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# Securing effective work from labor

J. L. McVicker

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NATIONAL ASSOCIATION  
of  
COST ACCOUNTANTS



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Vol. III NOVEMBER 15, 1921 No. 5

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Securing Effective Work  
from Labor

BUSH TERMINAL BUILDING  
130 WEST 42nd STREET, NEW YORK

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## Securing Effective Work from Labor

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BUSH TERMINAL BUILDING  
130 WEST 42nd STREET, NEW YORK CITY

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# National Association of Cost Accountants

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## SECURING EFFECTIVE WORK FROM LABOR

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There is probably no more pressing and important managerial problem today, than the securing of effective work from labor. This article presents a review of a seasoned incentive wage system which has produced satisfactory results. The system is being operated by a concern employing at times over five thousand workers in three plants. The beneficial results obtained from its use have been increased production, decreased costs and higher wages.

Many managers have so abused some wage incentive systems that the term "sweat-shop methods" for a long time has been used as a slogan by those workers who are opposed to any method of wage payment except day-work. Before the beginning of our last period of prosperity, scientific time study and rate setting were not rare, but in the opinion of many students of industrial management they were used almost entirely for the benefit of the owners with very little consideration for workers.

Today, in the successful business, the co-operative spirit must prevail. The stockholder or capitalist, the executive and the worker should be compensated according to the services they render. The value of their services should be based upon economies effected, and standards of ability. The standards should be established fairly and equitably. The stockholder who has invested his capital expects, and should receive, a fair return. The executive who plans and effects savings so that the stockholder will receive his dividends, should share in the economies he has helped to make. The employee, who by steady application and skill, increases production, reduces cost and automatically increases profits, should be rewarded in the proportion that his performance is to a standard or normal worker's performance. The average employee will not contribute his best efforts unless he has a chance of being suitably compensated.

While many profit-sharing methods are in use, it is almost impossible to make a fair division of profits, considering the effort and accomplishment of each worker as compared with his fellow-worker. Exceptionally efficient workers are apt to feel that they do not receive an equitable share in the profits in comparison with less skillful workers.

In the matter of wages it is the fairest method to compensate workers in proportion to their value as individuals. A company

should make it worth while for the worker to produce to the extent of his ability, by recognizing his individuality through paying him for his achievements, as compared to the accomplishments of his fellow-workers. In this connection a standard should be set that the worker can reach and pass. Thus, if George Smith is naturally quicker and a better worker than Harry Rowe, then George should first be hourly rated higher than Harry, and should be rewarded by receiving extra remuneration, based upon the difference in time between Harry's elapsed time on the job and his own. This difference, plus his margin of hourly rate, represents George's superiority as a worker. His additional monetary reward is the elapsed time difference multiplied by his hourly rate. In this case, Harry Rowe's rate represents the standard, or 100% rate, which is the basis of the efficiency ratings in the plants under consideration which are later explained in this article.

### CHOOSING THE INCENTIVE SYSTEM

No unanimity of opinion exists as to which incentive wage system is generally the fairest and most satisfactory to the worker and at the same time nets the owners the greatest saving, considering the additional overhead expense necessary to run an incentive system.

Workers usually have an aversion to straight piece work. Changing rates with the changes in the labor market is difficult. If the wages in the labor market increase considerably, it is necessary to revise all wage rates in fairness to the workers. On the other hand, if market wage rates decrease greatly, straight piece work rates should be revised downward in justice to the owners.

It is self-evident that rates of pay must be sufficient to reward the worker, equal to what he can get elsewhere where working conditions are similar, and sufficiently high enough to encourage him to make a special effort.

One very serious objection to straight piece work is that the rates are too inflexible, and consequently unjust to owners and workers when conditions change from what they were when the rates were set, unless the rates are revised to meet existing conditions. An attempt to change rates to meet changes in the labor market is costly and difficult. Furthermore, it takes considerable time.

It takes a very short time, however, to create a dissatisfied organization. If a worker thinks injustice has been done, it is always magnified by other interested parties.

Other conditions which more or less affect the wages of workers on straight piece work are the interferences caused by the variations in the "machinability" qualities of materials and the necessity of putting the product through machines which are not

the most suitable for the work in hand. In periods of high production these interferences with the regular routine are sometimes necessary in order to maintain the schedule of production and to balance output.

One incentive wage system used by the concern under consideration is a guaranteed hourly rate with full allowance for time saved. This system is called "time work." In order to use the method time studies are made and the best possible time is determined. To this best possible time is added 25% and the result is termed "allowed time" or "standard 100% time." Allowed time is set on every operation in terms of hundredths of hours per piece, and if the work is completed in less than the allowed time, the worker gains the entire difference between allowed time and actual time. If he meets with difficulties, or is not efficient enough to better the allowed time, he receives only his hourly rate. This method is obviously fair to the worker and to the company, the latter benefitting through increased production. The formula used for ascertaining the worker's efficiency is allowed time divided by actual time. A worker who equals the allowed time is 100% efficient, but earns no extra pay. A worker who equals the best possible time earns an extra 25% of his hourly rate, and is rated as 125% efficient. A worker who betters the best possible time earns as extra compensation, an extra 25% plus the difference between allowed time and actual time, multiplied by his hourly rate. A worker who fails to meet the allowed time earns as much as the worker who equals it, since his hourly rate is guaranteed, but his efficiency per cent. would show below 100 and his services would be dispensed with after he has received a sufficient number of low rankings in efficiency. Hence, it is apparent that eventually only 100% men or better would be employed if this system is strictly adhered to.

While the worker, under the wage system being described, who falls a little below 100% undoubtedly reduces costs, since he has made more of an endeavor to meet or better the allowed time than he did when there was no incentive, nevertheless, he earns no more than he had previously earned and his rating of less than 100% results in the company having a production shortage which is shown on a production shortage report. As a result additional work or overtime is necessary in order to keep production up to schedule.

The following table shows hypothetical performances of four workers rated at 50 cents per hour and illustrates the workings of the features of the wage system just discussed.



		A	B	C	D
Best possible time	} First Job	6.40 Hrs.	6.40 Hrs.	6.40 Hrs.	6.40 Hrs.
Allowed time		8.00 "	8.00 "	8.00 "	8.00 "
Actual time		8.00 "	6.40 "	5.00 "	10.00 "
Time saved		0	1.60 "	3.00 "	....
Extra earnings		\$ .00	\$ .80	\$1.50	....
Best possible time	} Second Job	....	1.60 Hrs.	3.84 Hrs.	....
Allowed time		....	2.00 "	4.80 "	....
Actual time		....	1.60 "	3.00 "	....
Time saved		....	.40 "	1.80 "	....
Extra earnings		....	\$ .20	\$ .90	....
Total allowed time		8.00 Hrs.	10.00 Hrs.	12.80 Hrs.	8.00 Hrs.
Total actual time		8.00 "	8.00 "	8.00 "	10.00 "
Hourly earnings		\$4.00	\$4.00	\$4.00	\$4.00
Total time saved		0	2.00 "	4.80 "	....
Total extra earnings		.00	\$1.00	\$2.40	....
Total 8-hour earnings		\$4.00	\$5.00	\$6.40	\$4.00
Efficiency per cent		100%	125%	160%	80%

These four workers, A, B, C and D in the above table, are given similar jobs with the same allowed time. "A" finishes his task in the time allowed. Neither he nor the company gains or loses. According to the rating he is 100% efficient. "B" completes his task in the best possible time and earns 25% over his hourly rate and uses the time saved to make an additional 25% on another job. He is 125% efficient. "C" accomplishes more than "B". He surpasses the best possible time; earns 60% more than his hourly rate and continues to earn as much additional on his second job. He is 160% efficient. "D" takes 10 hours to do what "A" has in 8, "B" has in 6.40 and "C" has in 5 hours. He is but 80% efficient.

#### WAGE AGREEMENT

Before starting an incentive system of this description, the following agreement should be understood by the employees and rigidly adhered to by the company. Rates are set through scientific time study with a view of allowing the worker the entire time saved between the allowed time (standard 100% time) and the actual time, the worker having the privilege of receiving a demonstration showing that the allowed time is attainable. A standard or allowed time rate once set and approved is not to be altered for a year, unless changes in tools or equipment are made. Furthermore, the rate is not to be changed under the latter conditions if the employee is responsible for or suggests an improvement in tools or tooling.

As a penalty for doing the work incorrectly the worker receives credit for only good parts which pass working drawing inspection.

In order that a worker's record of performance may be made comparative and his ability and individuality easily recognized, an efficiency record must be kept of each job. A daily, weekly or monthly spoiled work deficiency record, an attendance efficiency record, and a department deficiency record and a tardiness deficiency record, respectively, are also maintained.

#### RATE SETTING

The success of the incentive system described in this article

depends upon the setting of reliable standards and the desire of the worker to increase his earnings. He must be convinced at first that he has a good chance to better the standard, which must be set by someone fully qualified for this important work.

It is extremely important that the rate setter must be a good all-around mechanic and familiar with all types of machine tools. He must have the interest of the company at heart and yet be so tactful that he does not acquire the enmity of the worker. He must be a good judge of human nature and character, and be cool and courteous. He must be able to personally demonstrate that his allowed time is fair and can be surpassed by himself. He should also be able to detect the slightest movement of the worker made for the purpose of tricking him when making time studies. There are mechanics who know of many tricks which will fool the rate setter unless he is wide awake and thereby obtain a greater allowed time. Therefore, care must be taken in timing an operation performed by the worker.

After several time studies have been made, checked and re-checked, the allowed time is set and approved by the production superintendent and recorded on a standard operation write-up sheet. This sheet shows the part number, operation numbers, the routine of the movements of the material, the type of machines upon which the operations are to be performed, the allowed time per operation, the description of the movements necessary to perform the work, the kind and numbers of the tools and gauges used in performing and measuring the work and the feeds and speeds.

#### NECESSITY OF GOOD INSPECTION AND TIME ACCOUNTING SYSTEMS

Operation inspectors are employed in each department and are responsible for the passing of good materials and the recording of daily production records and spoiled work reports. The daily production record is a report which shows the daily accomplishment of every employee working under the incentive system. It shows the employee's name, shop order, part number and operation, the quantity produced, allowed time per piece, total allowed time, actual time, time saved, the efficiency percentage and the result of inspection both as to quantity good and quantity spoiled.

Operation inspection expense is the largest portion of overhead expense necessary to maintain the time work system, but it has been demonstrated that it pays for itself many times, by eliminating labor on parts actually spoiled, the defects of which would otherwise not be discovered until a final inspection were made. For example, there are several parts such as cylinders, crankcases, camshafts and crankshafts, used on automobiles which have many varied operations. If a part is spoiled on one of the first operations and not discovered at once, the succeeding operations are wasted. The value of this lost labor amounts to considerably more than the extra cost of operation inspection.

The routine of the operations, as well as the amount of inspection necessary, is predetermined by the planning department.

Each department has a time clerk who is responsible for the count of the parts, as well as the ringing in by workers on the time clock at the start of jobs and the ringing out at the completion of jobs. It is quite necessary that a foreman or a time clerk inspect each job at the time the job ticket is punched "in" to make sure the work has not been started, and it is necessary to inspect the work again when the job ticket is punched "out". Unless each order is checked at the start and finish it is possible for a worker, if he punches his own job card, to report more time on one job than he should and less on another which he might do, since he may be exceptionally efficient on one class of work and not as skillful on another kind. The following is an example of manipulated time in the case of a worker rated at 50 cents per hour :

	Allowed Time	Correct Actual Time	False Actual Time	Correct Time Saved	False Time Saved	Correct Extra Earning	False Extra Earning	Correct Effi- ciency	False Effi- ciency
Job 1	8.00 Hrs.	7.80 Hrs.	8.50 Hrs.	.20 Hrs.	.....	\$ .10	.....	103%	94%
Job 2	8.00 "	5.20 "	4.50 "	2.80 "	3.50 Hrs.	1.40	\$1.75	154%	178%
Total	16.00 "	13.00 "	13.00 "	3.00 "	3.50 "	1.50	1.75	123%	

A manipulation of job cards with the above result would not net the worker any considerable amount of extra earnings unless he had two work-orders, both lasting over a period of several days. He could not work this scheme very often on small orders because it would result in too many low efficiency performances, and the employees realize they cannot consistently have less than 100% ratings and retain their jobs. The example is shown to illustrate the necessity of protection against the manipulation of time, particularly in cases where an incentive system of this kind is started. Before the workers have had the advantage of the time study man's instructions, regarding movements and lost motion, low efficiency is natural and should be allowed for during the rudimentary stage of development.

Another duty of the time clerk is to make sure that the number of pieces sent into the department correspond with the quantity called for on the production order routing card, and that the total number of parts rejected as defective, incorrect and spoiled, plus the quantity of good parts, agrees with the total originally received in the department. He is also responsible for checking the quantities on job cards with quantities on the daily production record and the daily inspection report. The latter is a summary of each day's inspection, showing good pieces passed, bad pieces rejected, and the reasons for rejection.

#### DAILY USE OF THE EFFICIENCY RECORDS

The daily production record which discloses each worker's efficiency and spoilage on each operation is in the hands of the production superintendent and the department foremen by noon on the

day following the workers' performances. The workers with less than 100% performance are asked for an explanation regarding their failure to do the work within the allowed time. Their excuses are recorded and future performances are checked with these explanations. The reasons given by the workers sometimes reveal conditions which may never be discovered in any other manner. They may show that machines or fixtures are slightly out of order, perhaps not enough to spoil the parts being machined, but enough to retard production and to cause so much extra concentration on the operation that the movements which count the most are lost. No attention would be given by the worker to such a condition, if he were paid on day work basis, where he had no particular incentive for increased production.

The writer recollects an excuse which was given by a worker for spoiling some cylinders. The spoilage, while not particularly large in any one day, was occurring constantly. Almost every day there was at least one cylinder spoiled on a boring operation. The workman stated that the jig was at fault. The foreman declared that only the man was to blame. The foreman made but a casual check of the jig, which showed nothing wrong. An investigation and study of the operation by the time study man and a careful check of the jig by a tool inspector brought out the fact that the worker's contention was right. One of the clamping bolts was slightly worn but not enough to cause spoiled work, if enough pressure were used in tightening. Occasionally, the worker did not put this extra pressure on the clamping bolt and the result was a scrap cylinder. The worker's excuse in this instance, led to the designing and making of a better jig which paid for itself within a month by stopping the spoilage. It is apparent, therefore, that the workers' excuses at times furnish the means for correcting faults. Another worker claimed that there was too much excess stock on castings. This fault was easily remedied by having the foundry change the patterns. The saving here is obvious.

The performances of workers who show less than 100% efficiency are carefully checked each day. They are given every chance to meet the allowed time and if they are habitually inefficient, they are tried on other work. If they then fail, they are dismissed. The success of the methods being discussed depends upon having better than 100% men in the shops, for they are then making above the market labor rate and are satisfied, and the company is at least producing the minimum quantity scheduled. Men who continually range from 100 to 110%, when it is known that they could rate themselves higher, are studied carefully. They are usually the dubious ones who are wary of going the limit, fearing cuts in allowed time. These men have to be convinced that the company will rigidly carry out the wage rate agreement regarding cutting allowed time. When once satisfied that the company is honest in its own purpose, little further trouble with those workers is experi-

enced. Special study is also given to workers who consistently rank high in efficiency. They are shifted to other jobs and tried out in many ways with the view of promoting them to foremanships. If they are very efficient on all classes of work, they may be just the men the company wants as foremen, to instruct workers how to attain greater production.

### LABOR ON SPOILED WORK AND DEFECTIVE MATERIAL

When an operation inspector discovers work which is spoiled to the extent that it cannot be saved without additional operations being performed on it, he issues a spoiled work slip which shows the worker's number, and then records his own number and signature on the slip. After the spoilage has been recorded on the daily inspection report, daily production record and routing card, respectively, the spoiled work slip is sent to the factory accounting department where the total time saved is reduced by the number of pieces spoiled times the actual time per piece. The worker, therefore, receives extra earnings only for those parts which are good. At times, parts do not pass inspection, but they may be made to pass the limits set with a slight additional operation. Such parts are called incorrect material and the worker is allowed to correct the parts on his own time by having this operation considered as part of his actual time. If the parts are found to be defective during machining, that is, if castings have blow holes or forgings are spotty, which are purely material defects and no fault of the machinist, and if the operation is completed before the defect is discovered, the worker receives credit for the labor performed since it would be unfair to make him stand the burden of something beyond his control.

### USE OF EFFICIENCY RECORDS IN NORMAL TIMES

The method of determining proper hourly rates (hiring rates) is to divide the workers into three classes, A, B, and C with a minimum and a maximum rate in each class.

In the chucking department where the machine tools used consist of automatic and semi-automatic chucking machines, the classes and ratings might be as follows:

	Class A		Class B		Class C	
	Rate per Hour Minimum-Maximum		Rate per Hour Minimum-Maximum		Rate per Hour Minimum-Maximum	
Jones and Lamson Operators	36	48	29	35	23	28
Libby	36	48	29	35	23	28
Gisholt	44	55	34	43	28	33
Potter and Johnson	36	48	29	35	23	28
New Britain	44	55	34	43	28	33
Acme	36	48	29	35	23	28
Bullard	44	55	34	43	28	33

The figures are fictitious, but they show the basis of rating. Class C men on Jones and Lamson Chucking Machines would be rated from 23 to 28 cents per hour; class B men from 29 to 35 cents;

and class A men from 36 to 48 cents, depending upon their efficiency in the respective classes. A worker's rate is increased in his class or the man is promoted to another class, according to the progress he has made, based on results as shown on his efficiency and deficiency records, consideration being given to attendance, efficiency, deportment, spoiled work and tardiness deficiency as well as production efficiency.

When a worker's records, and observations of him, indicate that he is not attaining the standards set, he is given three warnings that unless he shows improvement, he will be demoted to another class or will have to accept a decrease in his wage rate in his present class. After the third warning, if no improvement is shown, he is advised of his demotion. In very few cases are more than one or two warnings necessary, for it is self-evident to the man that the company has an accurate check on his movements and performances, and he may realize that the only way he can obtain his reward is by strenuous and earnest labor. In cases where an application for an increase in a wage rate is made, the records are carefully studied and if no increase is warranted, the employee is advised as to the reason which is plainly evident on the efficiency and deficiency records. Very few requests for wage increases are received from employees, however, since each worker is automatically increased in rate and class from his record of individual performances. In other words, his efforts are recorded and rewarded automatically and he is not lost sight of. The procedure in use in many plants, today, is to raise individual rates at different times upon the foreman's recommendation. This was the practice in the plants under consideration before the present incentive system was established. At one time it was desirable to make a general increase of rates. The employees' record cards were carefully checked and it was discovered that there were good workmen who had been with the company a long time, whose rates had not been increased in three years, while some of their fellow-workers had received advances several times during that period. It was apparent that the foreman had perhaps deliberately failed to recommend these men.

The following description of an actual occurrence will show the fairness of keeping employees' performance records. A foreman made out and forwarded to the employment manager a request for discharge for one of his men, giving as reasons "spoiling too much work" and "too much absence from work." Reference to the employee's records showed that his spoiled work deficiency was practically nothing and that he had lost no time in several months. The foreman's request for discharge was refused and he was advised that dishonesty of this kind would not be tolerated. This foreman wanted to be boss and to discharge those men who did not come up to certain personal standards which he had set. He was soon convinced that the man's individual performances were the

first consideration and requests for discharges had to have a basic reason, which would stand investigation.

#### USE OF EFFICIENCY RECORDS IN DEPRESSION PERIODS

Regardless of how much it hurts to lay off some workers it is necessary in times like the present to shut our eyes to sentiment and reduce the force. Obviously the ones retained should consist of those who are faithful, loyal and most efficient. How many firms employing large numbers of workmen can conscientiously state that they have kept their best men? They cannot be sure without an intimate knowledge of each individual's achievements. Probably the most common method used in reducing the force is to ask the foreman for a list of the men whose services in his opinion, could most easily be spared. It is undoubtedly true that there are many cases of worthy men who have been discharged on account of the antipathy of foremen. The workmen may have lacked tact and did not hesitate to show their disdain of the head of the department. An employee may be independent or sensitive and go about his work without kowtowing to his foreman who may resent an independent spirit. Yet such a worker may be one of the most efficient and valuable men in the shop. Nevertheless, his is liable to be the first name on a foreman's list of men to be laid off. How much fairer it is to both the workmen and the company to have the factory manager consider each man from the employee's record of production, attendance, deportment, spoiled work and tardiness. Certainly the high efficiency men have helped to make the company successful. They should be retained as a reward for giving their best service and allowances should be made for temperament.

The workers who rank high and average best should form the nucleus of the larger organization that will be necessary when business becomes normal again. Performance records should be referred to when business does increase, and when it becomes necessary to employ more workers, the company will want to re-hire those employees who ranked highest when they were laid off. It is more satisfactory to refer to "past performances" and to read the whole story than it is to consider several hundred men whose only ratings are recorded as first class, good or fair, those classifications perhaps having been made by a prejudiced foreman. How much better is one man than another who is rated good? Perhaps it cannot be determined except from the foreman's memory. This method is not wholly reliable.

Generally speaking, managers have not given as much attention to the quality of workmen as they have to the quality of their tools. Before buying tool steel they insist on knowing the contents of carbon, manganese, silicon, phosphorus and sulphur, and the elastic limit, tensile strength, elongation, contraction and schleroscope hardness of the steel. Yet all that they know of the human being working with this steel, is that he is rated by his foreman as first

class, good, fair or poor. A manager should know the varying efficiency ratings of all of these different classes of men, who should be analyzed as carefully and as positively as their tools are specified and inspected.

This paper may be interpreted as an appeal for justice to the worker which is not its purpose. Justice is impartial and means fairness to both workers and owners. It depends largely on co-operation. The writer realizes, however, that co-operation does not mean only a union between the executives and the heads of the departments, but that it must be a union between the officials, the foremen and the largest unit of the organization—the workers—if success is to be assured. To attain that co-operation, rewards commensurate with a man's individual achievements as compared with the performances of his fellow workers must be paid.

The reader is asked to put himself in the shop-worker's place. Acknowledge that he has all the aspirations to succeed that you have. Give him credit for being intelligent and of good education, as most skilled mechanics are. Then consider what you would do among hundreds of co-workers, on a day or hourly rate, with no chance to show your superiority as a mechanic. Would you strive? Perhaps you would for a time until you became disheartened and were convinced that your fellow-workers knew what they were talking about, when they quietly told you that it was useless to work harder than they did, as there was no personal reward for it, and that there was only one chance in a thousand of being recognized for it. If, after months and years of extreme effort no recognition came, other than your rating as a first-class worker, would you continue to strive? You would be convinced that the easiest way was the best, and you would admit that there was no incentive to keep on. Your efficiency would drop off and you would join the rest of your co-workers in the "Society of Discontent" or the "Apathy Club." But, suppose you were advised that you would be paid on the basis of the time you saved for the company. Would you still continue to plod along? No, for your ambition would be stimulated. You would have something to work and compete for and the harder you worked the greater the reward you would receive. You would be happy in knowing that you received pay for what you individually accomplished, not on the principle of being a first-class worker, along with hundreds of other first-class workers, who were rated neither better nor worse than you. The spirit of rivalry would be re-established and you would feel that you could be a success in your own particular work where you had failed before.

The methods of securing effective work from labor as outlined in this article cannot be carried out unless workers are recognized and rewarded as individuals. Grouping labor according to hourly ratings is proper for a basis, provided that there are enough groups or classifications, as illustrated by the tables, shown under the



heading "Use of Efficiency Records in Normal Times." An incentive must be established which is based upon a standard of time, and all time saved should be credited to the workers. Performances must be recorded promptly. The entire method must be on a foundation of fairness to both the company and the employee. As a result the company will have boosters, happy workers, permanent efficiency, and the workers will receive permanent earnings above the labor market rate.

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