full implications of an incentive scheme should be carefully considered before it is introduced. This study refers not to any particular incentive scheme but is generally applicable to financial incentives of all types for plant workers.

Historically, payment on the basis of work done is not a new phenomenon. In medieval times, merchants used to buy products from craftsmen and pay them according to measurement of quantity and evaluation of quality. With the advent of industrialisation, the machine became the centre of the piece in industrial activity and payment and necessarily to be regulated by

the time a man spent on the machine. The first reaction was that if only the employee was closely watched and bossed the employer could get the best out of him. The thoughtful among the industrialists, however, soon came to realise that somehow or the other the worker was holding back his full potentiality, in spite of the closest supervision and control.

Naturally employers began to think of the ways and means of making an employee work to his capacity. In this development, F W Taylor, the Father of Scientific Management, has a leading place. Through time study he tried to determine the task, employees might fairly be expected to perform, and then compared the actual output with the task layout so worked out.

Taylor's 'Pig Iron Experiment' is yet worth a repetition: working day then was 10 hours equal to 600 minutes. But even a first class worker, best suited to such work as handling pig iron, could be under load only 42% of the working day; hence the actual working time was 252 minutes.

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In this time, a man, walking briskly in order to get rid of the heavy load on his head, would walk 16 miles. This distance would mean 1156 trips a day for an average distance of 36 feet between the pig iron and the wagon to be loaded. The total load for the day on the basis of a load of 92 lbs per trip would be  $1156 \text{ trips} \times 92 \text{ lbs} = 46 \text{ tons}$ . The actual task load per day was  $12\frac{1}{2}$  tons. The incentive offered was the rise of the daily wage from \$1.35 to \$1.85 a day if the worker could raise his task load from his usual average of  $12\frac{1}{2}$  tons to the Taylor task of 46 tons. It was, however, found that only one man in eight of the gang originally employed in handling pig iron proved to be physically capable maintaining that much of output per day. It is of course not known how long this man could keep pace and survive the ordeal.

One great consequence however of the Taylor system of scientific management was the standardization of tools (shovels for shoveling, cutting tools for machining etc.) and working methods (speed, feed and cut). Standardization also of raw materials and working conditions followed as a matter of course, for standard task for job to be done on machine could only be determined, if all other factors were fairly standardized.

With regard to the main basis of the Taylor system, however, many began to feel that *the standard tasks so worked out were hard on the workers*. Gantt, Gilbreth and others began to modify the tasks and incentives, and different methods of paying incentives were devised principally with the idea of bridging the gap between what a man actually produced and what he could produce.

Much scientific thought was devoted to working out the following types of incentive schemes:

### 1. Individual Incentives:

- (a) Time wages with incentive features
- (b) Piece rates
- (c) Payment for standard time worked with all or partial saving of time to workers
- (d) Payment for points earned.

### 2. Group Incentives:

Names of many efficient experts in the United States such as Merrick, Gantt, Halsey, Diemer, Baum, Rowan, Emerson, Knceppel, Bedeaux, and others are associated with incentive schemes.

The feeling among the workers, however, was that these incentive schemes were devised to make them put in more work for less pay in proportion. Illustrative of such plans is the one that is historically known as the Rowan Variable Sharing Plan developed in Scotland in 1888. The Plan provides for the establishment of standard time for operations, for guaranteed hourly rates and for payment of bonus, as shown below. The Rowan formula was really a very simple one: bonus or extra earnings equal to  $\frac{A-1}{S} \cdot \frac{A}{S}$  where

A was the actual output of the worker during a given period of time and S the standard task calculated for the same period of time. If S was to be taken as unity, the formula would become simpler:  $\frac{A-1}{A}$ . Thus if a man

produced three times the standard task, his bonus would amount to  $\frac{2}{3}$  his guaranteed wage. If he produced 10 times he would earn  $9\frac{1}{10}$  extra. Even if he produced a thousand times, yet his extra earnings would be  $\frac{999}{1000}$ . That is no matter how hard a worker laboured he could never aspire even to double his wages!

Thus on account of historical experience workers came to look on incentive

schemes with a certain amount of suspicion.

There is, however, the positive side of the case for incentive schemes. The advantages claimed for Incentive Schemes are:

- (a) incentives make it possible for the worker to increase his total wages not at some indefinite future time but immediately
- (b) management obtains greater output
- (c) they improve employee morale and tend to reduce labour turnover, absenteeism and lateness
- (d) they help reduce watching and bossing over workers
- (e) as a consequence supervisors can devote more time to other activities.

While there is a point in the advantages listed above, the other side of the case also needs close examination. Let the following illustrations show what incentives mean and what they ultimately imply: (a) suppose incentives are introduced and an employee is thereby enabled to earn a monthly pay of Rs 150 instead of Rs 100 which was his take home pay prior to the introduction of the incentive scheme. From the second month he would be expecting Rs 150 a month and *any reduction would be a disincentive*. He would begin to look on his pay of Rs 150 as a matter of course: and *this larger pay ceases to be a psychological incentive*. Once these incentive schemes come into operation, the possibility of a steady and continuous rise in the earnings of employees, diminishes; (b) when such incentive schemes are introduced, the management comes to have a feeling that it has passed on the responsibility of improving productivity to workers and nothing more needs to be done. In many cases it really amounts to an abdication of responsibility for improving methods, procedures, de-

signs, surroundings, climate of works, etc.

The main argument throughout this thesis is that it is this managerial responsibility for improving productivity that can achieve the objectives we have in view. Considering incentives as such, they come in the way of introduction of new methods and procedures. Usually managements insert an additional clause in incentive schemes, giving themselves discretion to revise standards, if new methods, designs or procedures have to be introduced. This really creates a vicious circle, for workers look upon this clause with suspicion, while management does not introduce new methods, even if they are more productive due to fear of reaction among the working classes.

A more doubtful point is the effect of incentives on labour turnover, absenteeism and lateness. The following examples cannot be called conclusive but are illustrative in a marginal sense. In the case of Italian immigrants working in the Construction Industry of the United States workers remained absent for days on end, for they received what they considered as more than enough money during short working periods. In a non-ferrous foundry in England, workers stopped working about 2 hours before closing in spite of incentive scheme. This however does not appear to be a conclusive argument, for it may work both ways and it is possible to frame incentive schemes in such a manner as to reduce absenteeism, lateness and service breaks. *But the surer way of achieving the same objective is by 'better climate of work'.*

The greater harm done by incentive scheme lies in the implicit threat to the employee: "you better produce so much or else..." or else an employee is threatened with a *cut* in his take-home pay, in his merit rating and in his supervisor's attitude towards him. This breeds resentment against



management. It sometimes amounts to disciplining rather than motivation for higher performance. Sometimes what may appear strange, the workers feel that the management expects them to be grateful for the bonus payment.

The workers believe rightly or wrongly that these incentive plans increase unemployment. Their economic analysis is as follows: the total demand for the particular product which they are making is limited. If each of the worker increases his individual output, some of them would be forced out of employment. With unpleasant memories of management reducing work force whenever workers produced more, this fear of retrenchment has become deep-rooted. The strong opposition to automatic looms and rationalisation in the Indian Textile Industry is due to this fear. It may be argued that *technological change makes job*. "It does but not for the same peoples."

There is a further belief among workers that if they really put in their best and earn what the employers think *too much*, the management would find some excuse to revise the rates on pretext of changing methods, procedures or designs. Hence, as was conclusively proved in the famous Hawthorne experiment, *workers guard jealousy against management coming to know how much they really can produce*.

There are other difficulties: after a worker has earned enough to meet his basic requirements, he would put in extra work only if he gets more than proportionate compensation. But even

to give proportionate incentives would be difficult, as the amount becomes proportionately less attractive as the employee's income goes up. For instance, an increase of Rs 50 would mean a 50% increase to man earning Rs 100 but only 25% if he is earning 200. The situation today is that since the take-home pay is only a part of the total payment an employee receives, a proportionate increase in the latter would be a costly proposition for a worker receives a number of fringe benefits, such as dearness allowance, sickness insurance, unemployment insurance, earned leave, gratuity, provident fund, housing, canteen service etc., costing the ranging management anywhere from 20% to 200% of the basic wage.

All this does not mean that the workers should not be paid higher wages. On the contrary the author is firmly of the opinion that the worker should not only be paid the standard or living wage but an adequate wage. Nevertheless financial incentives are wrong methods for achieving higher productivity. Incentive schemes, as such, not only do not lead to higher levels of productivity, but have in fact a contrary effect. Despite incentive schemes, employees are inclined not to put in their best because of suspicion, group solidarity or of feeling that work is a necessary evil. Psychologically, incentives threaten satisfactory human behaviour because they make an employee uncertain of his financial future and try to pull him out of his social group.

\* \* \*

"When I am going hell bent for election on a good piecework job, the evening passes very swiftly and I do not realize that I am tired until it is all over. On these day work jobs I get so bored I could stand in the aisle and yell"

# Possibilities of Incentive Schemes

RL MITCHELL\*

For the past twelve years the author has been associated with the design and installation of over 100 different incentive payment schemes in Europe: incentives for men making railway engines, for women making children's toys, incentives for people who drive lorries, people who sweep floors, people who mind stores, men who make motor cars in Italy, girls who sew dresses for the fashion houses in Paris, men who mend roads, and for clerks—and even farmers too.

**F**OR all categories, suitable schemes of payment by results can be designed. This article, however, does not deal with schemes but rather about some general principles that apply to all incentive schemes, and which govern what can be done with the help of incentives—and, *equally important, what cannot be done*. In the first instance financial incentives may be differentiated from non-financial incentives; and schemes in each of these classes may be grouped into major and minor—major financial incentives and minor ones, and so on.

Among the minor financial incentives are schemes which award to the employee a bonus of around 5% of his basic wages on some criterion or other, perhaps for not being late for work too often, or for keeping his workplace clean etc. These schemes have little effect on production, not being strong enough incentives to induce action. So too with annual bonus schemes, often based on the profits of the enterprise. The only direct results which such schemes usually have is to induce the employee to remain in the employment

of the Company until the day of the annual payout. Some of the drawbacks of such schemes are well-known. The employee frequently comes to expect a bonus every year whatever the profits, and feels cheated if the bonus this year is less than last. These minor financial incentives are weak as inducements to increase production or to raise productivity.

There is another group in the same class of minor financial incentives, however, which does have the same effect. These are the schemes which pay small increments of money for acquiring additional skills—as when job evaluation has been applied and wages have been related to job ratings, schemes of merit rating, and money devoted to certain welfare and provident fund activities. Again, with these schemes, the amount of money paid out per head is small in proportion to normal wages, and the positive effect which the schemes have on improving production is slight. But these schemes do make for a more contented work force, one which is happy to be in the employ of the particular company, and that is a very good background against which to introduce

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other, more positive incentive schemes or to seek the cooperation of workers in raising productivity.

Major financial incentive schemes, however, are far different. These are more usually known as schemes of *payment by results*. The scope for payment by results is almost as wide as industry itself. There are very few jobs for which satisfactory schemes of this type cannot be devised. Occupations, listed in the opening paragraph, are of this type. They cover not only direct workers—those actually making the product—but also indirect workers: storekeepers, crane drivers, foremen, sweepers, clerks and so on. There are, of course, one or two exceptions: certain jobs for which it is difficult to devise satisfactory payment by results schemes, and the two most notable of these are inspectors, and those whose jobs involve *attending rather than working*.

If a bonus scheme is drawn up for inspectors based on the number of good pieces they pass, all the pieces will somehow turn out good. If on the other hand, they are basis of rejection the management will soon learn that the factory is making nothing but rejects. The best thing to do with inspectors is either to pay them a fairly high flat wage and forget about incentives, or to pay them a bonus based not on their own results but on somebody else's—say on the volume of output turned out by the direct workers, which of course affects the quantity of pieces the inspectors have to inspect.

The other difficult class is those whose jobs involve attending rather than working. Such, for example, are men in electricity sub-stations who watch dials all day long; men who stand and salute; men who sit by paper mills all day long so as to be there in case the machine breaks down; men who sit in a fire engine at the airport in case an aeroplane catches fire on landing. These

men do not have results in the ordinary sense which we can measure and pay bonus on. And in some cases—like the fire man at the airport, or the breakdown man, we are perfectly happy if they have no actual work to do.

So these are the exceptions. But leaving these men aside, what can we expect to achieve with a well-drawn scheme of payment by results? If such a scheme is really well designed and intelligently introduced, it will *increase the effort* which a worker or group of workers will expend up to the best level which they can maintain continuously. It may not do this all at once. But over the weeks, months and years that the scheme is in operation, the rate of effort will rise until it reaches that *best continuous level*. And there it will stay.

How much of an increase is this? In Europe, changing from time rates to payment by results means an increase of 30% usually. Whenever the author has been asked to visit a factory to design an incentive scheme, and told that the workers are paid on time rates, there is no need to know any more at this stage. It is not even necessary to know what they make or how they make it. *Whether it is railway engines or ladies corsets, if they are on time rates, it be taken for granted that output can be increased by 30%*. If the management is good, the supervision is active, and the workers well trained, 30% increase in production is certain, may be with a little struggle. But if any of these factors are not as good as they might be—if say the production planning and control is weak, then the question to be assessed is how much more than 30% can be obtained in the course of the reorganisation during which incentives may be introduced. This is the position in Europe.

*In India the scope is greater still. In many of the Indian factories a good in-*

*centive plan would eventually increase effort by over 100%. This of course, has already been done in some factories in this country. Several Indian industrialists have informed the author of instances in their factories where increases of over 100% have been achieved.*

So a payment by results scheme can increase the effort being expended by the workers from whatever it is upto the level of their continuous best; and this word *continuous* needs to be stressed; for the level of effort which one can maintain comfortably, continuously, is of course much less than that which one can put out for short bursts—for spurts, so to speak. Secondly, the scheme will maintain the level of effort at the new high plane, to which it has been raised. Thirdly, the incentive will help the management to induce the worker to channel his effort into those avenues in which the management wants it to flow. The scheme persuades the worker to expend the effort. But whether that effort is effective, or wasted, whether it results in good production or bad, depends on the management. It is for them to channel that effort into productive courses. Lastly, *the incentive scheme will reduce the cost of production. If it does not do that, it is not worth considering, and certainly not worth all the fuss and bother which will have to go into designing, introducing and maintaining it. If the object is simply philanthropy, there are simpler ways of giving away money. An incentive scheme is intended to give more money to the employee, and lower costs to the employer. These things a scheme of payment by results can do. But what of the things it cannot do?*

One of the things it cannot do in India is to reduce absenteeism markedly. The author has had recently the benefit of consulting four or five industrialists who have tried bonus schemes

linked to attendance, and designed to reduce absenteeism. In every case the scheme has failed. Occasionally there has been some effect, sometimes quite a marked one for a short while, but eventually the net effect on absenteeism has been very small indeed. And the reason seems to be that the social pulls which induce absenteeism are stronger than the desire for money, at the moment.

Another thing a payment by results scheme cannot do is to increase the effort of the workers beyond what they can give as their continuous best. The management cannot go along and say "We gave so much bonus and you increased your effort splendidly. Here is twice as much money, increase your effort twice as much again!" It cannot be done. The reason is simple: the limits of human ability are finite and closely defined. If a man's job is carrying sacks of sugar about and he usually carries on his back, at a time, 50 lbs, he may be persuaded to carry 100 lb sacks, but not all the tea in China nor all the gold in America will induce him to carry 300 lbs at a time. He simply cannot do it. Once his performance has risen to the level of his continuous best, no incentive scheme will raise it further.

No incentive in the world will induce a man to do continuously more than he can do comfortably. Those who would have us believe that by incentives we might induce men to work at such a pace that their health would be endangered are ignoring this and wilfully ignoring the experience of all the millions of workers who are working now on incentives and have been for years. They cannot produce one single instance of a payment by results scheme to work at a damaging pace. They cannot—for there is none.

But there is a way to get a man to give performance higher than his conti-

nuous best. Every one can recall an occasion on which he worked all day, and all night too, and all the next day in an effort to get some special thing done. That rate of expending effort is far greater than could be kept up continuously. It is a peak—a spurt. This sort of thing can be induced by incentives—but not by payment by results schemes. We have here to turn to the non-financial incentives: patriotism, *esprit de corps* or pride of service, feat etc.

Hundreds of examples can be given from wartime experience when men have been impelled by patriotism, or fear, or simply the will to live, to put out performances far in excess of what could be expected as their continuous best. Hundreds of examples could also be given from peacetime experience in industry where *esprit de corps* or the will to win or simply a gamble has induced men to give similar peaks or spurts over short periods: electricity supply workers who work day and night to restore the supply after a breakdown; railway workers who will give tremendous outputs after an accident or to clear a blockage on the line; maintenance workers in factories who do in two hours what would normally take four hours or more to get a vital machine back into production.

A scheme of payment by results will not produce such efforts. One must turn to non-financial incentives, the strongest ones of all, if man is wanted to work all night, or to run 100 yards in 10 seconds, or produce any other peak. On the other hand, these powerful non-financial incentives are good only for that purpose—they will not do what the payment by results schemes can do, produce an output all the time equal to a man's continuous best. There is just no case of advocates of purely non-financial incentives inducing in a group of workers in industry a steady continuous high level of performance.

While we are considering non-financial incentives, it will pay us to think closely about some of the incentives normally listed in the non-financial group: incentives like the possibility of promotion; the desire to do well in the eyes of one's superiors; the chance to acquire training and the like. A man does not seek promotion to a job which will pay him less than he is getting at the moment, does not seek training to fit himself for a job which brings him less money than his present one; he does not ask to do well in the eyes of his superiors so that they will reduce his wages. Incentives cited above, like the possibility of promotion, good opinion of superiors, training facilities etc are really financial incentives. The only difference between them and systems of payment by results is that they represent the possibility of cash tomorrow instead of the certainty of cash today. And precisely because they do offer the possibility of cash tomorrow instead of the certainty of cash today, their appeal is limited to those of higher intelligence. They are rarely forceful incentives to employ on the shop floor, although they may well be of service among the ranks of management and staff.

The minor incentives, things like merit rating, unemployment insurance, annual bonus schemes, profit sharing and the like, do not achieve the same objectives, as *pay by results* schemes. They cannot enthuse a group of workers to raise their performance to the level of their continuous best and keep it there. They can, of course, produce harmony between management and workers, good relationships, and a number of other desirable things in industry. But they achieve different ends from the other bonus schemes. The reasons are two: firstly the size of the bonus is really not large enough to achieve the large objective. And the second reason is that they are based on things



which the individual worker cannot directly affect, and thus they offend against one of the fundamental principles of incentives: *to be fully effective, a bonus scheme must be based on something which the individual worker can affect.* In making railway engines, the man in the wheel making shop can affect the output of wheels but he cannot affect the output of boilers, and still less can he alone affect the profit of the whole company. If the incentive is going to be effective, it must be based on something the man can affect, and *can see and understand that he affects.*

The objective is not always more output, but more often than not, to have a specified amount of work done on time. If surgeon is paid to take out the appendix, he will not get bonus if he does more and take out the kidneys as well for good measure. There are many jobs in industry like that. The motor manufacturer who makes 100 cars a week wants 100 steering wheels a week, not 99 and not 101, but he wants them on time, this week; and so on with the other components. With clerks, we frequently do not want them to fill in any more forms, or send out any more invoices, or still less send out any more cheques, but we do want them to do a specified amount of work on time. We do not want storekeepers to take more things into store, or issue more out of store, but just to do the right amount speedily, courteously and on time. If this is our objective, piecework is not good; we must devise a different scheme.

Again, there are many occasions when we are not so much concerned with having more pieces as with getting every piece of a higher standard of quality. This applies particularly when the cost of materials in the product is high, or when a slight slip can damage the article beyond repair. An example is the grinding of crankshaft bearings for an engine. One slip and the job is ruined—it can't just be put back.

If the primary objective is quality of workmanship, piecework is not the right type of incentive. Bonus will have to be based on quality.

For maintenance workers, the objective may not be to get them to rush round pulling the machines to pieces. The objective is probably to have no breakdowns of production machinery, and if the maintenance men can achieve this by some private magic without working at all, there can be nothing nicer. So bonus will probably have to be based on having no production stoppages.

There are many shops where the most important thing is to keep the wheels turning. The machine may cost you Rs 200 an hour to run, and the labour less than one rupee an hour. Then it may pay to reduce the work load to put two men instead of one on each machine, so that if one has to go away for a while the machine will keep on running. It is wisdom, in such cases, to pay bonus on machine running time. Sometimes what is wanted is good team working, with workers interchanging their jobs and helping each other to keep the whole production running smoothly. This is often the case with assembly line working.

These are just some of the possible objectives of incentive schemes. They are mentioned here to show that it is not always *more* that we want, and it is not always that piecework is the best type of incentive scheme. The central point is to ask: what is it that is wanted of workers to do. And then incentive may be designed round this objective.

The author may summarise his experience by listing seven points which have been found to be important in designing any incentive scheme. Firstly, the scheme must be *simple*: simple enough for the workers to understand, and simple enough for them to be able