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COPYRIGHT BY THE NATIONAL ASSOCIATION OF COST ACCOUNTANTS JULY 1952
DEEM IT A HIGH HONOR to be privileged to represent the National Association of Cost Accountants at this The Sixth International Congress on Accounting. The Association which was only founded in 1919 today has some 30,000 members located in all parts of the free world. It is fundamentally an organization devoted to the study of the problems of industrial accounting and related phases of business management.

In attempting to draw a profile of the accountant in industry in the United States it seemed desirable to first review briefly the development of industrial accounting and consider the place it occupies today in the American industrial enterprise. Against this background the accountant in industry takes on perspective and emerges in more definite form.

Historical Development of Industrial Accounting

Industrial accounting as we know it today may be said to have had its start in the United States during the last two decades of the Nineteenth Century. One who had much to do with this development was the late Frederick W. Taylor, so-called father of scientific management. Dr. Taylor and his associates of that far away day probably never thought of their pioneering work as industrial accounting but the big contribution which these men made to the art was the practical idea of setting standards of performance for jobs and of com-
paring the actual time taken to perform the jobs with these predetermined standards. It is interesting to reflect in these days of highly developed industrial accounting techniques that these pioneers of some seventy-five years ago used all the fundamental principles of the modern standard cost system with the exception of the continuous control of cost variances through appropriate cost variance accounts.

In the succeeding years and up through the first decade of the twentieth century industrial accounting procedure developed somewhat slowly. Progress seems to have been made more in the area of engineering than accounting. The torch was carried largely by industrialists who experimented with the new methods and found them valuable and by a small but almost fanatical group of practitioners. The tremendous increase in industrial output brought about by World War I focused attention on the need for industrial accounting methods and procedures. The result was a blending of the work of the scientific management practitioners with that of the accountants. This marriage produced the cost accountant who operated in an area between and overlapping the work of both the financial accountant and the industrial engineer. The work of the cost accountant usually leaned more heavily on accounting than on engineering techniques and, as a result, the use of job order costs and allocated historical costs came into prominence. However, all during this period a limited but growing number of accountants continued the development of the standard cost or engineering approach to industrial accounting.

During the decade of high business activity in the United States which followed the close of World War I, there was a widely expanded acceptance and use of industrial accounting in industry. This coincided with a substantial influx of trained cost accountants into manufacturing positions. Although during this period there was also considerable expansion in the field of management or industrial engineering which was the successor to the earlier term, "scientific management," the industrial accounting work of that period was largely under the direction of accountants, usually with shop training or experience, rather than engineers. The so-called actual or historical cost concept was widely used and the traditional accountant's love of balancing all cost transactions out to the last penny was indulged in all too often.

The great depression of the early 1930s made it necessary for the businessman to re-examine all phases of his organization to determine whether or not they represented valuable contributions to the business welfare. Those things which could not justify their existence in terms of this test had to be tossed overboard. Industrial accounting naturally had to stand up and be assessed.
along with all other activities of the business. In many cases the procedures were weighed in the balance and in the opinion of the executives concerned found wanting. Not infrequently this elimination or change of methods which were used formerly went too far and, although expenditures were reduced, certain valuable operating information was lost.

Out of this crucible and developed from the white heat of necessity came a much greater appreciation on the part of the business community of the important contributions which practical industrial accounting can make to the organization and a more general understanding of the particular techniques which will best provide management with the tools needed in the day's work. All of this resulted in a greatly expanded use of practical standard cost procedure and a corresponding decline in the use of historical or bookkeeping costs. The intense competition of that period had the beneficial result of educating great numbers of executives in the fundamentals of practical industrial accounting to the great benefit of the business community generally through improved competitive conditions and enlightened operations.

It was well that this broadening of the industrial accounting concept of so many executives took place otherwise accounting and control problems which were ushered in during World War II and which were phenomenal in scope for most industrial companies, might well have been appreciably greater. For nearly 10 years prior to the outbreak of World War II American industry had been operating at low levels of output, with price structures geared to these levels. Almost overnight with the outbreak of the war, came the demand for capacity operations in practically all lines of manufacturing. There was no previous yardstick of measurement which could be used to determine fair prices and probable profits at these new volume levels. In many lines multiple shift operations were called for where single shift operations had been the order of the day for many years. Obviously historical or accounting costs would be of small value to management in its efforts to get fast answers to the pressing problems which were arising on every hand. Hence the experience gained during the lean years in developing practical combined accounting and engineering costs was of utmost value.

**Modern Industry and Accounting**

The industrial executive needs two fundamental results from his accounting procedure:

1. A general accounting plan which will record the day to day transactions with clarity and in sufficient analysis to make possible the prompt preparation of analytical statements of profit and loss and of condition at the end of each month.

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(2) an industrial accounting plan which will show the anticipated cost of all products in the line, the effect of varying volume levels on these costs, and continuously reflect in usable detail any differences which may be found to exist between these anticipated costs and the actual results.

This information is needed particularly by the medium-sized and small American industrial enterprise because, by the very nature of things, the small business has to be more efficient than so-called big business if it is going to compete successfully with giants in its industry.

A few examples will illustrate the practical uses of modern industrial accounting.

An ever-present problem is that of measuring the profitability of the different products which a company makes. Obviously it is a simple matter to determine the calculated cost of each product and the resulting gain or loss. Therefore, why not simply discontinue the unprofitable or marginal products. Unfortunately life is not that simple. Immediately certain questions will arise, such as the effect on the business of the failure to provide a rounded line of products and the effect on the cost of currently profitable products if they are forced to carry the burden otherwise absorbed by the marginal products. Management is expected to keep the plant busy, which means keeping people employed and earning reasonable profits on the family of products, not necessarily on all specific products. The answer to this question of product profitability can only be provided by soundly developed accounting and cost information.

When and at what price to sell to a large buyer can pose a serious problem. One of these huge companies may offer the medium-size manufacturer a sufficient volume of business to utilize a sizeable amount of his plant capacity for continuous operation over a long period of time. The buyer will usually want a substantial price concession on the theory that the manufacturer will have practically no selling and little administrative expense. This argument may prove correct, provided the manufacturer will discharge people and otherwise reduce selling and administrative expenses commensurate with the desired reduction in price. But, unless this is done, the regular products will have to bear as additional cost the expenses which will not be recovered in the special price. It is not intended to argue that sales to large buyers of this type are not desirable but, instead, to emphasize the fundamental need of adequate industrial accounting and cost information as a means of determining whether or not such business is desirable, as it well may be, and of obviating the possibility of the manufacturer pricing himself out of business.

The industrial executive needs continuous and accurate data in connection with labor costs. Following the great depression of the thirties, labor unions

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in the United States expanded phenomenally and wages increased substantially. The principle of paying the highest possible wages has been quite generally accepted by American industry for many years. Whether or not any wage can be afforded will depend entirely on whether or not it is earned in terms of production. No wages are too high, provided the goods produced can be sold in adequate volume at prices which will return fair profits to the enterprise. Management must have continuous information with respect to the balance that is being achieved between wages and the production received for them.

Not enough attention has been accorded by industrial companies in the United States to the importance of having carefully set up systems of job evaluation to rate the jobs and merit rating systems to rate the employees who perform the jobs. So-called job evaluation plans are quite generally used but, all too often, they fail to do an adequate job. A rather common weakness flows from a confusion of the job as such with the worker who is performing it. An unfortunate result of the industrial system has been the too general failure to recognize the individual as such. It is a common occurrence to lose him in the mass group of workers simply known as "labor." Happily, many industrial companies are recognizing this fact and are taking steps to correct it. This can be helped effectively through the proper development and use of merit rating coupled with job evaluation. With this program in effective operation, the worker, regardless of his job, ceases to be lost in a huge group and becomes recognized as an individual who knows he is under the eyes of management and that good work and loyal service will get commensurate rewards. Probably nothing the accountant can do for his company will be more rewarding than effective work in this important area.

Some Industrial Accounting Techniques

Assistance in obtaining the answers to these and other problems which are continuously arising in industrial enterprises can best be provided by the use of standard costs. But it is not enough simply to have standard costs for all products in the line. The operating conditions which were used as a basis in setting up the standard costs must be definitely known. Fundamentally, the standard costs should reflect the cost of producing a specific product at a given level of output and under an assumed set of circumstances. All of these conditions must be definitely spelled out. They represent the time table of anticipated operations. An essential requirement of the standard cost plan is to provide management with knowledge as to how much can be cut from these standard costs before invading the field of out-of-pocket costs. In other words, in a period of intense
competition, what is the point at which the company must stop doing business at a loss in trying to make a profit.

It has been traditional to separate costs into the two divisions of variable costs and fixed costs. To meet the needs of modern business, this two-way split is not enough. A three-way cost analysis is essential: (1) out-of-pocket costs, (2) fixed or sunk costs, and (3) semi-fixed costs. Out-of-pocket costs are all those costs which are directly altered by volume—direct material, direct labor and all indirect costs which directly go up or down with the production of goods. The fixed or sunk costs include all expenses and costs which will be present regardless of operating conditions. They include insurance, taxes, depreciation, watchmen's salaries, firemen's salaries, fuel, maintenance and any other kindred costs. Hence, on the one hand, will be reflected all costs direct and indirect which vary directly with volume while, on the other, will be shown all costs which will be present whether or not the plant is operated. The third element, semi-fixed costs, refer to all expenses not allocable to the out-of-pocket or the fixed classifications. These are the salaries and other costs which management believes are essential in order to operate efficiently at the anticipated volume levels and yet would have to be pruned in case of bad business. It would, for example, be impossible for management to reach a sound conclusion with respect to the advisability of taking special price business from large buyers, as discussed previously, without cost knowledge broken down in accordance with this three-way split. This analytical information is also essential if the management is to determine intelligently with respect to the profitability of various products in the line.

Management needs monthly profit and loss statements which are co-ordinated with the cost control program. Cost of sales should be obtained by pricing shipments at standard costs and not as the result of taking inventories. It should be emphasized that this procedure refers to income statements for management purposes and not to those prepared for general financial purposes at the end of the fiscal year or other period. The uses of the two income statements are very different. For financial reporting purposes, the income statements should show the results of operating the business.

This information is not sufficient for management purposes. Management must know continuously from month to month, not only the results of operations but, in addition, these results must be known by classes of products costed on the basis of the standard costs which have been based on the management's operating program. In this way, management can determine the operating results that would be provided by the orthodox income statement. But, more importantly, management will also know: (1) how these standards or pre-determined costs were arrived at, (2) why they were arrived at as they were, and (3) what results were obtained by virtue of adhering to these standards.
costs compare with the sales dollars received for the products, (2) how much this resulting profit on the basis of standard costs will have to be adjusted upward or downward to reflect differences between anticipated and operating results and (3) reasons for the differences. The reasons for the differences will be obtained from the monthly analysis of cost variances which, under certain operating conditions, may be the most important executive report.

Many companies operate quite complete and detailed budget systems which start with the sales forecast and follow through the various points of control to the income statement and the balance sheet. Not infrequently these companies continuously co-ordinate operating results with budgeted anticipations to obtain variances in all important phases of operations. It should be emphasized that these completely budgeted situations are the exception and not the rule. It should, however, also be pointed out that, wherever standard costs are used—whether or not they are tied in to the financial books of account—some form of budgeting will be found.

**Status of the Accountant in Industry**

It is obvious from a review of this brief outline that the job of the accountant in industry is an important one and that the person who fills it satisfactorily must have stature. He may, for example, be known in his company as treasurer, controller, chief accountant, auditor, but, whatever his title, the chief accountant in industry is a man of importance and, if he measures up to his opportunities, he is likewise a man of substantial value. As opportunities for the accountant have widened, his responsibilities have naturally kept pace.

At times he is in a rather difficult position. He is a member of the management team. In this capacity he is subordinate to the chief executive of the company. Yet he is a professional man, even though all of his time may be devoted to the work of a single employer. It seems clear that a test of a professional man is the type of work he does and the attitude of mind which he brings to the day's work. The accountant who devotes all of his time to the affairs of a single company may be every bit as much a professional man as his brother who serves a number of companies. So the industrial accountant, although subordinate to the chief executive, is a professional man and as such he has definite responsibilities to third parties who may rely on accounting reports upon which he has placed his approval.

The accountant in industry who issues financial statements to be used by third parties, which he knows to be false in any particular or which he should have known to be false had he exercised the care and prudence expected of a
trained man, does so at his personal peril and he could be estopped from pleading in his defense that his superior officer ordered him to take the steps which he took. Hence, more and more, the accountant in industry is, in his responsibilities achieving, somewhat the same position as the certified public accountant in public practice who must at all times maintain an independent position.

There are some who believe that the chief accountant in industry should report directly to the board of directors and not to the chief executive of the company since, as a professional man, he should be independent of the operating management. This idea would obviate the peculiar position of the accountant as referred to above. Theoretically, a good case can be made for the principle of having the chief accountant report directly to the board of directors but, from a practical standpoint, the plan is unsound. As a matter of good organization, the president of the company or the chief executive, regardless of his title, is engaged by the board of directors and held responsible by the board for his actions and for the results of the company under his direction. It is essential, therefore, that he have a free hand in all phases of operation, including the hiring and firing of personnel. As a practical matter, therefore, if the chief accountant is part of the management team but at the same time required to report to the board of directors he will be placed in an impossible position the first time he takes an important stand with the board in conflict with the ideas of the chief executive.

In practice the only way this procedure would work would be for the board of directors to engage the chief accountant and have him report directly to the board and in no way be responsible to the chief executive. This would seem to add an unwieldy step to the business organization and work of the board which ought not to be performed by its members. It seems quite generally accepted practice in the United States for the chief accountant to report directly to the chief executive of the enterprise. If, however, the occasion arises wherein he finds himself faced with instructions from his superior which would require him to do something which he, as a trained professional man, knows he ought not to do, his alternative course of action must be quite clear. He must (1) either convince the superior officer of the necessity for conforming to proper and accepted procedure or (2) resign. Ethically speaking, an accountant cannot compromise on a fundamental issue of this sort and, practically speaking, doing what he knows to be the right thing will prove to be good business.

Not only is the accountant in industry an important member of the management team but there is an increasing tendency to include him in top management committees and not infrequently on the board of directors. It is also

**Some Interesting Points**

The chief accountant in industry is, in his responsibilities achieving, somewhat the same position as the certified public accountant in public practice who must at all times maintain an independent position.
interesting to note the substantial number of chief executives of American industrial companies who started as accountants. With the continuing growth and complexity of American business, it would seem reasonable to assume that the accountant in industry will play an increasingly important part in industrial councils and will find ever-widening opportunities for service.

Some Social Implications

The accountant in industry is becoming increasingly conscious of the social aspects of his work. With industry operating at high levels of output so essential to mass production enterprises and with competition ever present, the costing concepts of the accountant can have far-reaching effects on the successful operations of his company.

Unsound costing procedure, coupled with unsound methods of price determination, could well serve to price a company out of a competitive market. Under the most favorable circumstances, a delicate balance must necessarily exist between the three fundamental elements of wages, prices and profits. When one of these elements gets out of balance, difficulties develop.

The first and fundamental job of business must be to serve the public interest. There are some who believe that the first job of a business enterprise is to make profits. Obviously, unless adequate profits are earned, no business enterprise will long endure. But if the enterprise exists solely to earn profits for the owners, it is most decidedly not carrying its load in the modern social structure. This job of serving the public interest requires that (1) business constantly strive to get more goods to more people at the lowest possible prices and (2) to the greatest extent possible provide a job for every person who wants one and at the highest possible wage. All segments of society in the United States are realizing more and more that full employment at high wages is essential if the American system of a free economy is to survive in a world that has been drifting toward totalitarianism. Excepting in periods of national emergency, there is no place for spread-the-work methods or other limitations on output.

The public attitude towards business is going to depend more and more upon the job that business does in meeting these fundamental highly important social problems. For the first time in recorded history we are rapidly developing an industrial system that is capable of producing all the things that we need and want but we have much to learn about how to bring to all the people the high standards of living which this system can make possible. In this tremendous job the accountant in industry has a marvelous opportunity for service and by the same token a grave responsibility.

JULY, 1952
Selecting and Training Industrial Accounting Staff

by DONALD E. CHAPMAN

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A plan for spelling out the accounting jobs within an organization and the opportunities arising from vacancies, for choosing new personnel from among graduates of business schools and colleges, for appraising work performance and recognizing progress, and for introducing a formal training program, are the four features of the case material here presented. The author points up the procedure described, with interpretative comments.

In the past, the accountant has often been looked upon as a person performing a recording and reporting function—nothing more than a bookkeeper. Today, this same accountant is called upon to advise and assist management in formulating policies which will lead the company into profitable endeavors. With the records and statistical data he has compiled and with the knowledge he has gained while accumulating this information, the accountant is in a good position to assist management in formulating these policies. It may be said that the line of demarcation between the accountant and management has steadily decreased. Because of this close relationship with management, it is logical to assume that the accountant is a natural contender for filling executive billets in the organization as they become vacant. However, to gain recognition from management, the accountant must gear his activities so that management may intelligently make decisions and solve specific problems.

Numerous opportunities for the accountant lie within the accounting department. If this department is to perform efficiently, the work must be planned, organized and supervised. There is a definite need for the person who can successfully accomplish these three phases, not only in the accounting department but in other departments as well. To gain the confidence of management, the accountant must talk in a language which is familiar to management. He must present his figures in such a way that management will understand the terminology and be able to distinguish differences. In other words, the accountant must be able to sell his tools to management. To do this, the accountant must have a thorough knowledge of production processes and control procedures, and their relationships to one another. This knowledge is vital to the accountant in presenting his reports to management. It puts him in a better position to interpret his figures for management which, in turn, will use the information to plan future policies.
From the above statements, the conclusion can be drawn that there are numerous advantages for developing the accountant to perform executive functions in the organization. It is the purpose of this paper to present a program for selecting and training personnel in the accounting field to become potential executives. However, before presenting this program, it is believed that further evidence of the need for developing potential executives in industry will make the reader become even more aware of the problem.

Why A Selection and Training Program? Four Elements

Industry is cognizant of the fact that there is an increasing demand for creating "reserves of trained executives" to fill specific positions in the organizational structure. Since World War II, this idea has had a tremendous forward movement, primarily because of necessity. This necessity was created during the period between 1940 and 1945, when the infusion of new blood in the lower level of management nearly ceased. Men at the top postponed their retirements, creating a breach in succession. In a survey of sixty-five companies, it was found that the average age of the officers had risen from forty-seven in 1929, to fifty-four in 1949, and the average age of the presidents alone, from fifty-three to nearly sixty. Often there was a difference of only three years between the age of a retiring executive and that of his apparent successor. Another discovery which has jolted many top managements when confronted with the figures, is that normal retirements account for but a fraction of the yearly attrition which they can expect in executive ranks. Resignations, discharges, sickness, deaths and early retirement now open up two to six times as many jobs as anticipated retirements.

At the same time, the increasing complexity of business has loaded management with specialists, few of whom have much knowledge of—or interest in—overall management. Up through the twenties, production men generally got the top posts, then salesmen took over the reins. This was no great handicap so long as the only conscious goals of business, in its search for profits, were output and satisfied customers. But, since the nineteen thirties, the specifications for good executives have been broadened to include capacity for financial administration, the handling of public and labor relations, and responsibility to the community. The result is that many top executives have acquired an impelling self-consciousness about their responsibilities. Such critical introspection has led many to realize the weaknesses in their own ranks.

At present the call for trained executives is even more significant because of the needs created by defense production. Increases in industrial output have
necessitated expansion of plants, the establishment of new plants, the development of new techniques, and expanded research. In each of these fields, training plays an important part.

In this paper emphasis is placed on the accounting field. No two companies have followed the same system of recruitment and training, but a logical sequence of steps in a formal development program is now established. The program presented here is the one followed by Trico, which manufactures automotive equipment and parts for a majority of the automobile manufacturers, as well as the jobber trade. This program consists of five phases which include the following:

1. Organizational analysis.
2. Personnel selection.
3. Evaluation and guidance.
4. Personnel development.

**Inventory of Accounting Jobs**

The first phase, organizational analysis, begins with an identification of all the company's operating functions and responsibilities, alignment of functions, and removal of conflicting responsibilities, and finally the preparation of an ideal organization chart. In our company, this phase of activity has been recently incorporated into the objectives of the management engineering department. The primary purpose of this department is to investigate, analyze and make recommendations with regard to the organization, administration and control of company operations.

One of the functions of the department is to provide a consulting service to supervision and to the production and staff departments in the area of job descriptions and personnel specifications. These job descriptions and specifications are a necessary prerequisite to any training program. First of all, they are of immeasurable aid to the company representative who is recruiting college graduates and, second, they aid the "trainee" while he is on the job.

By preparing these job descriptions and specifications, we are tending to become more objective in our placement of the individual. It is our principle that, if people are intelligently placed, then sound training, follow-up, and development will pretty well insure success in the particular job. Whether the individual rates a better job is another matter. The job descriptions for each job and succeeding jobs should be so definite in every respect that each trainee will know exactly what is expected of him, what the rewards of the job will be, the "prices" in terms of performance he must pay for the job, and the machinery which will be set up to give him the necessary experience and training to qualify.

In addition, areas of responsibility must be developed for every individual in each level of management, so that, after training for each assignment, the
accountant may be able to perform tasks without constant reference to his superiors for advice and directions. He should find himself able to carry out his functions and advise his superiors of his accomplishments. The assigning of responsibilities to the lower levels of management relieves the higher echelons of many miscellaneous problems.

There is a second part to organizational analysis. In addition to the determination of the position requirement, recorded by a job description which defines the responsibilities and duties necessary for the performance of the position, the individual qualifications required of the person filling the billet must be set down. This company-wide analysis, which is by no means a simple task, will complete the organization analysis phase of the program.

**The Survey of Vacancies**

The next phase, personnel selection, includes initial selection and promotion. In supervisory selection, two factors are of paramount importance: (1) the potential executive must have the ability to handle people and (2) he must have definite future growth possibilities.

The methods used by Trico in the selection of accounting personnel are described in the succeeding paragraphs. The first step is to determine the number of accountants required in the organization for the ensuing year. The survey for this purpose is usually conducted in the fall through a personal visit to the accounting and cost control department heads by a representative of the training department. The specific jobs are identified and, if job descriptions have not been prepared for them, a request is immediately made to the management engineering department to do so. Existing descriptions are checked for completeness.

To give an idea of how the openings to be filled are recognized as the year rounds into spring, it may be cited as an example that, for the year 1950 and 1951 up to and including April 1951, the company’s expansion developed a need for ten men to fill new positions. In addition to this, three men had left the company. Some of these vacancies had been filled. The following summary reveals a net reduction in the number of technical and business administration employees:

<table>
<thead>
<tr>
<th>New positions (10)</th>
<th>Positions vacated (3)</th>
<th>13 Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired in 1950</td>
<td></td>
<td>4 Employees</td>
</tr>
</tbody>
</table>

| Vacancies remaining | 9 Positions |

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Each year, a similar summary discloses minimum needs. In addition, three other factors were taken into consideration in the spring of 1950-51, used here for illustration:

1. The company was expanding its plant facilities and needed more trained men to administer the new facilities.  
2. Twenty-one of the company's technical and business administration employees were in a military classification which would take them into the military sooner than other civilians.  
3. The demand for accounting and technical personnel in industry exceeded the supply and this situation was expected to continue for several years.

Samples of individual vacancies in which business administration personnel could be placed were:

1. Supervisor for tool cost statistics section.  
2. Supervisor of standard cost and budgetary control department.  
3. Analyst for departmental costs in the standard cost and budgetary control department.

Making Contact with Educational Institutions

The only basic qualifications for employment in our accounting departments is that the candidate be a graduate of a recognized business administration course, preferably an accounting major, and eligible for employment. Stress is placed on character, leadership, and initiative. The applicant must be of sound health and able to pass the physical examination which is required for employment.

The majority of the accounting and business administration graduates considered are from local schools. The reason is that these men are usually local residents. Past studies have revealed that hiring local residents results in a lower turnover. Nevertheless, we do not exclude the possibility of hiring potential executives, having a high stability rating, from colleges in other locations. Past experience, largely, governs the colleges contacted in this group. Members of the training department visit the local schools. Students attending other schools are required to visit the company for the first interview.

Placement directors in the selected colleges and universities are contacted regarding the jobs available. A tentative date for the interviews is suggested and, if agreed upon, confirmed. It is recommended to each placement director that he forward to the company's training director the estimated number of candidates who would be interested in being interviewed. The purpose of this estimate is to allow the training director to determine the time required for recruitment.

Group and Individual Interviews

Once the date and time have been established, arrangements are made to hold a group meeting with the candidates before individual interviews. This meeting
The training director presents general information about the company, its history, products, organization and operating policies. The training program is discussed, as are also the opportunities available in the company. These meetings have been helpful in expediting the interviewing process. They save a considerable amount of time which the interviewer would otherwise need to answer individual questions.

Following the group meeting, the individual schedules for the interviews, which are held about twenty to thirty minutes apart, are prepared. The candidates who are definitely interested in employment and are scheduled for interview, are given a selection application to complete before the interview.

In our opinion, the interview is the most important part of the selection phase of our accounting personnel program. It is necessary for the interviewer to be well trained in this area. The interview is largely subjective and the outcome of it depends, to a great extent, upon the experience, personality, and skill of the interviewer. A great deal of emphasis must be placed on the soundness of his judgment.

The program adopted at Trico for selecting employees is based on a system developed by the training department in January 1951. This system rests primarily on the concept that basic habit patterns seldom change and requires the determination of those basic habit patterns. It is done by gathering historical information. This information is then analyzed from the standpoint of the applicant's "can do" and "will do" factors.

The "can do" factors include such areas as appearance and manners, education, intelligence, experience, and physical condition. The "will do" factors include such areas as character traits, motivation, and emotional maturity. By using these basic selection principles, we believe that we can be more objective in placing the right man in the right job, which, after all, is our primary responsibility.

It is not customary for the interviewers to hire a candidate on the spot. The purpose of the first interview is to screen the applicants. The candidate is not informed as to the decision but merely told that he will hear from the company in a few days regarding the outcome. Upon returning to the office, the interviewers check the various rating sheets along with the completed interview forms.

The most promising candidates are selected for additional interviews with the department heads most concerned with the candidate's final placement. The remaining candidates, not selected for additional interviews, are so notified.

Following the second interview, definite commitments are made to candidates chosen for employment. The others are notified that their records will be kept...
on file and, when vacancies arise, they will be notified with regard to possible employment.

As can be seen from the foregoing procedure, the multiple interview is used. More than one interviewer is involved. This method of interviewing is most common in industry because it tends toward a more objective analysis of the potential executive than does a rating based on one man's opinion. Some companies even go so far as to use formalized tests along with the multiple interview.

**Rating the New Employee**

The third phase of the company selection and training program has to do with the evaluation and guidance of the trainee. This usually takes the form of periodic ratings based on three essential determinants for complete evaluation:

1. **Performance.**
2. **Growth of the individual.**
3. **Estimate of ratee's future potential.**

The training department, through its contacts with every employee, starting with selection and continuing through orientation and the various phases of job training, is in a position to arrive at a sound estimate of potential ability and special interests and skills. To extend this program, the training department provides a consulting service to the staff and production departments in the area of employee evaluation and guidance.

The first step in this service is the development of a ten-test battery for the counseling and guidance of technical, business administration and supervisory personnel. This battery provides a check of general ability, mathematical ability, mechanical comprehension, supervisory knowledge, interest and personality. A form, entitled, "Technical and Business Administration Profile of Test Results", was developed. This was designed so that the employee's test scores could be plotted opposite a scale which showed whether each score was very high, high, average, low, or very low in relation to the scores made by the other company employees taking the same test.

In addition a counseling and guidance patterned interview entitled, "Technical and Business Administration Counseling and Guidance Program Interview Questions," was developed for technical and business administration employees. This interview provides for a review of employees' ambitions, interests, training, work assignments and self-development program.

In this same area, the graphic scale rating system, used by the training department to enable supervisors to rate employees who are rotated from one job to another, was analyzed. Over three hundred separate rating reports were reviewed.
reviewed and compared for accuracy of evaluation and, as a result, a new form entitled, "Evaluation of Development and Performance," was originated and placed in use. This provided a performance check list, ranking of the employee with others on the same job, a field review of strong and weak points (promotability and development), and a rating of the employee as to overall performance on the job.

Employees are called in for counseling and guidance at the end of each assignment to determine their attitude, interests, ambitions, etc. This step is directed primarily to guiding individuals by presenting to them their weak and strong points, with the thought in mind that they will work to overcome weak points.

Evaluation is a continuous, almost daily, activity and includes periodic rating, multiple judgment, discussion with employee, formal follow-ups and attitude surveys. The purpose of the evaluation process is to determine the growth potential of the individual. The data is compiled and filed in the employee's employment folder, to be used as an aid in determining any action to be taken involving the individual and the company.

Contents of a Formal Training Program

The final part of the company program for new employees is personnel development and was established to expedite the training of technical and business administration personnel. A formalized training program was established to accomplish this phase, consisting of orientation and job rotation. Any new employee requires a certain period of time to become familiar with the company he is working for. If this familiarity is obtained by means of the "school of hard knocks" principle, the employee often becomes confused, wastes time and effort seeking information, and violates rules and regulations.

It was determined that the key to the elimination of much of this confusion is the development of certain attitudes within the employee. These attitudes include an appreciation of company problems, feeling of responsibility for waste, and other attitudes of similar importance. These attitudes can be developed in various ways, but the most rapid means is through the presentation of information in an interesting, cohesive pattern by people who are the most informed about the specific knowledge being presented. This presentation is known with us as orientation and the program finally decided upon at Trico lasts five days and is divided into two basic parts.

Part 1. History and policy of the company.

The first part covers such subjects as the history of Trico, trainee orientation, responsibilities, your career at Trico, pay, vacations, health, safety rules, and
union regulations affecting the trainee. The second part covers such subjects as the description of products, the dramatization of a typical flow procedure of a company product from customer request to delivery, and an introduction of the staff department heads and the general functions of these departments.

After the five-day orientation program, the trainee begins his eight months job rotation program through selected departments. The training program for business administration graduates is designed to present various areas of knowledge. These areas were selected as a result of a survey of the departments which would ultimately receive the individuals undergoing this training program. For the purpose of the training program, these areas of knowledge have been grouped in a list of learning objectives which will be used as a guide throughout the program. Required is knowledge of:

1. People at Trico.
2. Material used at Trico.
3. Departments—organization and operations performed.
5. Scrap control system.
6. Processes and equipment.
7. Analysis of methods.
8. Inspection procedures.
9. Cost systems.
10. Handling systems.
11. Safety facts.

It will be seen that some of the above objectives can be gained in specific departments, while other learning objectives will be gained in all departments.

The following is a listing of the learning objectives already given, correlated with the degree to which each trainee is responsible for achieving them.

<table>
<thead>
<tr>
<th>LEARNING OBJECTIVE</th>
<th>EXTENT OF LEARNING RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. People at Trico</td>
<td>Name, title and function.</td>
</tr>
<tr>
<td>2. Material used at Trico</td>
<td>Uses and reasons for use.</td>
</tr>
<tr>
<td>3. Departments—organization and operations performed</td>
<td>Basic functions of each organizational section and why they are performed, description of each job in each organizational section.</td>
</tr>
<tr>
<td>4. Systems</td>
<td>Description of the system.</td>
</tr>
<tr>
<td>5. Scrap control</td>
<td>Description of system for recording, controlling, and disposing of scrap.</td>
</tr>
<tr>
<td>6. Process terminology and equipment</td>
<td>Description of the process or equipment and the general principle of operation.</td>
</tr>
<tr>
<td>8. Inspection procedures</td>
<td>Description of each procedure.</td>
</tr>
<tr>
<td>9. Cost systems</td>
<td>Description of the flow of cost information and procedure for recording, compiling and analyzing for control purposes.</td>
</tr>
<tr>
<td>10. Handling systems</td>
<td>Description of the types, uses and reasons for use.</td>
</tr>
<tr>
<td>11. Safety regulations</td>
<td>Description of the various safety regulations and reasons for them.</td>
</tr>
</tbody>
</table>
The training program consists of thirty-seven weeks of job rotation among the following jobs for the time indicated:

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inspection</td>
<td>4</td>
</tr>
<tr>
<td>2. Standard cost and budgetary control</td>
<td>4</td>
</tr>
<tr>
<td>3. Metal finishing</td>
<td>2</td>
</tr>
<tr>
<td>4. Standards</td>
<td>3</td>
</tr>
<tr>
<td>5. Quality control</td>
<td>4</td>
</tr>
<tr>
<td>6. Materials handling</td>
<td>2</td>
</tr>
<tr>
<td>7. Production control</td>
<td>2</td>
</tr>
<tr>
<td>8. Inventory control</td>
<td>6</td>
</tr>
<tr>
<td>9. Cost accounting</td>
<td>3</td>
</tr>
<tr>
<td>10. Tool control</td>
<td>3</td>
</tr>
<tr>
<td>11. Tool design</td>
<td>1</td>
</tr>
<tr>
<td>12. Product design</td>
<td>1</td>
</tr>
<tr>
<td>13. Metallurgy</td>
<td>1</td>
</tr>
<tr>
<td>14. Production research</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to his rotation assignment, the trainee is required to attend special educational sessions during this same period. Some of these sessions are held during regular working hours and others are held at the plant after working hours. These educational sessions include courses in such matters as effective speaking, job instruction, and job methods. There are also training films on manufacturing processes, etc.

**What the Results Are**

At the end of this training period, the trainee is placed in the department for which he was hired, if the selection has been sound. This depends on the showing he has made during training and the needs of the company at that specific time. It is our policy to make a sincere effort to place management trainees in positions in which both the organization and the individual will realize the maximum benefit from the training program. From a practical viewpoint, such a program represents a long-term investment in the organizational welfare of the corporation.

By applying a program and training of this type to selected accounting personnel and other personnel with management potential, industry is assuring itself of continued efficient production through intelligent planning, organization and training. Without such a program, executive development may largely be a hit-or-miss affair and threaten to collapse the entire management structure.
A Cost Reduction Department—When and How

by F. W. WAGNER, JR.

Planning Manager, Tube Turns, Inc., Louisville, Kentucky

Pointing out that cost reduction is so direct an attack on loss factors that it is an effort which naturally enlists cooperation, the author of this article elaborates briefly on four conditions which underlie effective company-wide cost reduction and describes the organization and work of department set up to achieve the objectives.

Cost reduction is a management responsibility to its employees, to its customers, to its stockholders and to itself—and has very tangible affects on each of these groups. The following is a simple summary of the principal benefits:

1. Cost reduction benefits employees because—
   a. It makes their job more secure.
   b. It enables them to earn more money.
   c. It teaches them to think and be thrifty.
   d. It instills in them a sense of pride in their work and their company, to see progress in the form of cost reductions. Many employees see waste and extra cost and, to themselves, feel management is not doing its job if these conditions are allowed to continue.

2. Cost reduction benefits customers because—
   a. It gives them more product for the same money or more quality for the same money or a combination of both.

3. Cost reduction benefits stockholders because—
   a. It enables their money to earn larger dividends.
   b. It makes their investment more secure.

4. Cost reduction benefits management because—
   a. It makes individuals better managers and subject to higher salaries.
   b. It makes possible growth and expansion of the company for which they are responsible.
   c. It gives the company a good reputation which is a direct reflection on their ability to manage.

Since cost reduction offers such large benefits to so many people, what is the best way to do the job? In my opinion, cost reduction must be an ever continuing program. The job is never done. No matter how low cost may be at present, no matter how much the company has already reduced cost, further reduction is always possible and necessary because conditions directly affecting costs are continually changing.

These changes need continual analysis and continual revaluation, so why not set up a cost reduction department? Actually there are cost reductions being made in the plant every day, but how many are not being made because there is no organized effort to bring about the savings. That is a question for the company to answer.
is no one to point them out or to do the work so often required to study the problem in order to determine what should be done? Spasmodic programs so often started for reducing costs, do not, as a rule, even scratch the surface and, in some cases, have even done more harm than good. I think cost reduction is a year-in and year-out job which will test the thinking and ingenuity of the best brains in any company. It is a "natural," then, to set up a cost reduction department as a permanent part of the organization.

When is the best time to start this cost reduction department? Tomorrow, if the house is in order. If it is not in order, then as quickly thereafter as possible to get it in order. One does not expect a workman to do a good job without tools and good working conditions, nor a machine to do so without power and maintenance. In like manner, one would not expect a cost reduction department to function properly and to get the best results without its tools and good working conditions. However, the tools and conditions required for this type of work cannot be bought in the open market for so much money but must be manufactured right in the company's own "shop."

**Favorable Conditions for Cost Reduction Activities**

Let us review some of the more important tools and conditions which must be "manufactured."

1. A real desire in the top authority at the plant to operate as efficiently as possible, whether that authority be the president or the vice-president in charge of production or a works manager. Whoever is the top authority must have a keen desire to reduce costs. This is a condition which must exist.

2. Accurate cost reports on material, direct labor, indirect labor, and burden, and presented in simple, understandable language.

3. Accurate accounting reports of how the plant money is spent by departments, by item of expense.

4. Standards — attainable ones, not the kind which can only be met when condition is completely favorable.

There are compelling reasons why the above four tools and conditions must exist at the time a cost reduction department is started if optimum results are to be obtained. In the first place, if the top authority at the plant is not keenly desirous of reducing costs, the cost reduction department will not be charged with the proper responsibility, nor will it get the backing required to do a good job. Also, it is absolutely necessary that a certain climate or feeling be established in the entire operating personnel of the plant regarding the importance of cost reduction work. This can come about only through top authority embodied in an individual who really believes this himself.

It is hardly less important that accurate cost reports be kept. Accurate cost reports are priceless if intelligently used. Inaccurate reports are worthless. If
inaccurate information were used as a tool to reduce cost, it would not take long before all confidence in the figures was lost and, without confidence, there is no "sale." This accuracy should start with the time card or job card, which should show the time spent, by employee's clock number and by operation number. It should show the machine or machines used, with a reason given for any downtime. It should also show the pieces produced, both good and bad. This accuracy should continue in the reporting of raw material receipts and usage, stores items receipts and usage, and the consumption of electricity, gas, fuel, oil, and other major expense items. If plant management is really interested in cost reduction and approached properly, accountants will get accurate basic data.

The problem of accuracy then moves on to the distribution of service department expense. This type of expense has grown rapidly in recent years and will continue to grow because such service departments as tool grinding, product engineering, tool and die design, work methods, time study, production control, laboratory, and others have come into prominence and will pay their way two...
fold if properly managed. Therefore, whatever time and money need be spent to accurately distribute this expense to products, will be worthwhile. An accurate cost report cannot be had without an accurate distribution of service department expense. It has always seemed silly to me for companies to spend thousands of dollars to make sure of accurate basic reporting of labor and material, and then render this reporting worthless by haphazardly distributing service department expense. Today it is not unusual to find service department cost equal to all other operating costs other than material.

Further, to take up the next of the four prerequisites to systematic cost reduction, already listed, it must be known with equal accuracy how and where the plant spends its money by item of expense, because these are the very things we are going to try to reduce—expenditures. If we do not know how we are spending our money, we cannot very well know what to do to reduce those expenditures. Also, a good portion of the expenses never show up in a cost sheet as such, since most of them are presented as burden. Reports disclosing them serve to furnish the basis for holding service department managers responsible for their respective portions of total product cost. Controls should be checked to make sure that all items of expense are being properly charged.

The fourth tool of cost reduction is comprised in standards. Unless we have standards, we are lost, because we have no good means of measurement. Operating personnel should know when they are doing a poor job and when they are doing a good job. For this reason, it is imperative that standards be set by part number and by operation for labor (both direct and indirect), material, and burden. The standards should be attainable ones because most people will fight to reach a reasonable goal but will lose interest if it is beyond the possibility of attainment.

When the foregoing four conditions exist, the company is ready to start a cost reduction department and can expect excellent results if the installation and conduct of the department is properly managed. I do not mean, necessarily, that a company should never start such a department unless all the above conditions exist. There might be times to go ahead anyway.

**Qualifications of a Cost Reduction Department Chief**

If it is decided to start a cost reduction department, it is of great importance to get the right man to run it and to be sure the department is properly placed in the organization. In small companies, the cost reduction department could well be a separate department and its head would report directly to the top authority at the plant. In large companies the department could belong to a
### Analysis of Variance
#### Commercial Forgings

(Colums Shown are for Monthly Figures. Complete Report Has Year-to-Date Columns Also)

<table>
<thead>
<tr>
<th>Production:</th>
<th>Actual</th>
<th>Standard</th>
<th>Variance</th>
<th>% Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>$ 85,000</td>
<td>$ 87,500</td>
<td>$ 2,500</td>
<td>3%</td>
</tr>
<tr>
<td>Labor &amp; Burden (A)</td>
<td>35,000</td>
<td>42,000</td>
<td>7,000</td>
<td>17%</td>
</tr>
<tr>
<td>Dies</td>
<td>4,000</td>
<td>3,400</td>
<td>(600)</td>
<td>(18%)</td>
</tr>
<tr>
<td>Spoilage</td>
<td>500</td>
<td>800</td>
<td>300</td>
<td>38%</td>
</tr>
<tr>
<td>Totals</td>
<td>$124,500</td>
<td>$133,700</td>
<td>$9,200</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Burden Rate Variance:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department A</td>
<td>$ 500</td>
<td>$</td>
<td>(500)</td>
<td></td>
</tr>
<tr>
<td>Department B</td>
<td>2,000</td>
<td>(2,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department C</td>
<td>(500)</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department D</td>
<td>(1,200)</td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>$ 800</td>
<td>-0-</td>
<td>(800)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Idle Plant Cost:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department A</td>
<td>$ 1,500</td>
<td></td>
<td>(1,500)</td>
<td></td>
</tr>
<tr>
<td>Department B</td>
<td>1,000</td>
<td>(1,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department C</td>
<td>500</td>
<td>(500)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department D</td>
<td>700</td>
<td>(700)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>$ 3,700</td>
<td>-0-</td>
<td>(3,700)</td>
<td></td>
</tr>
</tbody>
</table>

| Grand Total         | $129,000| $133,700 | $ 4,700  | 4%         |

(1) Parentheses in actual cost column indicates a favorable variance.
(2) Parentheses in variance column indicates an unfavorable variance.
(A) Burden represents machine operating hours, valued at the established burden rates.

---

**EXHIBIT 2**

A group of units under the industrial engineering department or the planning department and would report to the staff manager of this department. There are advantages to be gained in larger companies by having the cost reduction department reporting to the unit in charge of standards, methods, production control, and plant records. A great deal of the information that the head of the department will require from the plant will come from these departments and most of his requirements will be of a special nature, necessitating preparation time in these departments. If all are under a single supervision, less friction will develop as to whose work should come first during periods of pressure.
### ACTUAL COST VERSUS STANDARD COST BY OPERATION

**Customer X-Y-Z - Part 12345**  
(Columns shown are for Monthly Figures. Complete Report Has Year-to-Date Columns Also)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Prod</th>
<th>Direct Labor</th>
<th>Indirect Labor</th>
<th>Machine Burden</th>
<th>Total*</th>
<th>Cost-Month</th>
<th>% Var</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Act</td>
<td>Std</td>
<td>Var</td>
<td>Act</td>
<td>Std</td>
<td>Var</td>
</tr>
<tr>
<td>Material</td>
<td>2450</td>
<td>.05</td>
<td>.01</td>
<td>.10</td>
<td>.01</td>
<td>.10</td>
<td>.01</td>
</tr>
<tr>
<td>Cutting</td>
<td>2450</td>
<td>.02</td>
<td>.01</td>
<td>.10</td>
<td>.01</td>
<td>.10</td>
<td>.01</td>
</tr>
<tr>
<td>Forge</td>
<td>1500</td>
<td>.09</td>
<td>.08</td>
<td>.10</td>
<td>.08</td>
<td>.09</td>
<td>.08</td>
</tr>
<tr>
<td>Grind</td>
<td>1500</td>
<td>.07</td>
<td>.06</td>
<td>.10</td>
<td>.06</td>
<td>.07</td>
<td>.06</td>
</tr>
<tr>
<td>Pickle</td>
<td>1200</td>
<td>.09</td>
<td>.10</td>
<td>.10</td>
<td>.10</td>
<td>.10</td>
<td>.10</td>
</tr>
<tr>
<td>Machine</td>
<td>600</td>
<td>.08</td>
<td>.07</td>
<td>.10</td>
<td>.08</td>
<td>.08</td>
<td>.08</td>
</tr>
<tr>
<td>Inspection</td>
<td>600</td>
<td>.06</td>
<td>.06</td>
<td>.09</td>
<td>.06</td>
<td>.06</td>
<td>.06</td>
</tr>
</tbody>
</table>

1. Standard production rate is 60 per hour, actually forged 51 per hour.
2. Standard production rate is 12 per hour, actually machined 14 per hour.
3. Parentheses indicate unfavorable variances.

### EXHIBIT 3

The planning and control of costs are the essence of the cost reduction department. There is no cost reduction without production reduction, and the head of the cost reduction department is the operating superintendent, less frills and red tape. The planning and controlling of costs is not the domain of the chief purchasing agent, or the department head. The planning and controlling of costs is the domain of the cost reduction department. This arrangement will also tend to better concentrate cost reduction possibilities which naturally emanate from this group of departments.

Some of the qualifications suitable to the man to head the cost reduction department are:

1. He must be able to think straight.
2. He should be an engineer, preferably an industrial engineer.
3. He should have a good background in the company's general accounting and cost accounting system.
4. He should know the uses and limitations of the machines in the plant and be able to talk the language of the shop.
5. He should be even-tempered and able to keep a cool head under fire.
6. He should have a reputation for good judgment and fair play.
7. He must be able to get along well with people and inspire their confidence.

**Get the Facts and Present Them—Tactfully**

These, then, are the tools for cost reduction: a qualified person to manage the department and the full backing of the top authority at the plant. All is in readiness to start to work. A good question at this point is, "How do we reduce costs?"

A cost reduction department does not reduce costs. Costs are reduced by the operating personnel out in the plant, starting with the superintendent of each section or department and filtering down to the sweepers. This point should be kept firmly in mind at all times, for it is important. A cost reduction department analyzes data and points out the weak spots and offers suggestions to the

**JULY, 1952**

**1307**
ANALYSIS OF BURDEN RATES

Current Month

<table>
<thead>
<tr>
<th>Department</th>
<th>Operating cost</th>
<th>Idle cost</th>
<th>Total accounted for</th>
<th>Department actual expenses</th>
<th>Variance This month</th>
<th>Year-to-date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept. A</td>
<td>$22,000.00</td>
<td>$1,500.00</td>
<td>$23,500.00</td>
<td>$24,000.00</td>
<td>($500.00)</td>
<td>($500.00)</td>
</tr>
<tr>
<td>Dept. B</td>
<td>$24,000.00</td>
<td>1,000.00</td>
<td>$25,000.00</td>
<td>$27,000.00</td>
<td>($2000.00)</td>
<td>($2500.00)</td>
</tr>
<tr>
<td>Dept. C</td>
<td>$26,000.00</td>
<td>500.00</td>
<td>$26,500.00</td>
<td>$26,000.00</td>
<td>500.00</td>
<td>(2000.00)</td>
</tr>
<tr>
<td>Dept. D</td>
<td>$25,000.00</td>
<td>700.00</td>
<td>$25,700.00</td>
<td>$24,500.00</td>
<td>1200.00</td>
<td>(800.00)</td>
</tr>
</tbody>
</table>

Total: $97,000.00 $3,700.00 $100,700.00 $101,500.00 ($800.00) ($5800.00)

() Parentheses indicate unfavorable variances.

EXHIBIT 4

department head for correction. It helps the department heads to reduce cost and renders them a real service which will be appreciated, if a certain amount of tact and diplomacy is used in presenting cost problems to them.

You cannot talk out to Joe and, in utter disgust, tell him his grinding wheel costs are twice as high as they should be and he had better get them down because you have advised the plant manager of this fact and he will probably be talking to him. If you present your case in this manner, you will not help reduce many costs because Joe will be mad and on the defensive and will have some pretty good answers when called on the carpet.

Instead, you might go out to Joe and explain that, in reviewing his operating supplies, you found that the item of grinding wheels looked pretty high so you were investigating it from all angles. Then ask him if he knew his boys were using a thousand dollars' worth of wheels each month. He will probably be surprised but will mention that he has put out a lot of forgings during the past months. At this point you can tell him you have a plan worked out under which it is possible to cut this cost in half if the information you have is correct. Ask him to go over the figures with you to make sure you are on the right track. In my experience, he usually says at this point, "Let's go over them now," or "How about right after lunch?"

Now, if you know what you are talking about and have not gone off "half-cocked," you have helped a department head cut his cost about $6,000 a year and have laid the foundation for many other pleasant dealings with Joe. However, be sure to keep a check on all the conditions which have to be met to make this saving real, whether it be day-by-day or month-by-month. Keep Joe posted on any improvement as soon as possible after it becomes evident. When he has finally made that fifty per cent reduction, be sure to pat him on the back.
for a job well done. Always give Joe full credit for the reductions made. It will not take many cases like the above before Joe is turning the credit right back to you and, in addition, coming to you for help in analyzing and developing his own cost reduction ideas. Always remember there is enough credit for everybody in a cost reduction job well done and a great deal of satisfaction. You can be ever so right but, unless you can "sell" the man who is actually responsible for the costs in his department, you will not get very far in your work.

Eight Serviceable Reports

As a practical matter, how does one go about finding the bad spots? In our case, a series of reports are prepared monthly. The most important are described in this section of the present article.

Departmental Costs (Exhibit 1) consists of a single sheet for total plant expenditures by item of expense and a similar one for each department. The sheets are in a binder and we keep them at the plant until the first of the month, at which time we send the binder to the general accounting department where the month's expenditures are filled in. Immediately upon receipt of the sheets, there is marked at the bottom of each the number of work days in the month. The overtime and premium pay account (if it is a month in which we have a paid holiday) are starred. We already know from plant records what we have produced and shipped by product. With this information and a few months' experience, the excess cost spots can be picked out. A list of the items which look out of line is made and the figures are re-checked by the cost or general accounting departments. If they are not in error, we begin to dig into the facts. The items which get the most attention are those appearing nowhere else in the cost sheet as such. They are burden items like gas, fuel, oil, electricity, water, etc.

Analysis of Variance (Exhibit 2) is an over-all cost sheet by product. We have one for elbows, one for fittings, and one for commercial forgings. The one used for illustration is a commercial forging sheet. It will be found self-explanatory. With us standards are established for material and labor at the time the job is originally put into the shop. Burden, as the "A" note at the bottom of the exhibit indicates, represents machine operating hours, valued at the established burden rates. This does not give a burden rate variance, but it does tell the amount of money saved (or lost) by beating (or failure to meet) the production rate set up in the standard.

Actual cost vs. Standard Cost by Operation, Direct Labor, Indirect Labor and
DEPARTMENTAL COST SHEET

<table>
<thead>
<tr>
<th></th>
<th>Total expenses</th>
<th>Charged to production</th>
<th>Year-to-date</th>
<th>Total expenses</th>
<th>Charged to production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect labor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision and clerical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overtime premium and vacation accrual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas and fuel oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance and repair materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other charges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cost per 1000 lbs. Net Production:

<table>
<thead>
<tr>
<th></th>
<th>Year to 1951</th>
<th>Year to 1950</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fittings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>forgings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Burden (Exhibit 3) gives the current month cost and year-to-date, with explanations for variance. At the bottom, it shows service department expenses not included in burden. This sheet discloses how labor is performing against standard, since the burden is picked up by burden rates. If production rates are being met, the burden automatically takes care of itself. However, the report does show how material performance has been, dollar wise.

The Report of Raw Material Usage, showing spoilage and customers' returns, gives a better picture as to material. The numerous column headings on this report are as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Part number</th>
<th>Gross material to production</th>
<th>Gross cutting in production</th>
<th>Customers returns to production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EXHIBIT 5

In the report, each department has been broken down and each department is given an index number. This index number has been carried down to the actual data to show the overhead cost control, and has been broken down to the departmental level of the company.

A tabulation of the report is as follows:

<table>
<thead>
<tr>
<th>Building Cost</th>
<th>Fabrication Cost</th>
<th>Machining Cost</th>
<th>Assembly Cost</th>
</tr>
</thead>
</table>

In the report, the material usage for each department has been broken down into categories, and the departmental overhead cost has been broken down into subcategories. The report shows the material usage for each department, and the departmental overhead cost has been broken down into subcategories.

Depreciation is shown on a per-employee basis. The report also shows the number of employees in each department, and the total number of hours worked by each employee.

The report is divided into three sections: raw material usage, direct labor, and indirect labor. The raw material usage section shows the material usage for each department, and the total material usage for the company. The direct labor section shows the direct labor costs for each department, and the total direct labor costs for the company. The indirect labor section shows the indirect labor costs for each department, and the total indirect labor costs for the company.

The report is accompanied by a summary sheet, which shows the total cost for each department, and the total cost for the company. The summary sheet also shows the total labor cost, and the total material cost for the company.

The report is accompanied by a graph, which shows the trend of material usage, and the trend of labor costs, for each department, and the company as a whole.

Each department has a separate summary sheet, which shows the total cost for the department, and the total cost for the department's subcategories. The summary sheet also shows the total labor cost, and the total material cost for the department.

The report is accompanied by a graph, which shows the trend of material usage, and the trend of labor costs, for each department, and the company as a whole.
Analysis of Burden Rates (Exhibit 4) affords a picture of how well the company has done with burden items. This schedule may be explained by saying that the total accounted-for column is the earned burden for the number of actual machine operating hours during the month and fixed burden for the idle hours. This is compared to the department actual expense, as shown, which is the expense incurred by and distributed to the department. Here we get a picture of how we are operating against the burden established. There is no one of these schedules that really gives the whole picture. It is necessary to look at all of them and to get each phase in turn.

A Service Department Report is issued which contains, basically, the following information:

<table>
<thead>
<tr>
<th>Building maintenance &amp; service</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per 100 sq. ft. floor space</td>
<td>Cost per 100 pieces inspected</td>
</tr>
<tr>
<td>Cost per 100 lbs. net production</td>
<td>Cost per 1000 lbs. net production</td>
</tr>
<tr>
<td>Cost per $1000 net sales</td>
<td>Cost per $1000 net sales</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine general maintenance and service</th>
<th>Raw material handling and storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per $1000 invested in machines</td>
<td>Cost per 1000 lbs. for handling raw material</td>
</tr>
<tr>
<td>Cost per 1000 lbs. net production</td>
<td>Cost per 1000 lbs. net production</td>
</tr>
<tr>
<td>Cost per $1000 net sales</td>
<td>Cost per $1000 net sales</td>
</tr>
</tbody>
</table>

In this report as actually prepared there are several sheets listing each service department, with one or more measures of performance. These come out each month. One set of sheets is for the total expenses at the plant, by service department, and one set is for each of our three product lines after distribution has been made. Looking at handling and storage, it may be noticed that we work up cost per 1,000 pounds for handling raw material. In each department, we have tried to take the pertinent item which would be a measure of operations, rather than simply to look at the cost per 1,000 pounds of net production. We tie this particular department down to the amount handled. Each department has something like this directly related to its work.

Departmental Cost Sheet (Exhibit 5) is sent to the superintendent or manager of the department. It shows the most important original items of expense incurred by the department. Some measure of performance is given at the bottom of the sheet. Operating supplies used are disclosed to department heads in detail by item of expense on a separate sheet.

These reports tell us how we are doing—good or bad—and, from the in-
## INCENTIVE STATISTICS

**DEPARTMENT**: Commercial Forgings Finishing  
**NAME**: John Jones  
**NUMBER**: 2600  
**WEEK ENDING**: Nov. 12, 1951

### SECTION A - GENERAL

<table>
<thead>
<tr>
<th></th>
<th>FIRST SHIFT</th>
<th>SECOND SHIFT</th>
<th>THIRD SHIFT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of hourly employees</td>
<td>13</td>
<td>10</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>2. Direct employees receiving incentive</td>
<td>12</td>
<td>10</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>3. Indirect employees receiving incentive</td>
<td>92</td>
<td>100</td>
<td>100</td>
<td>96</td>
</tr>
<tr>
<td>4. Per cent coverage of direct employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Per cent coverage of indirect employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Total overtime worked</td>
<td>24</td>
<td></td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

### SECTION B - ANALYSIS OF DIRECT LABOR HOURS

<table>
<thead>
<tr>
<th></th>
<th>FIRST SHIFT</th>
<th>SECOND SHIFT</th>
<th>THIRD SHIFT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Direct labor hours charged to department</td>
<td>370</td>
<td>349</td>
<td>55</td>
<td>774</td>
</tr>
<tr>
<td>2. Hours lost against standard</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>3. Per cent coverage of direct labor</td>
<td>76</td>
<td>78</td>
<td>91</td>
<td>78</td>
</tr>
<tr>
<td>4. Per cent performance on standard</td>
<td>126</td>
<td>132</td>
<td>130</td>
<td>129</td>
</tr>
<tr>
<td>5. Bonus hours paid per hour on standard</td>
<td>.26</td>
<td>.32</td>
<td>.30</td>
<td>.29</td>
</tr>
<tr>
<td>6. Bonus hours paid per hour of direct labor</td>
<td>.20</td>
<td>.25</td>
<td>.27</td>
<td>.33</td>
</tr>
<tr>
<td>7. Non-accumulative rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FIRST SHIFT</th>
<th>SECOND SHIFT</th>
<th>THIRD SHIFT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Total non-rated direct hours</td>
<td>155</td>
<td>88</td>
<td>5</td>
<td>170</td>
</tr>
<tr>
<td>a. Ratable (Code 3)</td>
<td>57</td>
<td>42</td>
<td>5</td>
<td>104</td>
</tr>
<tr>
<td>b. Non-ratable (Code 4)</td>
<td>31</td>
<td>35</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>c. Set-up (Code 0-9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SECTION C - ANALYSIS OF INDIRECT LABOR HOURS

<table>
<thead>
<tr>
<th></th>
<th>FIRST SHIFT</th>
<th>SECOND SHIFT</th>
<th>THIRD SHIFT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total Indirect labor hours charged to department</td>
<td>76</td>
<td>13</td>
<td>2</td>
<td>91</td>
</tr>
<tr>
<td>a. Waiting or waste (Code 5)</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>b. Indirect (Code 6)</td>
<td>90</td>
<td>59</td>
<td>3</td>
<td>152</td>
</tr>
<tr>
<td>c. Machine down (Code 7)</td>
<td>18</td>
<td>11</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>d. Other (Code 8)</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2. Expected indirect hours</td>
<td></td>
<td></td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>3. Variance - Indirect hours against expected</td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>4. Per cent indirect labor to direct labor</td>
<td>21</td>
<td>4</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

### EXHIBIT 6

We take action to correct any bad spots. The cost sheets are brought to the plant around the twenty-fifth of the month by our cost department. I generally spend a full day with the cost department head, going over each sheet in detail. He has made notes, while working up the sheets, of the items which might need attention. We add additional item brought out in our review. I then get together with our vice president in charge of production.
go over the sheets with each department head individually. I make notes of any charges, production rates, or cost figures questioned and investigate them. Then I report my findings back to both. Our vice president highly praises department heads for a good job and demands periodic reports back to him on how and what has been done to correct any poor showings.

Incentive Statistics (Exhibit 6) is our control for wage incentive program and indirect labor. Each week these sheets are made for the total plant and for each department. The vice president goes over them and makes notations, particularly in Section C.

A column marked "expected" refers to expected indirect labor hours. These have been arrived at with the superintendent or the head of the department on the basis of production requirements in the past and what he expects to happen in the next period of months. With that guide or measure, there is reported over to the right, the actual indirect labor and, on the next to the bottom line, the variance of indirect hours against expected. This comparison is made weekly and is our method of controlling indirect labor cost. Our vice president makes notations on this variance and sends a copy, with the notations, to the department head, who later explains to him over-runs on indirect labor.

**Project Outlay Control Routine**

There must be controls of all major expenditures if costs are to be kept in line. Our controls are handled in the form of requests for expenditure. These generally originate with a superintendent who contacts the plant engineering department with the problem of replacement of a machine, a major overhaul, new roadways in yard, additional equipment, etc. The plant engineering department then works up in detail the money which will be required to complete the job. Its staff questions the superintendent regarding benefits he expects to gain and explains these ideas under "benefits" on the form. This form, made out in pencil, is then passed through the cost reduction department for justification. It is analyzed in detail and, if the benefits prove to be realizable, it is signed and passed on to the vice president before it is typed and sent to the controller's office for final approval. If the savings or benefits attributed to the project appear doubtful after analysis in the cost reduction department, an alternative proposal is offered or the suggestion made that the idea be tabled for the time being and brought up at a later date when conditions might justify the expense. The reasons why it cannot be justified now are fully stated as a notation. After money on approved project is spent and the project has been
in operation for a reasonable period of time, there is an investigation to find out results. A report is made which bears on three points:

1. Estimated cost to install vs. actual cost to install.
2. Estimated benefits or savings vs. actual. We may have to wait until we have a time study on the job, but we always report what we said we were going to save and what we actually saved, whether the comparison is favorable or unfavorable.
3. The opinion of the superintendent as to whether or not he is getting what is expected out of the expenditures.

This report is sent to the vice president and the plant engineering department.

To summarize briefly the most important points to keep in mind in cost reduction work it may be said that:

1. A cost reduction department does not reduce costs. This is done by the operating personnel.
2. Credit should be given to the operating personnel for reduced costs. The cost reduction department will get its credit from them. There is plenty for everyone.
3. Snap decisions should not be made. Carefully analyze and be sure the right course is being followed before it is entered upon.
4. Tact and diplomacy are needed in presenting recommendations to plant supervisors. Timing comes under diplomacy. I have held up for months a good cost reduction project until I was sure the timing was right for a "sale".
5. Every project should be followed up to make certain it is going as expected. Do not forget to establish controls after the job is complete to insure that it will stay that way.

N.A.C.A. BULLETIN
**Accounting System of the New Jersey Turnpike**

by HENRY A. WEGENER
Manager at Newark, N. J., Office, Peat, Marwick, Mitchell & Co.

Here given is a comprehensive and informative outline of the accounting which has taken place for the construction of (at present) America's most featured toll road—of the few existing—and of the accounts and some of the accounting procedures in force with respect to the operation of the road for revenue. Described are the determination of the cut-off between construction and operation and the setup of internal control for toll collections.

The opening to traffic of the 118 mile New Jersey Turnpike in November 1951 has focused national attention on the toll road as the only presently practicable solution to the congested conditions on American highways. While not the first of our modern toll roads—there are five others in the United States—the New Jersey Turnpike, because of the magnitude of the project and the speed with which its construction was accomplished, has stimulated the imagination of highway planners throughout the nation. Furthermore, the unpredicted high rate of traffic in the first few months of operation of the New Jersey toll road has pointed up the fact that the American travelling public is willing to pay a toll for the privilege of using an express road, provided there is a demonstrated saving in time or expense. From the trend of legislation now in process in many states, it is apparent that the toll road, or turnpike as it is more commonly called, will play a large part in the transportation of the future.

As these roads multiply, it is not unlikely that some uniform system of accounting for toll roads will develop as in the case of the railroads and other public utilities and in some of our industries today. In the meantime, those charged with the responsibility of planning the accounting systems for the toll roads now in operation have, of necessity, designed their accounting to meet their particular requirements. These requirements vary, depending on the legislation authorizing the project and the method selected for financing the construction. While this article is concerned primarily with the accounting system adopted by the New Jersey Turnpike Authority, most of the principles discussed have common application to toll road construction and operation. The problems to be met are generally the same. It is not expected that in a brief article of this kind the reader can be made acquainted with all aspects of toll
road accounting. However, sufficient information will be presented to indicate the problems involved and the type of records required to be maintained.

**Legislative Authorization, Financing**

Sponsored by Governor Alfred E. Driscoll, the New Jersey Turnpike Authority, a three-man commission, was created by an act of the New Jersey legislature authorizing and empowering the Authority to construct and operate turnpike projects. Under the act, the bonds issued by the Authority are not deemed a debt or liability of the State. While technically a division of the State Highway Department, the Authority operates as an independent and self-sustaining organization. Ultimate cost of constructing the New Jersey Turnpike, without taking into account proposed extensions, was estimated by the Authority at December 31, 1951, to be approximately $225,000,000.

The financing of the New Jersey road was accomplished by the issuance of revenue bonds and the provisions of the agreement under which these bonds were issued received paramount consideration in the development of its accounting system. In its essentials, this agreement or bond resolution provides for the deposit of the proceeds of sales of bonds with a trustee, to be held in trust and applied to pay the cost of construction of the turnpike. Payment of construction costs are made on requisition of the Authority accompanied by various specified types of supporting papers, depending on the nature of the payment. All toll and other receipts from the operation of the turnpike are deposited by the Authority with a trustee who, after making monthly payments to the Authority to cover its budgeted operating costs, applies the receipts to the payment of interest and sinking fund requirements. This close control of the Authority's monies by the trustee affords the investor maximum assurance that his money will be used exclusively for construction of the road and that its revenues will be applied to pay the interest and principal on his investment.

The accounting operation for a toll road divides naturally under two broad classifications: (1) accounting for the cost of construction and (2) accounting for the receipts and expenses of the road when in operation. To insure proper segregation of construction and operating costs, it was deemed desirable in the case of the New Jersey Turnpike, to establish two separate sets of records. This principle was applied to all journals as well as to the ledgers.

**ACCOUNTING FOR THE CONSTRUCTION PHASE**

Generally speaking, all costs necessary to put the road into operation properly come within the scope of the term "construction costs." This includes many types of expenditure which in their usual accounting concept denote expense.
rather than capital expenditure. Examples of these are interest, advertising, rent and administrative expenses. If the road is put into operation before completion of all phases of construction, careful scrutiny of all expenditures is necessary to make a proper distinction between construction and operating costs. While purchase of the initial supply of collectors' uniforms is a proper construction cost, replacements are an operating expense. The road maintenance division, the expenses of which are ordinarily an operating cost, may be finishing up some phases of the construction work, such as landscaping or placing delineators and signs. The cost of such work must be segregated and charged to construction.

More difficult of segregation in a dual construction and operating period are the administration costs. The clerical work necessary to make exact division of administration expenses where the same office is used for both construction and operating personnel, can be so burdensome as to compel adoption of some arbitrary method of allocation. Good judgment is needed in this matter of allocation of expenditures between construction and operating expenses, so that the treatment will be in conformity with requirements set forth in agreements with bondholders. This problem was intensified in the case of the New Jersey Turnpike, because, not only was the road put in operation while construction was going on, but also some sections of the road were opened to traffic prior to the opening of the entire route.

In any construction project it is usually desirable to distribute and analyze the construction costs under major account groupings descriptive of the principal tasks of construction. This facilitates comparison of actual costs with preliminary cost estimates made by the engineers. The New Jersey Turnpike Authority, when establishing its chart of accounts, divided its construction costs under the following main classifications:

Engineering and architectural.  
Lands, easements and rights-of-way.  
Construction.  
Maintenance organization.

Toll collection and toll audit organization.  
Administration.  
Financial.

Appropriate sub-accounts were opened under each of these classifications to provide the information considered essential for a proper analysis of the costs, without giving unnecessary details which would serve no purpose and only add to the number of accounts to be kept.

**Engineering and Architectural Costs**

Engineering and architectural costs were distributed to the following sub-accounts:

**JULY, 1952**
Salaries.  
Preliminary engineering.  
Test of materials.  
Engineering borings and foundation investigations.  
Estimates of costs and revenues.  
Engineering and architectural services.  
Travel staff.  
Blueprints, plans and specifications.  
Miscellaneous.  

The principal feature of the accounting for engineering and architectural costs is an engineering cost control procedure which was instituted by the Authority to control fee payments to the engineers.

To expedite the engineering work, the Authority divided the 118 mile turnpike into seven sections and assigned nationally-recognized highway and bridge engineering firms to design and supervise construction within the respective sections. The fee arrangements with these engineers were, for the most part, based on a percentage of the construction costs in the particular section, the percentage varying with the type of service performed. In addition, the engineers were reimbursed for certain services performed by others which were not part of the fee but includible in the basis on which the fee was computed. There were also services not part of the fee and not includible in the basis on which the fee was computed.

Control of these payments was effected by establishing separate engineering accounts for the seven sections of the turnpike and further subdividing these accounts to conform with the varying fee arrangements. The construction costs on which the percentage fees were based were also distributed by sections. With this information available, it was a comparatively simple operation to check at any time the status of the payments to engineers.

**Lands, Easements and Rights-of-way**

Expenditures to obtain the right-of-way for the turnpike were analyzed under the following accounts:

Salaries.  
Surveys.  
Services and travel (other than staff).  
Travel staff.  
Cost of land, including damages.  
Appraisals.  
Negotiations.  
Title insurance, examination and curative work.  
Expenses and costs in condemnation cases.  
Miscellaneous.

In the process of acquiring the right-of-way, it was often necessary, in order to complete negotiations on a fair basis to the owner where a property was being divided by the Turnpike, to take title to property outside the minimum right-of-way line. These parcels, known as "ex-parcels" are later disposed of by the Turnpike Authority. The proceeds from the sales or rental of such property and from the sale or salvage of buildings and other removable property could be used towards the costs needed for concessions and other services along the turnpike.
effect a reduction of the cost of right-of-way. A credit account was established within this classification of accounts for the purpose of collecting and analyzing these receipts.

Approximately 3,600 parcels of real estate were acquired by the New Jersey Turnpike Authority's real estate department in its negotiations for purchase of the right-of-way. It was necessary for the real estate department to be at all times informed of the status of negotiations with individual property owners in order to clear the way for the contractors as they proceeded with the construction work up and down the right-of-way. To record the progress of its activities in respect of each parcel to be acquired, the real estate department maintained a "status of acquisition" ledger for each section of the turnpike. In addition to their use by the real estate department, these ledgers served as subsidiary ledgers for the control totals kept in the general accounting department. They will be maintained as a permanent record of the Authority's real estate holdings. The ledger sheets listed by sections, municipalities and counties, every parcel of real estate needed for the turnpike right-of-way, the information being taken from maps prepared by the section engineers. The ledger sheets were columnar, designed to furnish the following information in respect of each parcel:

| Parcel number, owner, acreage | This information obtained from the parcel maps. |
| Possession | Date; method of possession, whether by right of entry permit, purchase contract or condemnation; date contractor notified. |
| Appraisal | Date; name of appraiser; appraisal amount and date approved. |
| Purchase contract | By whom to be negotiated; date and amount; date approved and date executed. |
| Title examination | By whom to be made; date ordered and date received. |
| Closing | To whom assigned and date closed. |
| Deed | Recording, book and page number. |

It will be readily seen that, from the information available in the status of acquisition ledger, it was possible to determine at any time the progress being made in acquiring the turnpike right-of-way.

**Construction Costs**

All construction work on the New Jersey Turnpike was performed by contractors under competitive bidding, with the exception of the construction...
of buildings which, because of uncertainties in the building construction industry, were performed on a cost-plus fixed-fee basis.

The following subdivision of construction costs was made in the accounts:

Salaries.
Demolitions, relocations and clearing rights-of-way.
Grading and drainage.
Major bridges.
Miscellaneous structures.
Paving.
Buildings.
Travel.
Lighting, communications, road marking, signs, delineators and fencing.
Relocation and reconstruction of utilities, roads and communications.
Services and travel—other than staff.
Bid advertising and expense.
Toll booth canopies and toll collection equipment.
Construction policing.
Miscellaneous.

Further details of the construction costs are contained in a contract ledger which functions as a subsidiary record for the various construction accounts. The ledger reflects the break-down of costs by sections and by contracts. For each contract, the ledger provides such essential information as the original contract amount, change orders and the adjusted contract amount, total earnings on the contract, total payments and the amount of retained percentage withheld until completion and final acceptance of the contract work.

A construction project of this type receives daily a large quantity of invoices and vouchers to be processed for approval and paid. Recognizing the fact that each contractor has his own financial problems and regular payrolls to meet, the Authority's accounting division expedited the payment of bills by controlling their movement from the time they were received in the mail until payment. Immediately upon receipt, all bills were entered in a register before forwarding to the various engineers and executives for approval and processing. A weekly review was made of the register to follow up and expedite the payment of any bills which had not been returned to the accounting division for payment. This service had the effect of creating good will with the contractors which is essential when a project is being pushed to meet a predetermined completion date.

**Maintenance Organization and Costs**

Long before the scheduled opening date of the New Jersey Turnpike, consideration was given by the members of the Authority to the maintenance force and equipment which must be on hand to insure safe operation of the road. The maintenance personnel was recruited and purchase made of trucks, road graders, snow plows, de-icing materials, etc. Their repair shops were made ready to take care of the maintenance of automotive, radio and toll collection equipment. The costs of establishing the maintenance organization were analyzed under the following accounts:
Maintenance and toll collection

A necessary part of the maintenance organization records is an equipment ledger to control the use and record the location of all motor vehicles, road equipment and tools. Each of the six maintenance districts along the 118 mile right-of-way will be charged with the equipment assigned to it. While the responsibility for the equipment and the keeping of the equipment records has been placed on the maintenance organization, the turnpike accounting and auditing division will make frequent inspection of the equipment and check of the records to determine that a proper accounting is made.

Toll Collection and Toll Audit Organization

The costs of toll collection and toll audit organizations were distributed to the following accounts:

<table>
<thead>
<tr>
<th>Salaries.</th>
<th>Maintenance materials.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor vehicles, road maintenance equipment, tools, etc.</td>
<td>Office supplies, special forms, etc.</td>
</tr>
<tr>
<td>Temporary maintenance buildings.</td>
<td>Travel.</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous.</td>
</tr>
</tbody>
</table>

Selection of the toll collection equipment and establishment of collection procedures and safeguards was an important phase in the planning for the turnpike operation. The equipment and procedures of other toll projects and the experience obtained in their use was carefully studied by the New Jersey Turnpike Authority's auditors and its consulting engineer, together with the comptroller, members of the Authority and its staff. The utmost care was taken to see that the system, besides functioning effectively to handle traffic, would safeguard the turnpike's revenues.

The system adopted involves the use of a tabulating card which serves as a ticket. The cards are pre-punched before delivery to the interchange to indicate the class of vehicle and the identifying number of the interchange of issue. As the motorist enters an incoming lane, the toll collector inserts the ticket in a stamping device which notes the collector's number, the lane number and the date and time of entry. The tickets are printed with the rates of fare to the various interchanges from the point of entry. On leaving the turnpike, the motorist pays the fare indicated for the interchange he is leaving. At both the point of entry and exit, treadles in the pavement at the toll booth record the number of transactions and the number of axles (vehicle classification) passing through the lane. The treadle counts are recorded in a registering device.
which is inaccessible to the collectors. Daily readings of the treadle counts provide a check of the number and classification of tickets given out or received by each collector. The treadle counts are correlated to a tabulation of the tickets and cash collections, which is made at administrative headquarters daily.

In addition to selecting and arranging for the installation of the toll collection equipment, the Authority had to recruit, train and uniform, prior to the opening of the turnpike, a toll collection force of approximately 150 men; also, hire and instruct the tabulating personnel and print and pre-punch the initial supply of tickets. A comprehensive manual containing instructions for the performance of all phases of toll collection activity was prepared and a copy issued to each collector. All of the expense involved, including salaries in the training period, were considered a proper charge to the cost of construction.

**Accounts for Administration Expenses**

The chart of construction accounts provides the following division of the administration expenses:

- **Salaries.**
- **Legal expense and fees.**
- **Audits and fiscal advice.**
- **Furnishings and fixtures.**
- **Motor vehicles purchased.**
- **Motor vehicle expense.**
- **Insurance.**
- **Rent.**
- **Stationery and office supplies.**
- **Postage.**
- **Telephone and telegraph.**
- **Advertising, printing and binding.**
- **Travel.**
- **Public information.**
- **Surety bond fees.**
- **Repairs and maintenance.**
- **Miscellaneous.**

The classification of the administration expenses is self-explanatory and needs no comment except to point out that it was not deemed necessary or practicable to make distribution to other classifications of construction costs of such expenses as rent, insurance and telephone service. Administration expenses amounted to less than one-half of one per cent of the total cost of the construction of the turnpike.

**What Financial Costs Were Charged to Construction**

The financial costs charged to construction comprise expenses in the preparation, offer and sale of revenue bonds; bond interest and commitment fees during construction; bond counsel fees; and fiduciary fees and expenses. Accounts were established for each of these costs, all of which are properly chargeable to the cost of construction during the construction period. Interest received on the interim investment of construction funds was applied to reduce the financial costs.

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How the Comptroller Kept Commissioners Informed

Before passing on to discussion of the operating accounts, mention should be made of the means by which the comptroller kept the commissioners informed of the Authority's financial affairs. Prior to each of the regular weekly meetings of the Authority, the commissioners were furnished with a comprehensive agenda prepared by the executive director containing charts and reports of the progress of the construction of the turnpike and including the reports of the comptroller. The comptroller's reports usually included a weekly statement of the cash position, forecasts of future cash requirements and monthly financial statements. The comptroller also submitted to the commissioners each week a listing and significant details of all bills and requisitions requiring their approval. The decision of the commissioners in respect of these was entered in its minutes.

ACCOUNTING FOR OPERATIONS

The chart of accounts and accounting system for the operation phase of the New Jersey Turnpike were designed to provide such detail classification and analysis of revenues and operating expenses as were considered necessary to maintain control of expenditures through budget accounting. The need for close attention to budgeting is explained by the fact that, under its agreement with the bondholders, the Authority may not expend any amount or incur any indebtedness for operating expenses in excess of the amounts provided for in its annual budget which serves as a basis for monthly allotment of funds by the bond trustee to the Authority to cover its operating expenses.

The same chart of accounts serves both general accounting and budget accounting, thereby insuring more efficient budgetary control with a minimum of record keeping. Accounting requirements of the bond agreement were considered in making the decision as to the operating accounts and records to be kept by the Authority. It is of interest to note that, in accordance with provisions of the bond agreement, operating expenses do not include any allowance for depreciation, amortization or similar charges. Replacement of equipment is charged to operating expense.

Distribution of revenues and operating expenses is made under the following major classifications:

<table>
<thead>
<tr>
<th>CODE</th>
<th>CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000</td>
<td>Income from operations</td>
</tr>
<tr>
<td>4000</td>
<td>Maintenance, repair, replacement and reconstruction</td>
</tr>
<tr>
<td>4000 &amp; 5000</td>
<td>Toll collection</td>
</tr>
<tr>
<td>6000</td>
<td>Public safety</td>
</tr>
<tr>
<td>7000</td>
<td>General and administrative</td>
</tr>
<tr>
<td>8000</td>
<td>Other income</td>
</tr>
<tr>
<td>9100</td>
<td>Bond interest expense</td>
</tr>
<tr>
<td>9500</td>
<td></td>
</tr>
</tbody>
</table>

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The principal features of the accounting for each of these classifications will be discussed in the succeeding sections of this article.

**Income From Operations**

A turnpike has two principal sources of revenue—tolls and rentals from concession buildings. Accounting for concession revenue presents no special problems, as these receipts are entered in the accounts on the basis of periodic reports prepared by the restaurant and service station lessees. The Authority makes regular inspection and audit of the records of the concession lessees, which are permitted under the terms of the lease agreements. However, the collection of tolls has some interesting aspects from an accounting point of view.

Control of collections starts at the toll booth when the toll booth operator completes his day. At the conclusion of his shift, the toll collector places his collections, together with a bank deposit slip, in a bag which he locks and then drops in a depository located at the interchange for this purpose. He places his tickets in another bag, which he also locks, together with a copy of the deposit slip and a report of axle variations and any unusual occurrences such as U-turns, which might affect the fare totals as reflected by the treadles. The depositories are opened each day by representatives of the toll audit section who transport the money bags to the bank and the ticket bags, along with the tapes of the treadle counts, to the toll audit section at administrative headquarters.

At the toll audit section, the tickets and treadle counts are put through a tabulating procedure which eventually produces a report showing for each toll booth operator, a comparison of the revenue indicated by tabulation of the toll tickets with the amount of the bank deposit and also, a comparison of the transactions and axle counts as tabulated from the tickets with the counts reflected by the treadles. Differences are investigated by the toll audit section. In addition to this report, the toll audit section prepares a daily report showing the number and classification of vehicles leaving and entering the turnpike at the various interchanges and the vehicle miles travelled.

The toll collection and toll audit procedure adopted by the New Jersey Turnpike Authority provide quick and accurate collection of tolls with simplicity and economy of operation. While confident that there can be no loss of revenue which would not be disclosed in the operation of the toll collection and toll audit system, the Authority is constantly watchful for the possibility.
To facilitate preparation of budget data and to provide the information necessary for the control of the maintenance division costs, the expenses of this division are distributed on a functional basis, as follows:

<table>
<thead>
<tr>
<th>Account Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4100</td>
<td>Supervision</td>
</tr>
<tr>
<td>4200</td>
<td>Central and divisional shops</td>
</tr>
<tr>
<td>4300</td>
<td>Maintenance of pavement</td>
</tr>
<tr>
<td>4400</td>
<td>Painting and maintenance of bridges</td>
</tr>
<tr>
<td>4500</td>
<td>Maintenance of buildings</td>
</tr>
<tr>
<td>4600</td>
<td>Repair and replacement of fences,</td>
</tr>
<tr>
<td></td>
<td>guard rails, delineators, traffic</td>
</tr>
<tr>
<td></td>
<td>lines and signs</td>
</tr>
<tr>
<td>4700</td>
<td>Snow removal and control</td>
</tr>
<tr>
<td>4800</td>
<td>Maintenance of medial strip,</td>
</tr>
<tr>
<td></td>
<td>shoulders, drainage and subgrade,</td>
</tr>
<tr>
<td></td>
<td>landscaping, moving, sweeping and</td>
</tr>
<tr>
<td></td>
<td>seeding</td>
</tr>
<tr>
<td>5000</td>
<td>Repair and service of automotive and</td>
</tr>
<tr>
<td></td>
<td>road equipment</td>
</tr>
<tr>
<td>5100</td>
<td>Maintenance and service of</td>
</tr>
<tr>
<td></td>
<td>communication equipment</td>
</tr>
<tr>
<td>5200</td>
<td>Maintenance and service of toll</td>
</tr>
<tr>
<td></td>
<td>equipment</td>
</tr>
<tr>
<td>5900</td>
<td>Other maintenance expense</td>
</tr>
</tbody>
</table>

Subaccounts are set up under each of these classifications to furnish the necessary detail information. As these are too numerous for listing here, comment will be made on the significant items. The last digit of each account code was assigned to identify those costs which appeared most frequently under the various classifications, as follows:

1. Salaries and labor.
2. Travel and subsistence.
3. Motor vehicle expense.
4. Materials and parts.
5. Outside services.
6. Heat, light and power.
7. Rentals.
8. Tools and supplies.

The maintenance costs of buildings was further distributed to record separately the cost of maintenance of the toll collection buildings, the maintenance shops, the concession buildings and concession areas, and the administration building.

To simplify the distribution of the payroll costs to the many account classifications required for the maintenance division, the time reports which are prepared bi-weekly by the maintenance division were designed in columnar form to distribute the maintenance labor cost in accordance with the account classifications adopted for the maintenance division.

The maintenance division is charged with the responsibility for the proper storage of all the materials and supplies required for the operation and maintenance of the turnpike. The principal supply of these materials is stored at the centrally located maintenance headquarters where a perpetual inventory record is kept of all stock items. A small fixed supply of materials is kept at the six divisional shops located at various points along the turnpike. It was considered that the record keeping involved to keep detailed inventory of the
stores at the divisional shops would be too costly to perform in view of the relatively small amount involved. Hence, responsibility is placed on the maintenance supervisors to watch the use of materials at these locations. This is possible by check of the requisitions of these materials, which can be drawn only from the central stores and by regular physical inspection of the stores at the divisional shops.

Toll Collection Expense

The expenses of the toll collection division are analyzed under the following accounts:

- 6001 Salaries.
- 6002 Travel and subsistence.
- 6003 Motor vehicle expense.
- 6006 Heat, light, power and water.
- 6020 Purchase of and repairs to uniforms.
- 6030 Toll tickets and other printed forms.
- 6099 Miscellaneous.

The accounts are self-explanatory and no discussion would appear necessary.

Public Safety Costs

The Authority is constantly engaged in improving traffic control and safety on the turnpike. The salaries and expenses of personnel engaged in this work, as well as the cost of policing the turnpike, are distributed in the accounts to public safety. It should be mentioned that the New Jersey Turnpike is policed by a detachment of the State Police which has been assigned to the turnpike and the Authority reimburses the State for all costs.

General and Administrative Expenses

The administrative functions of the turnpike are divided among the following departments, for each of which an expense classification was provided:

- 8100 Executive.
- 8200 Accounting.
- 8300 Engineering-design.
- 8400 Engineering-Traffic.
- 8500 Real estate.
- 8600 Public information.

Analysis of the expenses for the respective departments is accomplished generally in the manner discussed under maintenance costs—the last digit of each account code being used for the types of expense common to all departments.

As with accounting for construction phase, it was not considered feasible to allocate to the various departments such expenses as rent, telephone and telegraph and postage. Separate accounts for these items were set up within the general administrative classifications. Budgeting of these expenses is made on an overall basis rather than on a departmental basis.
Budgeting

As previously mentioned, the Authority is required to keep its operating expenditures within the limits of its budget if funds are to be available to meet these costs. Control of commitments and expenditures is effected by use of an appropriation ledger which contains accounts corresponding to the classifications of operating expenses used for financial statement purposes. Monthly, the comptroller forwards to each department head, a report of the current status of the appropriation for his department, calling attention to any excessive rate of expenditure. Unused appropriations cannot be carried over and it is necessary to make provision for hold-over commitments in the budget of the succeeding year.

Manual for Operation of Accounts

To instruct accounting personnel in the proper operation of the accounts and to acquaint them with the procedures, the Authority prepared a comprehensive manual of its accounting system and procedures. The manual contains, in addition to detail information for the operation of the accounts, a chart of organization, a chart of the accounts, an index to the chart of accounts, copies of all procedures and forms and instructions for budget accounting. It is recognized that the accounting system and procedures for the operations phase were designed during the construction period and prior to the commencement of actual operations of the New Jersey Turnpike and that, after longer experience in the operating phase, some changes or improvements will be indicated.
HANDLING "LABOR CHARGES"

The actual expense of fringe costs of labor is not incurred in direct relation to labor throughout the year and, therefore, presents two problems: (1) expense of unequal incidence month-by-month through the year and (2) time-consuming distribution to cost centers. Items of this nature are:

1. Vacation expense—normally incurred in summer months.
2. Pay for holidays—incurred at the time of the holiday.
3. Payroll taxes—incurred in the forepart of the year.
4. Group insurance expense—relatively constant throughout the year.
5. Pension fund expense—relatively constant throughout the year.
6. Workmen's compensation insurance—relatively constant but involving split-week calculations each month.

In order to meet these two problems and solve them, we have related all of the above items to gross payrolls and have developed a percentage to be applied to wages and salaries to determine current monthly expense, both overall and departmentally. The month's actual cost for each of the items listed is charged to one deferred expense account. Detail on individual items is maintained. The amount to be included in expense for the month is determined by applying the percentage factor (in our case 17.3%) to gross payrolls included in manufacturing cost for that month. The result of this calculation, which we call "labor charges," is credited to the deferred expense account and charged to manufacturing expense.

The percentage factor must be developed with care. An example of our recent calculation of the factor follows:

<table>
<thead>
<tr>
<th>1951</th>
<th>1952</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension fund expense</td>
<td>3.547%</td>
</tr>
<tr>
<td>Group insurance expense</td>
<td>2.646%</td>
</tr>
<tr>
<td>Vacation pay</td>
<td>2.500%</td>
</tr>
<tr>
<td>Holiday pay</td>
<td>1.500%</td>
</tr>
<tr>
<td>Payroll taxes</td>
<td>3.466%</td>
</tr>
<tr>
<td>Workmen's compensation insurance</td>
<td>3.401%</td>
</tr>
<tr>
<td>17.097%</td>
<td></td>
</tr>
</tbody>
</table>

In adapting experience to use as a basis for current costing, we have attempted to be slightly conservative. Each item has been considered for possible increases or decreases in the coming year. For example, in anticipation of higher rates of pay in 1952, we raised the percentage for wages' compensation insurance.

If calculations have been valid, an unusual balance should develop by year end.

HUGH D. JORDAN, Mohawk Yale

THE PAY CHECK STUB COMES TO LIFE

Most payroll check stubs are designed by the accounting department rather than the advertising department. Consequently, we find accounting terminology rather than language. I would like to propose reforms in payroll check design. The reform is a change in terminology to emphasize gross earnings rather than net earnings. Our company recently made this change, so that the column headings on our payroll check stub read as follows:

This is what you earned:
Rate per hour
Hours worked
Extra pay for night work
Extra pay for overtime
Total pay earned

The secret to this method is the conveyer point of the entire check so it can be read. The separation of the skilling and the printing is accomplished by the face of the check, thus no additional printing.

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LABOR EFFICIENCY AHEAD OF TIME

We have in effect in our plants a system of labor cost control, one phase of which may be of interest because it is before-the-fact control. Just prior to the close of each month, those responsible for the issuance of cost control reports obtain from the production planning department the production scheduled for the following month for each manufacturing area. These production schedules are extended to determine the standard labor hours which will be required to achieve each. The calculations are used to forecast the labor efficiency for each department for the next month on the basis of no change in employment. This forecast takes the form of a curve of labor efficiency—actual for the past several months extended through the end of the next month. The forecast is accomplished at very little additional cost in clerical effort and is available in ample time to assist materially in planning operations for the new month.

If the forecast labor efficiency is unsatisfactory or contrary to a previous favorable trend, it is up to the department supervisor to eliminate the excess labor before he has incurred the excessive cost. The usual methods of eliminating the excess are by increasing the scheduled volume of production, by transferring workers to a labor pool where they may be used by other supervisors who are experiencing a labor shortage, or by lay-offs.

Our manufacturing supervisors tell us that this before-the-fact forecast is their most effective single tool in maintaining a satisfactorily high labor efficiency or in improving labor efficiency which does not yet compare favorably with standard.

F. L. METTLER, Newark
A Study in Materials Control

by WILLIAM A. MULLER
Assistant Controller, Lowe Paper Co., Ridgefield, New Jersey

What are the significant items in materials inventory? What formula conditions govern their use? What variances arise? What portion is attributable to price, to consumption? What over-all responsibility exists for materials inventory control? These questions are here answered in line with the case background availed of.

MATERIAL CONTROL OR INVENTORY KEEPING is the oldest form of applied mathematics known to the business world. Accounting for labor and overhead were developed much later. Men of yesterday were regarded as rich by the relative amount of cattle they owned and herded and the amount of grain and food-stuffs they had in their barns. Indeed, many historical records and the Bible testify that whole nations were often sacrificed to long wars and many people and entire races enslaved in order that the more powerful people might increase their material possessions. The possession of material goods represented power!

Later, when people began to produce more goods of a particular kind than they could personally use, the idea of trading surplus materials to other people was born. Bartering in the market places brought new ways of making a living. The need for shop-keepers, bankers, ship makers, and the growing variety of tradesmen centered around the more abundant accumulation of material and its exchange. Long and dangerous trade routes were open over land and sea. New worlds were anxiously sought after and explored for the materials they could yield. Variety and self-sufficiency in material stores became the corner-stone of the progressive nation.

By using strokes in the sand and marks on a slab of stone, the businessman of yesterday was able to keep a record of his possessions. The businessman of today might, instead, use simply a note-book or pad in which he would record, in chronological order, his purchases of material and off-set this amount with an estimated cost of sales, to obtain his inventory. Or, at the other extreme, he might employ a complete battery of mechanical tabulating equipment to assist him to record the pertinent facts and details regarding the receipt and disbursement of his material.

The purpose of keeping these material records is, of course, to assist in the preparation of the financial statements necessary to help chart the future moves.
or plans of the business. Management must be concerned with its investment in materials if for no other reason than the fact that the money so tied up is in most cases a considerable portion of the current assets. Certainly any system of effective control of material will demand the active attention of top management as well as the storekeepers concerned. This may not be a simple problem, but it is a very worthwhile one to tackle and solve.

There are really five distinct steps which must be taken to get a complete and effective material control. Their order is necessarily fixed because the whole process is one of building. The direction and the extent of each successive step is dependent on the decisions reached in the previous one.

**There are a Limited Number of Important Items**

The first step in setting up an effective material control plan is to learn just what there is to control in the inventory. Analysis should be made to find out, percentage-wise, what the important items in the inventory are in respect to quantity and also in dollars. The analysis may disclose, for example, that eighty-five per cent of the dollar consumption centers in only twenty out of a total of one hundred items. It would then seem logical to concentrate all efforts, especially in the beginning, on these twenty items and to group together into a miscellaneous account the other eighty items. After all, changes in any one of the eighty items could hardly affect the decisions of management. The amount is too small! Thus, a lot of time and effort can be saved and used more profitably in other matters by avoiding "hair-splitting" bookkeeping. A lot of small and unimportant details can, if we are not careful, put the brakes on a control system. Recognition that simplicity should be made part of the system is fundamentally sensible.

**Formula Standards and Check on Materials Substitutions**

With this list in hand of the more important inventory items, the second step would be to find out where and how these materials are used. This means that the mill superintendent and the foremen concerned must sit down with the design engineer, the chief chemist, the production manager, and the purchasing agent, as a committee, to determine on paper the various bills of materials or formulas necessary to make up and produce the more important products suggested in the sales mix analysis.

Here again, effective control is promoted and much time is saved by concentration on only those items which, dollar-wise, represent sales volume. The formulas to make these items form the basis and should be recognized as the

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master standards. It is these ideal formulas which are costed to sales. The material going into the other items should be calculated when and if the need exists. Thus, the accounting work of maintaining the cost data for the principal items in the sales mix can be kept to a minimum. When the master standards

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are reviewed and changed, the information can be carried through with a minimum of effort and time. This concentrated line of attack should help, to a considerable degree, to keep the accounting system streamlined.

Ordinarily, it should be the purpose of management to hold the developed master standards over an agreed period of time. However, there are occasions when substitute formulas become necessary. These may be prompted by a new idea of processing. Sometimes the inability to get desired material may force the production department to fall back on substitute material. At any rate, freedom to go ahead and use substitute materials should be allowed, so long as production keeps moving and comparative costs are kept. Thus, the cost of the actual production using both sets of standards, the master and the substitute standard, can be calculated and the difference shown in a formulation variance account.

This variance tends to focus attention on the cost of allowing changes to be made during the period. An unfavorable formulation variance means that the substitute formula is demanding either more material to be put into the unit or, if the quantity remains the same, that the quality of the material is more expensive or, as is often the case, a combination of both. The engineers and laboratory supervisors who are directly responsible for decisions in this area should stand accountable for increased cost of production. This check on the formula group tends to standardize the consumption of material. Often a contemplated change may be delayed without serious damage until the possible obsolete inventory items are given a chance to work themselves off the books. Such a course may mean a saving in dollars and in floor space.

The secret of formula cost control is teamwork and proper communication among the various functions of the organization which have some definite responsibility with regard to inventories. This working together, rather than unilateral action by any one person on important material changes, will tend to keep the organization on its toes and promote cost-conscious planning from every angle.

Consumption Variance

The third step in building an effective materials control system concerns the actual use of the material and presents a real challenge to the manufacturing area to reduce cost. This need not be a complicated matter, since a segregation of the more important materials of the inventory has already been made as a first step. From an analysis of the sales mix, there has been singled out the volume items and formulas have been developed for only these items, as the
INVENTORY TURNOVER ANALYSIS
Covering the Year Ended April 20, 1952

INVENTORY NO. 2

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>ITEM</th>
<th>TONS USED IN YEAR</th>
<th>AVERAGE TONS IN INVENTORY DURING YEAR</th>
<th>TURNOVER PER YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>1</td>
<td>52</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>18</td>
<td>0</td>
<td>Immediate</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>110</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>Group Total</td>
<td></td>
<td>400</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Group B</td>
<td>1</td>
<td>294</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>40</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Group Total</td>
<td></td>
<td>500</td>
<td>75</td>
<td>7</td>
</tr>
</tbody>
</table>

EXHIBIT 2

second step in preparation for control. Thus, attention is narrowed down to the more important elements in the inventory. Here is where the material consumption dollars lie. Here is where the shop foremen should be concerned.

By comparing the material applied to the current standard formulas, which include the substitute standard formulas, with the amount of material actually used, as reported in the perpetual inventories, the shrinkage or processing loss of material can be ascertained. This variance, sometimes called the consumption or manufacturing variance, is the direct responsibility of the plant superintendent and his foremen. They are charged with the responsibility to see that only the best methods and procedures are followed in the manufacturing process. The requisitioning of materials to fill the current formulas or bill of materials is under their jurisdiction.

The problem of keeping the consumption variance down to a reasonable amount is a knotty problem which can involve all phases of the manufacturing process. We find that excessive shrinkage or waste is due to many reasons,
some of which are poor scheduling of orders, small orders, bad machine fills, poor machinery, careless workmanship, "green" help, lack of proper instructions, wrong material used, and clerical errors in calculations. These are by no means all the causes for excessive waste, but they are typical reasons for high shrinkages.

After the accountant has had the chance to analyze and point out the areas of cost which seem to be "off-the-beam," the foreman concerned should be consulted. This does not mean that the foreman should be assigned, in any sense of the word, to clerical work. But, given the opportunity to review the statistics, this foreman will be in a better position to move more intelligently into the productive areas of excessive cost, to observe his men's performance more closely, and to evaluate critically the relationships in the activity (Exhibit 1 is illustrative). Most foremen realize that it is fully expected of them, as part of their jobs, to take appropriate and prompt action to eliminate excessive waste wherever possible and to prevent nonstandard practices from creeping into the manufacturing process through someone's carelessness, incorrect methods or procedures, defective machinery, etc. A requirement for having the foreman and accountant report back to a standards committee what action is taken on a particular unfavorable condition has the effect of keeping the manufacturing people, and especially those responsible for the manufacturing, cost-conscious.

Indeed, this material consumption variance can be the important sign at the fork of the road for business. Some managements can, of course, get rid of the variances indicated by falling into a pattern of "tolerant do-nothing" and simply charge the variance off on the books to profit and loss. The superior type of management will, however, at least make some effort toward getting rid of the uneconomical condition. Clearly, the choice of attitude whether complacent drifting along with unfavorable elements of operation or a vigorous attack to eliminate waste, will help one to evaluate the real worth of management as a body of responsible men.

Being governed by the principle of exception, a good management should naturally look at this consumption variance as a sort of "efficiency barometer". When the variance is high, management must hop in fast and single out the causes for the excessive waste. Continued excessive shrinkage in material can be the death-knell for the competitive operation of the business because, usually, more money is involved in this particular variance than in any of the others. Also, it is highly important for everyone on-the-line to understand that the "little extra good measure" given here and there through requisitions is simply

JULY, 1952
### Material Consumption Summary

**X. Y. Z. Company**

<table>
<thead>
<tr>
<th>No. 1 INVENTORY</th>
<th>PERIOD ENDED: APR. 20, 1952</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DOLLARS</td>
</tr>
<tr>
<td></td>
<td>Std.</td>
</tr>
</tbody>
</table>

**I. FORMULATION VARIANCE**  
(Formula Committee):

1. Master Formulas  
   10,000
2. Current Formulas  
   10,500
3. Variance  
   % Variance
   
**II. CONSUMPTION VARIANCE**  
(Superintendent):

1. Current Formulas  
   10,500
2. Actual Inventory Consumption,  
   priced with Std. Prices  
   12,000
3. Variance  
   % Variance
   
**III. PRICING VARIANCE**  
(Purchasing):

1. Inventory Purchased at Std. Prices  
   14,000
2. Inventory Purchased at Actual Prices  
   13,500
3. Variance  
   % Variance

---

**EXHIBIT 3**

A flitting away of the company assets. It has no place in good business. In a free market, competition will not buy inefficiency and waste. "Survival of the fittest" is a philosophical truth which applies very definitely to the business world.

**Make the Purchasing Department Responsible for Price Variance**

The fourth step in an effective material control centers around the pricing of the standard formulas. Since all unfavorable variances in a standard cost system are direct deductions from the profit and loss account, the careful setting of standard prices for the formulas by the purchasing agent should tend to promote a better tool for control purposes. If the question of price fluctuation is taken out of the realm of the production department's responsibility, the variances due to formulation and to consumption are somewhat isolated and therefore easier to understand. A clear-cut variance can be worked on intelligently. A complex variance can be confusing and a barrier to speedy elimination.
By pricing a new substitute formula with standard prices and comparing its cost with that of a master standard formula or some other current substitute formula, a direct evaluation may be made in a minimum of time. If one were to keep all the formulas priced up-to-date with the fluctuating market or actual unit inventory prices, the maintenance of this cost project would be burdensome, slow, and expensive.

Furthermore, the very fact that a price variance exists and appears on the books should force the purchasing agent and those under him to do the best job possible when bargaining permits. Watching the price variance and plotting it on a graph should point up important market trends. An increasingly unfavorable price variance in major inventory items should be a definite signal for the purchasing department to shop around in the market for a suitable material which costs less. This working to hold the cost of material down should contribute to stabilize the cost of the finished product.

**Supervisory Services of An Inventory Control Committee**

The fifth and final step in any program set up for promoting an effective material control is the creation of a top level inventory control committee, which would be composed of the treasurer, sales manager, production manager, purchasing agent, plant superintendent, chief engineer, and cost accountant. This group should meet once a month, usually after the books are closed and the statements prepared, to review the materials situation. All of the inventory summaries should be analyzed comparatively with the prior ones. Reasons for the increases or decreases, as the case may be, in the broader inventory categories should be given. The effect that such changes may have on the future operations should be discussed.

In order that the capital tied up in inventories may be reduced to a safe workable minimum, this committee must be fully acquainted with the company's future sales picture, the production schedule, and the behavior and experience of at least the more important items in the perpetual inventory. Full co-operation among these responsible supervisors should promote the smooth running of the customers' orders and result in shipments being made on schedule.

An analysis of the inventory turnover should prove very helpful to this committee in planning or formulating policies with respect to the inventories on hand or the materials to be purchased. Such an analysis is illustrated by Exhibit 2. The objective should be to maintain an efficient inventory with a minimum amount of dollars. This should free more capital for other business
purposes. Also, the disclosure of the slow-moving inventory items should prompt an order to storekeeping and materials handling personnel to place these items in the less valuable warehouse space and to reserve the more accessible areas for rapid-moving items.

The inventory control committee should also be charged with the responsibility for approving the maximum and minimum limitations for the major items in the inventory. In a sense, this is a rough type of a budget. Depending on the economic and sales outlook, these maximums and minimums are moved upward and downward. This is not an automatic process since some materials, due to the ease of getting them, would not necessarily have to be increased or decreased proportionately to the activity in production.

Economic trends may present important problems in regard to the inventory on hand, especially so if the cash position of the company becomes directly affected. The inventory control committee may find it advisable to recommend the liquidating of inventories to get cash. Or it may find it advantageous at times to give the green light for some highly speculative plan. In embarking on any extraordinary materials policy, it is advisable to have everybody concerned well informed, so that the danger signals may be posted promptly should things suddenly go amiss.

Finally, this committee should tackle the problem of an unfavorable consumption variance, especially, if the condition seems to stem from operating poor equipment. Recommendation for new capital expenditures to overcome and eliminate controllable waste should be within the jurisdiction of this committee. Other variances shown in Exhibit 3 should also get attention.

Review of Points Made

It is possible to summarize briefly. To promote an effective materials control system, it is necessary to streamline the accounting reports, concentrating on the behavior of only the more important items in the inventory, and to seek out the reasons for the formulation, consumption, and pricing variances. Further, an energetic and well-informed inventory control committee, composed of top-level executives, will provide the necessary inspiration to keep material cost on a competitive business basis.
Techniques for Control of Finished Goods Inventory

by B. H. SEMLER
Assistant Controller, Johnson & Johnson, New Brunswick, New Jersey

Sales forecasting, production scheduling, customer service, management control, and direct selling efforts are the functions to be served by the close coverage reporting procedure—relating to finished stock, production, order, and shipment data—described in this article and which utilizes tabulating equipment. The steps in the routine are both described and illustrated.

An abnormal fluctuation in consumer demand, general uncertainty of prices, and the general expansion of industry requires that business control very carefully its continuing investment in inventory. The increase in conversion costs, on one hand, and the necessity for prompt customer service, on the other, requires that particular emphasis be placed upon control of finished goods inventories. This control can only be accomplished through the coordinated effort of the major operating sections of business. These divisions are market research, merchandising, sales, production, purchasing and accounting.

Primarily involved is the coordination of various statistics, records and reports, which can best be accomplished through the accounting function. The volume of transactions involved in sales and production operations and the multiple use which can be made of this common information make the required operations particularly adapted to punch-card equipment.

The remainder of this paper is devoted to an explanation of techniques of control developed through the use of punch-card accounting equipment. The following paragraphs are significant to this explanation, as background information about the company.

Organization and Policy Affecting Finished Goods

The organization of the company, so far as finished goods are concerned, includes the following classifications of activity:

a. Market research unit—Responsible for sales forecasting.
b. Product directors—responsible for the products and their distribution.
c. Manufacturing—Decentralized into six manufacturing units, each with its own production coordinator responsible for scheduling and maintenance of inventory levels.
d. Inventory control—A separate section in the accounting organization and responsible for inventory records and control over availability of merchandise and back orders.
<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This column reflects the cumulative quantity for the month-to-date quantity of orders received.</td>
</tr>
<tr>
<td>B</td>
<td>This column reflects the quantity of orders received on the date of adjustment, transfers, and special orders.</td>
</tr>
<tr>
<td>C</td>
<td>This column reflects the quantity of orders pre-invoiced.</td>
</tr>
<tr>
<td>D-1</td>
<td>This column reflects the quantity of orders for the month as shown in Column J.</td>
</tr>
<tr>
<td>D-2</td>
<td>This column reflects the quantity of orders total sales not used in the production of goods.</td>
</tr>
<tr>
<td>E</td>
<td>This column reflects the quantity of orders received on the date of adjustment.</td>
</tr>
<tr>
<td>F-1</td>
<td>This column reflects the quantity of orders pre-invoiced.</td>
</tr>
<tr>
<td>F-2</td>
<td>This column reflects the quantity of orders total sales not used in the production of goods.</td>
</tr>
<tr>
<td>G</td>
<td>This column reflects the quantity of orders received on the date of adjustment.</td>
</tr>
<tr>
<td>H</td>
<td>This column reflects the quantity of orders pre-invoiced.</td>
</tr>
<tr>
<td>I</td>
<td>This column reflects the quantity of orders total sales not used in the production of goods.</td>
</tr>
</tbody>
</table>

The above table helps in tracking and managing inventory and production orders, ensuring that the right goods are available for sales.

Just as entries in the inventory ledger are updated for every shipped order, the inventory balance is refigured at the end of each month to reflect any new orders, shipments, or returns. The final inventory figure for the month is then used to calculate the cost of goods sold for the period, which is a key component in determining the profitability of the company.

A more detailed view of the month-end process is outlined in the next section.
The company attempts to maintain sufficient quantities of all products on hand so as to be able to ship customer orders without delay. Orders are pre-invoiced on punch-card accounting equipment from pre-punched and pre-extended cards. Tabulating cards used in preparing pre-invoices are available for a summary of orders received and again, after shipment, for a summary of sales.

Just as market research and the resulting sales forecasts are the key to budgetary control, so also are they the basis for controls over inventory. The market research division provides an annual unit sales forecast by product by month in October of each year. Using these forecasts, the manufacturing departments establish monthly production schedules and the monthly planned inventory position, for the next year. The sales forecasts are subject to continuing review by the market research division, and adjustments made in the forecast up to the first of the current month. Monthly meetings of market research, manufacturing, purchasing and inventory control personnel are held the first of each month in order to establish the final adjustment to the sales forecast and the resulting firm production schedules for the month.

In order to insure an adequate stock of products to fill pre-invoiced customers' orders and to provide production departments with current information on inventory position, it is necessary that inventories be maintained on an order basis. The inventory on an order basis must reflect production promptly and also must reflect the recording of customer orders upon receipt rather than upon shipment. The establishment of the order inventory position and the coordination of the requirements of the various operating departments have been accomplished through the preparation of a single report on punch-card accounting equipment, as illustrated in Exhibit 1. This form is prepared in multiple copy, and distributed to the manufacturing units, the inventory control division and the market research division. Distribution is made at noon of the day following the date of transactions reflected in the report. Information is listed in product code sequence with a separate section for each manufacturing unit.

A master file of tabulating cards is maintained which contains index codes for manufacturing units, product directors, product codes and inventory units. Sales forecasts, production schedules, planned inventory and minimum stock quantities are key-punched into tabulating cards each month. Also, each day, the previous day's production, transfers and adjustments are punched into tabulating cards from documents processed through the inventory control section. Punched cards used in preparing pre-invoices are summarized daily by product.
### MONTHLY REPORT OF ORDERS RECEIVED, PRODUCTION AND FINISHED GOODS INVENTORIES

| CLASSIFICATION  | 
|-----------------|-----------------------------------------------------|
|                 | #1 | #2 | #3 | #4 |
|                 | 
|                 | ORDERS RECEIVED | PRODUCTION | INVENTORIES | BACK ORDERS |
|                 | Forecast | Actual | Forecast | Actual | Planned | Available | |
| A Manufacturing Unit | $315,200 | 322,100 | 326,200 | 324,100 | 165,270 | 182,520 | 5,000 |
| B Manufacturing Unit | 375,800 | 371,600 | 395,200 | 391,100 | 262,500 | 261,000 | 8,000 |
| C Manufacturing Unit | 251,600 | 250,400 | 260,100 | 259,300 | 185,300 | 172,000 | 3,000 |
| D Manufacturing Unit | 325,260 | 321,160 | 315,300 | 299,600 | 241,500 | 235,000 | 10,000 |
| **TOTALS**       |      |      |      |      |        |        |      |

### MONTH-END SUMMARY OF FINISHED GOODS INVENTORY AT STANDARD COST

| CLASSIFICATION  | 
|-----------------|-----------------------------------------------------|
|                 | 
|                 | REGULAR PRODUCTS | 
|                 | Planned Inventory | Inventory On Order Basis | Unshipped Orders | Inventory On Shipped Basis | Inventory of Special Products | Inventory of Government Products | Total Inventory On Shipped Basis |
| A Manufacturing Unit | $165,270 | 182,520 | 25,000 | 207,520 | 10,000 | 40,000 | 257,520 |
| B Manufacturing Unit | 262,500 | 251,000 | 40,000 | 291,000 | 20,000 | 20,000 | 331,000 |
| C Manufacturing Unit | 185,300 | 172,000 | 21,000 | 193,000 | 18,000 | 10,000 | 221,000 |
| D Manufacturing Unit | 241,500 | 235,000 | 60,000 | 295,000 | 30,000 | 10,000 | 335,000 |
| **TOTALS**       |      |      |      |      |        |        |      |
These daily transaction cards are merged with the master, forecast and balance-forward cards from the previous day and used to run the report. Summary cards are prepared while running the report, which contain the balances to be forwarded to the following day. The reports are prepared by manufacturing unit and released piecemeal, with the last section issued before noon each day.

This tabulated report, thus available promptly, supplies the interested departments with all of the factual information necessary to control the level of inventories. It eliminates duplicate records which might otherwise be maintained in these several areas. The use of common-source information also results in more accurate data and does away with the necessity for reconciliation which exists when several records are maintained. Actual orders received can be compared with those forecasts. Production to date can quickly be visually matched against the production schedule, enabling the production coordinator to judge whether he is overproducing or under schedule on any item. Production can also be gauged against orders received, enabling the manufacturing unit to step up or cut production of any item, as required. Available inventory is known daily, with the result that pre-invoiced customers’ orders may be back-ordered or prepared for shipment as processed.

In addition to the daily issuance of this information, similar reports are prepared each five, ten, and fifteen days and also at the end of each month for distribution to the several product directors. Information is presented separately for each product director and, on these reports, there is included in Column D-2 the sales value of orders received.

**Position in Terms of Shipments**

An inventory correlated with customers’ orders is required to control manufacturing schedules and the availability of merchandise for customers. However, the accounting requirements relating to inventories necessitate the maintenance of inventory records which reflect the position on a shipped basis. The information contained in the order inventory is the same as that which would be reflected in the inventory on a shipped basis, with the exception of the recording of customers’ orders as processed. An inventory on a shipped basis in dollars can, therefore, be prepared by computing the standard cost of the quantities reflected in the order inventory, after making a substitution of the cost of merchandise shipped for that reflected in orders processed.

The monthly sales are obtained by re-using the detailed pre-punched cards originally employed to prepare the pre-invoice when the customer’s order was
received. All calculations of cost are made by using master cost files and an electronic punch-card computer. The monthly inventory on a shipped basis details the inventory position by item at standard cost, the total of which agrees with the control accounts maintained in the general ledger.
Inventory Reporting to Management

The daily and periodic reporting of the inventory on an order basis in quantity only provides the operating personnel with tools for planning and control. The dollar inventory on a shipped basis satisfies the accounting requirement for detailed inventory records. A further combination and consolidation of the available information provides the means of reporting and control for higher levels of management. The conversion of quantities reflected in the order inventory report to dollars at standard cost provides the means of reporting the dollar inventory position.

Exhibit 2 illustrates a form of report which summarizes at standard cost the value of orders received against sales forecasts, the value of actual production against production schedules, and the standard cost value of available inventory compared with the planned position. The report also reflects the standard cost value of back-ordered quantities which must be considered in evaluating the relationship between available and planned inventory. This report is prepared in summary form to reflect the position of each manufacturing area as well as by product group for each group within each manufacturing area. Distribution of the report is made to manufacturing divisions and to manufacturing supervision.

As indicated previously in discussing the inventory on a shipped basis, the only difference between it and the inventory on an order basis is the substitution of shipments for orders received. The difference in inventories after making this substitution would, therefore, represent the value of unshipped orders. Exhibit 3 illustrates a reporting of the unshipped order position, as well as a reconciliation of the inventory position on an order basis with the inventory position on a shipped basis. The data for this report is readily available from the information on Exhibit 2 and the inventory on a shipped basis.

Source Data Serves Many Purposes

The advantages resulting from the use of punch-card equipment are derived from the wide distribution of the information by means of multiple report copies and the use of common information for more than one purpose. Exhibit 4 illustrates the inter-relationship of accounting, manufacturing and tabulating operations and the re-use of common information in the several reports. For completeness this inter-relationship has been extended beyond the inventory reporting to include the use for purchasing, cost accounting and cost control.

Exhibit 4 also illustrates the common use of information in cards representing orders received and orders shipped. Adjustments, transfers, special orders and
shipments to branch warehouses are reflected in both the inventory on an order basis and the inventory on a shipped basis. Production for the period is likewise reflected in inventory on both bases as well as being used for determining the value of monthly production and in the analysis of material usage and labor variations from standard.

On this last point, the production schedule quantities reflected in the inventory reports have been used previously to determine the raw materials required for production. This determination is made three months in advance by the use of a master card file containing the raw material requirements for each product. By use of this same master file, production can be broken down into standard raw material consumption and the standard quantities thus determined can be compared with materials actually consumed to provide an analysis of the material usage variations from standard. Similarly, by use of standard labor master files, the standard labor in actual production entering into inventories can be compared with the standard value of labor paid for as shown on the payrolls.

**Evaluation of Planning Through Inventory Turnover Measurement**

The inventory reports and controls which have been described relate primarily to operating tiers of management responsibility. The reports measure performance against forecast and the level of inventories against the planned position. However, top management must have a means of evaluating the acceptability of the inventory plans as such. This evaluation is best provided through calculations of inventory turnover. Inventory turnover measures the number of times the average investment in inventories is converted into sales.

Because of the seasonal nature of business and the probable desires to stabilize production and provide for possible vacation shutdowns, short-term turnover calculations on a month-to-month basis are not too significant in themselves. If, however, the annual cycle remains fairly constant, the month-to-month or quarter-to-quarter turnover can be significant when placed on an annual basis. The annualizing of this turnover ratio should be accomplished, not by an annualizing of the short period factors, but rather by reflecting a rate for the previous twelve-month period. For example, with a quarterly calculation, the current quarter would be added to the previous three quarters to reflect the annual turnover ratio. Under this method, the trend in ratio becomes a significant tool for measurement of performance. By applying the same calculation to the sales forecast and inventory plans, management can be provided with information for use in evaluating the planned operating program.
Control of Parts Inventories at Sales Branches

by PAUL T. SHERWOOD

Manager of Accounting Services and Auditing, Ozalid Division, General Airline and Film Corp., Binghamton, N. Y.

This case study narrates the solution of a problem in replacement parts accounting which grew, attracting little notice at first, with the sale of the company's main products. The appearance of adjustments in connection with physical inventories at branches occasioned the search for a satisfactory control method, which was found in extension of the use of punched card equipment.

Branch spare parts inventories can become quite a problem if not properly controlled. It is my intention in this article to enumerate some of the problems associated with the control of branch spare parts inventories and describe one method of control which has been found to work quite satisfactorily.

We have numerous branches throughout the country which stock material, both the finished product and replacement parts. This paper will be concerned only with the replacement parts. These parts are all originally shipped from the home office and stocked at the branches in minimum quantities for servicing the machines in the branch territory. Quantity records are kept at each branch for local control of inventories. All receipts and issues of material are posted to these records, which show minimum and maximum balance quantities for ordering purposes. Physical inventories are taken twice a year.

Origins of the Problem—and Getting at It

When it became evident from reports of inventory shortages and overages that our control of branch spare parts inventories was not what it could be, our first review of the situation indicated that the primary cause of our difficulties was paper work.

Also the results of physical inventories are posted to the branch inventory records, then forwarded to the home office for comparison with the control records and the preparation of adjustment entries. At the time that these physical inventories are being taken, material may be in transit from the home office to the branch. This material in transit, if improperly controlled, can render the physical inventory meaningless.

Another condition to be contended with is created by the fact that most parts sold are sold by servicemen while servicing a customer's machine. Since it is impossible to predetermine what parts will be required to repair a cus-
tomer's machine, it is necessary for servicemen to carry a stock of parts with them to avoid possible loss of time in returning to the branch to pick up a part. As a result, some servicemen who have a large territory or one located a considerable distance from the branch must carry a large inventory of parts, either in their cars or at some point convenient to their territory. Obviously this condition lends itself to a very loose inventory control. In addition, many small parts, commonly referred to as hardware, are not carried in inventory at the branch at all but rather are stored in open bins readily available for the serviceman to take a handful as required. No record is made of these informal withdrawals. Because the value of these hardware items is so small, it was felt that formal control of them would be more costly than the possible losses through this informal system.

In the beginning, replacement parts inventories at branches were minor and not subject to much activity. For this reason, the only record maintained at the home office of the value of branch replacement parts inventories was an overall control of the dollar without any detail quantity records. In time this proved to be inadequate. As the differences disclosed by physical inventories increased, it became more evident that something had to be done to improve our control of these inventories. For purposes of economy, it was agreed that any corrective measures should make use of existing facilities, in so far as possible.

It was pointed out that some of the necessary information was already available but in somewhat different form than required. All shipments of material from the home office to branches were covered by consignment invoices. All sales of parts from these branches were also covered by invoices. All invoices were punched by the tabulating department, because our accounts receivable are kept on tabulating cards. In addition, numerous statistical reports on sales were being prepared by the tabulating department monthly. It looked as though a lot of the information concerning branch inventories was already available on tabulating cards and, if some of the information not already available on cards could be recorded, we might develop control of branch inventory through the use of tabulating equipment. It was quite evident that any home office control record should consist of part numbers, quantities, and dollar values by parts rather than the over-all dollar control maintained in the past.

**Segregating Parts out with Servicemen, Expensing "Hardware"**

The first problem analyzed was that of forms. In the past it had been the practice at branches to withdraw parts from inventory, using either requisitions, invoices, service reports or, in some cases, no form at all, as with hardware items. In the first case, requisitions were not binding and were not returned. In the second case, invoices were issued near the end of the month to replace parts as they were withdrawn.

In the third case, service reports were not bound by the home office. In the fourth case, hardware items were withdrawn without documentation. In each case, the information did not follow the parts when they were withdrawn, and therefore could not be included in any inventory record. In the present plan the existing invoices and consignment invoices were utilized. Invoices were sent to branches, and were given the same number as the consignment invoice. The invoice was then processed by the bookkeeping department, and a copy was sent back to the branch.
Parts withdrawn by servicemen for their own inventory were taken on requisitions immediately posted to the branch inventory as issues. This could not be done on the home office records because, until parts were used on a customer's machine, they were still in inventory.

In order that home office inventory records might be in agreement with branch records, branches were instructed to establish inventory cards for all parts currently held by the servicemen. These inventory cards were to be included with the other cards covering the regular branch inventory. For each part, therefore, the branch maintained two cards, one representing the inventory of parts located in the branch and the other, filed immediately behind it, the inventory of parts held by servicemen. When withdrawals were made by servicemen from the branch inventory, they were posted as issues on the first card and receipts on the serviceman's card. These transfers of material at branches were not to be recorded on the home office records. In the event that a serviceman found it necessary or desirable to return a part to stock, he did so by preparing a credit requisition and having it receipted by the stock clerk. Parts retained by servicemen were considered inventory until such time as they were listed on a service report as having been installed.

Since the mechanics of punching tabulating cards for all invoices covering the sale of parts had already been established, it was decided that all issues of parts from branch inventory, even though not sales, would be covered by invoices. This included such miscellaneous uses of parts as in the rebuilding of machines, gifts to customers for good will, and parts scrapped. The invoices were to be made to ourselves, the "customer" copies destroyed, and the internal copies distributed, as usual. Since the number of parts so used at most branches was insignificant, very little additional burden was placed on any one branch. Once it was established that all issues from branch inventories were covered by invoices, we felt quite confident that, when we picked up all invoices in the tabulating department, we had accounted for all issues of parts at branches.

However, this did not take into consideration the hardware items passed out indiscriminately to servicemen. In order to standardize the handling of these items, a list was prepared identifying the part number and description of all hardware. This list was distributed to all branches to avoid the possibility of individual interpretation of what constituted hardware. All shipments of these hardware items to branches from the home office or from other branches were written off to expense rather than charged to the branch inventory. It was then possible for the branches to continue the practice of picking up small quantities of these items without disturbing our inventory values.

JULY, 1952
Customer Returns; Parts in Transit to Branches

With requisitions used to cover the transfer of inventory from the branch to the serviceman, hardware being shipped to the branch and all sales to customers.
(whether on a regular shipping order or service report) invoiced, it would appear that we had control of all receipts and all issues of inventory material at branches. Unfortunately, this was not the case. Frequently, parts were returned by customers for one reason or another. Many of these parts were good material and should go back to inventory. Since not all of the parts were necessarily good material, it was decided that, at the time the credit memorandum is issued for the customer, it could be coded to indicate whether or not the material was to be returned to inventory. When the credit memoranda were processed by the tabulating department, the cards bearing a code which indicated that the part was inventory material, were included as receipts of good material.

In order to control material in transit at the time of physical inventories, it was decided that branches taking physical inventories would report to the home office the last shipping order number received prior to the physical inventory. By this means, it was possible for the home office and the branch to synchronize their cut-off points.

**The New Procedure**

At the home office, invoices are delivered daily to the tabulating department covering shipments to and from each branch. These invoices are forwarded to the tabulating department in groups, with an adding machine tape for each showing the total sales value. The groups include invoices covering the sales of all types of products and sales analysis cards are key punched and verified for ultimate use as the accounts receivable record. Once these cards are verified and a tabulation of them proves to the total of the invoices received, the cards covering parts sales and shipments are sorted out and reproduced. After this reproduction, the original sales analysis cards are returned to the file of cards for statistical and accounts receivable purposes. At the end of the month, the reproduced cards represent all of the transactions affecting machine parts during the month. These cards are coded to show the part number, quantity, the shipping or receiving branch, the account number to be charged, if any, and the invoice number as a reference.

When the plan was set up, a group of balance cards was prepared from a physical inventory. These original cards were costed and extended. At the end of the first month, they became the old balance cards to or from which the cards representing the current month's activities were to be added or subtracted. It was our normal practice to use average costs in pricing inventories. Since this would mean, in the case of branch parts inventories, the calculation of a
new average each month, it was decided to use a fixed price. This fixed price was to be adjusted periodically based on studies made by the cost accounting department.

The file of cards representing the previous month’s end balances is maintained by part number. Cards punched from the current month’s invoices, therefore, are first sorted by part number, then match-merged with the old balance cards. The fixed unit price is gang punched from the old balance cards to the current month’s card. Current month’s cards which remain unmatched represent parts which were not previously in inventory or cards for sales of hardware. The hardware cards are removed from the deck by matching with a master file of hardware cards and a listing is prepared of the hardware sales for the month. This listing is turned over to the cost accounting department for relief of the expense accounts previously charged for this hardware. The remaining unmatched cards are listed for the cost accounting department where unit costs are calculated and key punched into the cards. These cards are then returned to the file of matched cards. The old balance cards are sorted out and the total cost of the current month’s cards is calculated and verified.

The current month’s cards are next sorted down into six groups for the preparation of statistical reports. These reports are as follows:

1. Transfers from the home office, tabulated by part number by receiving point and showing the quantity and dollar cost.
2. Transfers to the home office and branches by part number and shipping point and showing the quantity and cost.
3. Parts used for expense purposes, listing parts by account number and by shipping point, showing the quantity and cost.
4. Parts sold from branches, tabulated by part number and showing shipping point, quantity and cost.
5. Parts returned from customers, listed by part number and shipping point and showing quantity and cost.
6. Interdivisional sales, listed by part number and shipping point and showing quantity and cost.

After these reports are prepared, the cards are sorted by branch. The old balance cards are also sorted by branch and the two files match-merged by branch by part number. The cards are then listed by part number within branch, with the receipts adding to and the issues subtracting from the old balance cards, and cards are summary punched with the net of these calculations. These cards represent for each item, the new balance cards for parts at each branch. These new balance cards are then listed by part number within branch, re-sorted to straight part number sequence and listed by branch within each part number. Each of these listings represent the new balance of parts in inventory at the end of the current month. Exhibit 1 is a simple flow chart showing these operations. Exhibit 2 is a sample of the first-mentioned listing.

Using the Results

The listing by part number within each branch is used by the cost accounting department for comparison with any physical inventories which were taken during the month and the listing by branch within part number is used by the Machine Service Department for the determination of the total quantity of any particular part at all branches, facilitating the ready transfer of critical parts to branches where they may be needed and removal of parts from branches where they may be overstocked. The listings of the current month's transactions make it possible for the Cost Accounting unit to retrace all transactions on any particular part by month to localize any errors which resulted in inventory adjustments revealed during a physical inventory. The listing given to the Cost Accounting unit is also used to analyze the difference between the fixed cost and the average cost and to charge or credit the inventory adjustment account for the amount of the difference.

The results of the program as a whole are that, as a by-product of an accounts receivable tabulating application, control has been established over branch replacement parts inventories, losses indicated by physical inventories have been eliminated in some cases and greatly reduced in others, and the amount of inventory of machine parts maintained at branches can be controlled by the home office Machine Service manager, which makes it practicable to keep inventories at a minimum value.

JULY, 1952
Industry Accounting Manuals Today
by DONALD G. MACKENZIE
Research Staff, National Association of Cost Accountants, New York, N. Y.

This review of the current status of industry accounting manuals shows the expansion of subject matter which has taken place in the continuing development of these manuals. A brief summary is given of some of the more important of these additions and a list of more than sixty currently obtainable manuals is available from N. A. C. A. on request.

Before trade associations became actively interested in the development of industry accounting manuals, section 20 of the Interstate Commerce Act of 1887 required common carriers to file annual reports on forms which the commission prescribed. These reports brought into public view many variations in railroad accounting practice and, to reduce these, the Hepburn Act of 1906 authorized the I.C.C. to prescribe a uniform system of accounts. Such a system was prescribed in 1907 and, with numerous revisions, is in use today.

Factors Influencing Issuance of Industry Manuals, 1905 to 1952

The earliest reference made to development by trade associations of industry accounting manuals seems to be to Uniform Methods of Cost Finding for Steel Foundries which was published in 1905 by the Steel Founders’ Society of America and the object in those early days, as stated in this manual, was “to overcome a condition which more than any other tends to demoralize trade, viz., unintelligent competition, arising from the fact that quotations and bids are frequently prepared by various competing concerns upon totally different bases, or, worse yet, are often merely guessed at through not having any data on which to base calculations.”

A few years later, in 1909, a set of principles was adopted by the International Cost Congress of Employing Printers of America. This set of principles formed the basis for the so called Standard Cost Finding System published by the United Typothetae of America (now Printing Industry of America). The emphasis here, somewhat like that of the Steel Founders, was on the principles involved in ascertaining “the cost of an hour’s work in the various departments, the cost of each piece of work produced and the cost of all factors entering into the production of printing.”

The objectives in these early manuals are present in industry accounting manuals prepared in recent years but they have been expanded and added to during the years.
during most of the periods of governmental activity which have intervened. These periods of development seem to have coincided with periods of history, e.g., the first World War, as shown in the statement of William B. Reed, Secretary of the National Coal Association, N.A.C.A. Yearbook 1920, "Following the outbreak of the war, it became essential that some system be adopted which would show coal mining costs with a measure of uniformity, because it soon became the policy of the Fuel Administration to fix selling prices in a given field upon a basis of costs after allowing a margin of profit fixed by the Fuel Administrator above a bulk line including the major portion of the tonnage of a given district."

The momentum given to development of industry accounting manuals by World War I seems to have carried through into the postwar era of the 1920's, during which time many additional associations became interested in developing and promoting manuals for their own industries.

This period was followed by the demoralized price structure of the depression of the early thirties. The resulting National Industrial Recovery Act of 1933 presented the next incentive to the industry manual movement through the development of over 500 codes of fair competition.

The Robinson-Patman Act of June 1936 provided additional need for cost accounting data although its actual effect on the development of industry manuals is somewhat debatable.

The need for cost accounting has also been much in evidence during the second world war and the so-called cold war which has followed it. The Machinery and Allied Products Institute recognized this need as illustrated by the following statement in their new manual just published.

"Since 1944 new demands have been made of accounting by the progressive development of corporate operations and governmental regulations, and new opportunities have appeared for the utilization of accounting as a useful tool of management."

This is reflected in the more than forty new or revised industry accounting manuals which have been received by N.A.C.A. since January 1946. It is understood that there are at least seven additional manuals in process of preparation. Mr. H. N. Simpson, Executive Vice President of the West Coast Lumberman's Association, stated the case for his association in 1950 as follows:

"Over the past few years it has become more and more necessary for the industry to be in a position to set forth its economic position before regulatory bodies. The uniform Accounting System will facilitate the accomplishment of this requirement."
Of similar import is the following quotation from The Standard Expense Accounting Manual for Department Stores and Specialty Stores: (1948).

"This uniform accounting practice has advanced the public relations of the retail trade, which as a result has been able to make available to the government and to congressional investigating committees accurate and corroborating statistics on expenses and profit. The Standard Expense Accounting Manual as an authority for expense accounting procedure has eliminated needless discussion of expense classification."

**Developing of the Accounting Content of Industry Manuals**

Accompanying the expansion of industry manuals over the years has been the incorporation of accounting developments in these manuals. Illustrative of this is a statement from the Manual of Cost Principles for the Industrial Fasteners Industry as follows:

"In the more than ten years since the preparation of Cost Principles for Bolt, Nut and Rivet Manufacturers vast changes in equipment, processes and ratios of material, labor and overhead expenses have come about. Also, there has been a great advance in the technique of cost finding by the industry generally.

"To the end of keeping cost finding in pace with these changes and to present that which is known to be best and most applicable to this industry, the Cost and Accounting Committee of the Institute prepared this—a new manual."

A good example of progressive development is shown by the revisions, over the years, of the National Electrical Manufacturers Association manuals. Starting with the third edition of 1919 entitled Standard Accounting and Cost System for the Electrical Manufacturing Industry, we find it divided into three sections as follows:

1. General accounting
2. General cost system
3. Classifications and definitions of controlling and intermediate accounts

In publishing the fourth edition in 1922 a new section was added, entitled "Suggested Method of Applying this System." Among other things this section drew attention to the need for departmental breakdown into productive and non-productive centers as follows:

(a) Production departments or production centers, i.e., those which make goods for sale such as contributing or process departments and assembling or completing departments.

(b) Nonproductive departments, i.e., mechanical and administrative departments which do not make goods for sale.

In the sixth edition in 1931, the name of the manual appears as Uniform Manual for the Electrical Manufacturing Industry and the manual was expanded to include a section of account classification and a brief section on cost accounting."

The Manual of Cost Principles for the Electrical Manufacturing Industry contains:

1. Principles of cost principles
2. Cost principles for the electrical industry
3. Classifications and definitions of controlling and intermediate accounts
4. Suggested method of applying this system
5. Guide to the accounts

It is of interest to note that the methods and principles herein set forth have been developed in order to improve the control of cost and to facilitate the correlation of accounting and cost data. Some of these principles are also contained in the Uniform Cost Accounting and Accounting System for the Electrical Industry and have been adopted by the Institute of Electrical Engineers."

An editorial note in the July, 1931, issue of N.A.C.A. Bulletin states:"
to include sections on pension costs, valuation of inventories, and explanation of accounting for development and field service, job costs, process costs and a brief statement of procedure for standard costs.

The manual was not revised again until 1950 but, in the meantime, the association published in 1937 a supplement entitled *Standard Costs for the Electrical Manufacturing Industry* the purpose of which was stated to be to:

1. Present a comparison between job costs and standard costs.
2. Explain the advantages of standard costs.
3. Describe the sequence of steps in the installation of standard costs.
4. Illustrate and describe the resulting reports and procedure.

This supplement was incorporated in the present seventh edition, with the following explanation:

"Three basic types of manufacturing cost accounting systems are described herein: 1—Standard costs, 2—Job order costs, 3—Process costs. In recognition that standard costs will have more general application in the electrical manufacturing industry, and that much of the detailed procedure required for the operation of a standard cost system is also applicable to other methods, this type of procedure has been accorded prominence."

To complement the addition of standard costs, there was also added a complete new section on the analysis of cost variances, which deals with the separation of expense into fixed and variable and the development of a flexible budget.

**Frequency of Treatment of Principal Topics**

The development illustrated above leads naturally to an interest in what is contained in some of the more extensive industry manuals of the post War era. Some indication of this may be afforded by a listing of the frequency of treatment of the following subjects in 36 current manuals:

| 1. Cost accounting | 29 | 6. Inventories | 10 |
| 2. Classification or chart of accounts | 27 | 7. Budgeting | 9 |
| 4. Sample or illustrative types of forms | 17 | 9. Sales analysis and distribution costing | 9 |
| 5. Guidance as to financial accounting | 16 |

It is worthwhile pointing out that the reason only twenty-two manuals deal with general accounting procedures is that ten out of the thirty-six manuals are concerned exclusively with cost principles, cost control or cost figuring and the remainder are specialized manuals, such as, for instance, the *Standard Expense Accounting Manual for Department Stores and Specialty Stores in the Retail Field*.

An examination of the twenty-nine manuals which include detail on cost ac-

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counting procedures indicates that not all of them specifically point out the advantages of tying cost accounting procedures into the general books. However, a good representative proportion of the major manuals do, and the following quotation serves to illustrate the viewpoint.

"On this subject, the Drop Forging Accounting Handbook (1949) states, "many accountants will insist that all burden ledger and cost accounting records must be tied into the general accounting records in order to insure an accurate accounting structure. However, from a practical standpoint, there are many very successful companies that use the burden ledger in one form or another as a medium for checking the cost of operating the various centers within the plant and to establish burden rates for the various operating centers without any attempt to tie the burden ledger to the general ledger."

Frequency of Treatment of Characteristic Cost Topics

An analysis of the twenty-nine manuals which deal with cost accounting shows that the following subjects are treated with some frequency:

1. Separation of departments or cost centers into productive and nonproductive or direct and indirect
2. General and administrative expense
3. Standard costs
4. Separation of burden into fixed and variable
5. Analysis of variances

On the subject of separation of departments or cost centers into productive and nonproductive, the Drop Forging Accounting Handbook has the following description:

"As noted in the Chart of Accounts there are two groups of centers in any plant. One group is called operating centers, the cost of operation and the direct labor of which can be charged to the product in direct measure with the amount of benefit received by the product from the respective center. The second group is frequently and erroneously called nonproductive centers but here is called by the proper name of Service Centers. The cost of operation of the Service Centers cannot in any practical degree accurately be charged to the product. Their purpose is to provide the services, i.e. the power, maintenance, supervision, etc., so that the operating centers can apply their full capacity to the production of the plant's output.

"The cost of operating the service centers must then get into the cost of the product through the medium of the operating centers. This is most accurately done by distributing periodically the cost or expense of the service centers to the operating centers on the basis of the best measures or estimates of the services rendered to the various centers. There is no single basic or unit of measurement
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Management Cost Control Manual (1949) of the National Association of Photolithographers states as follows:

"The separation of fixed and variable expenses is important and necessary for the preparation of budgets and in order to exercise control over and insure proper interpretation of costs as the volume fluctuates from month to month."

An interesting statement on standard costs is made in the Cost and Accounting Manual of the Service Tools Institute (1950) as follows:

"In the Service Tools industry, standard cost methods are presently used by approximately 60% of the manufacturing companies and job cost methods by 40%. Some companies still using job costs have expressed either intention or desire to change to standard costs. The chief obstacle has been the mistaken belief that a large expenditure of time and money was required to establish standards.

"It is felt that for those in the industry now operating under a job cost system with the inventory tied into the books, the change can be made with relatively little trouble and expense and largely by the inside organization. For those who do not have such a system, the bugbear of setting standards should not be a block.

"While it is recognized that some companies in the industry have well developed job cost systems, it is the considered opinion of those who have studied the problem that not only these companies benefit by changing to standard costs but could make the change more readily by reason of the excellent cost information already available."

In addition to the above subjects treated by several manuals, there are special treatments accorded the following subjects in individual manuals.

1. Functional profit and loss statements.
2. By-product and joint product costs.
3. Conversion costs.
4. Branch costs.
5. Accounting for investment and capitalization.
6. Relationship between management and accounting.
8. Cost control through accounting reports.
10. Idle plant.
11. Packaging and shipping costs.
12. Loss on imperfects.
13. Forge die and tooling costs.
15. Cost estimating rates.
17. Formula yield and material costs.
18. Accounting for special types of costs.
19. Simplified systems.
If nothing else, the lists which have been given indicate the scope of coverage of accounting subjects by trade associations as a whole. The particular subjects have, of course, been selected in each case to suit the special needs of each industry and the manuals serve a variety of purposes from a basic classification of accounts to highly procedural accounting manuals dealing with many phases of present day accounting.

**For Small Business Units As Well As Large**

Running all through the various manuals is the consciousness that the manual must be useful to the small organization as well as the large and this factor may be responsible for limiting the scope of the manual in some cases. This problem has been covered in a number of instances by outlining parts of the manual useful for various sizes of enterprise. Sometimes, a procedure for small manufacturers has been described in detail, as well as a procedure for large manufacturers.

The Grinding Wheel Institute (1946) handles the question in the following way:

"One of the basic principles of the plan is that it must provide for uniformity of procedure and individuality of detail."

A good general objective would seem to be provided by the following quotation from *Bank Costs (1951).*

"The Committee approach has been to present a simple but thorough basic plan for cost determinations coordinated with additional material explaining and illustrating more detailed procedures for use by banks which desire such information."

"In any size bank, it is possible to produce cost figures ranging from those that are highly accurate to those that are so inaccurate as to be unsafe for use. Any shortcut procedure should be used only if it will not materially distort true results such as are produced by the highly accurate procedures."

"The test of short cut methods and less accurate figures is their effect when used in shaping bank policy. It would be better to have no cost figures than to have figures based on faulty shortcuts that do not tell the true story and, therefore, mislead. Because any shortcut is dangerous until proven against the more detailed methods, the committee has leaned first toward greater accuracy."

The extent to which an individual company refines the details of its accounting system will in many cases depend on the conditions to be met within the industry and the ability of company management to use the greater detail to advantage.

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Range of Purposes Served by Industry Accounting Manuals

As discussed previously, a considerable incentive to the development of industry manuals has been the periodical efforts of the Federal Government, occasioned by war and economic developments, to regulate business enterprise in various ways. This seems to have been responsible for making two of the principle objectives in developing industry manuals those of cost control and the development of adequate costs as a guide to pricing. However, there are a number of other objectives and one which seems to be growing in importance is development of costs to aid managerial decisions, both in long-range planning and for more immediate short-range production and distribution decisions. Evidence of this would seem to be the addition to several manuals of sections on standard costs, variance analysis and budgets.

Some of the objectives and purposes stated in the present day manuals have been listed and are presented here for the assistance of those connected with industries where industry accounting manuals are in use. These purposes and objectives are:

1. A uniform classification of accounts
   a. To provide a common accounting language.
   b. To provide a standard for defining and a procedure for classifying and distributing expense items.

2. The development of product costs
   a. To establish a basis for dealing with unprofitable products.
   b. As a basis for pricing.
   c. To determine costs of articles manufactured on a uniform basis.
   d. To tend to standardize products of industry.

3. The development of departmental costs
   a. To prevent waste of material and inefficiency of operations.
   b. To analyze costs through variances from standard and to determine reasons for waste and spoilage.

4. A flexible cost accounting system
   a. System must be sound, flexible and fitted especially to the industry.
   b. Uniformity of procedure and individuality of detail.
   c. To assist in determining reasonably accurate costs of converting raw materials into finished products.
   d. A practical and workable system, easy to understand.
   e. Simplicity, making system installable by anyone having general bookkeeping knowledge.
   f. A minimum cost accounting system.

5. A basis for statistical comparison.
   a. Accurate and more uniform financial statements.
   b. Productivity of employees and units of equipment.

6. Aids in formation of better management policy.
   a. Selection of profitable customers, distribution channels, territories.
   b. Basis for establishment of selling prices or direction of sales and manufacturing effort.
   c. Puts management in position to place more complete figures before regulatory bodies.
   d. Develop more intelligent competition between members and industry.
   e. Basis for decision of major policies, such as purchase of new equipment and size and type of equipment.
   f. An aid to obtaining financial help.

7. Elimination of expensive experimentation by the individual Manufacturer.
   a. Uniform accounting within an industry provides the "one best way" known to the industry to figure costs.

8. Shorten the apprenticeship of newly-employed accountants.

9. An accurate perpetual inventory system.


A summary picture of this broad scope of usefulness is contained in the "Foreword" of the new Machinery and Allied Products Institute’s Accounting Manual.

"New accounting and financial problems have been born and others have matured to full stature in recent years. Responsibilities in such matters as the preservation of economic income and the economic value of invested capital, pension plans, wage and hour and other governmental regulations, special contract accounting, product price redetermination and renegotiation have increasingly been added to the sphere of the Financial Officer."

The objective in this brief summary has been to give a picture, partly by illustration and partly by implication, of the extent to which industry accounting manuals are part of present-day accounting. It has been felt from time to time that some of the limitations of statistical analysis would discourage the further development of industry manuals. That this has not been true to a greater extent than appears to be the case would seem to be accounted for by the many more truly accounting purposes served by present day manuals.

Coming Articles IN THE N.A.C.A. BULLETIN, AUGUST, 1952

How to Use Standard Costs  
by JOHN PUGSLEY

The Case for Direct Costing  
by H. W. LUENSTROTH

Pitfalls of Direct Costing  
by JOSEPH A. ALVAREZ

Some Potentials of Statistical Methods  
by CARL E. NOBLE

A Study in Church Accounting  
by E. G. SCOVIL

THE WORKSHOP
Counter-Attacking Direct Labor Variances  
by JOE WINTERS

A Battery of Labor Efficiency Reports  
by RUDOLPH WYER
THE WORKSHOP

Symposium on Maintenance Cost Control

When Plant Engineering reprinted in its November 1951 issue, the letter of W. T. Brunot on "Advance Planning and Control of Maintenance" which appeared in the N. A. C. A. Bulletin for June 1951, a certain amount of interest in the subject and the accounting-engineering relationship involved, was aroused. The January 1952 issue of Plant Engineering contained several letters on the subject. A number of well-defined presentations by N. A. C. A. members have also been received. Six of these are grouped here. They cover a variety of aspects of control of maintenance and related costs.

I. The Differing Roles of the Accountant and the Engineer

by EARL V. HOPTON

THE FORUM LETTER "Advance Planning and Control of Maintenance" by W. T. Brunot which appeared in the June 1951 N.A.C.A. Bulletin brought quick response from readers of Plant Engineering in its November 1951 and January 1952 issues. In general the maintenance engineers interpreted Mr. Brunot's comments deploiring the lack of adequate standards for measuring repair and maintenance work, as reproof for noncooperation with accountants.

Discussions of maintenance costs and their reduction have been rather nebulous, which possibly reflects the difficulties involved. In keeping the plant in top condition, many problems arise in anticipating and planning for varying production loads as they affect diverse kinds of facilities located in different plant areas. Good maintenance control is not easy to achieve, but too little progress has been made in the past few years, during which management has improved the techniques relating to other indirect production costs.

Unsatisfactory maintenance control, it appears to me, is not fundamentally a problem of noncooperation between accountants and engineers. We can readily dispense with this misunderstanding and reassure the engineers if, as accountants, we agree that plant maintenance cost data are assembled essentially for the use of the engineer who, working jointly with production personnel using the facilities, is in position to do something about reducing and controlling them.

The accountant is responsible for basic control records which should be conceived of as serving to help establish plans and improve procedures, besides keeping score of what has
happened. He should realize that control, itself, must be exercised before and when the action is happening. For this reason, actual control responsibilities differ from the control record responsibilities. The accountant is in a position to accumulate helpful information but, in effecting control, the engineer alone makes decisions which add up to the ultimate results. Deciding what is to be accomplished and the means to be used is the province of the engineer whose responsibilities, it appears to me, can be reduced to two broad objectives—the setting up of a simple, workable preventive maintenance program and the administering of established maintenance policies economically.

In some plants, maintenance costs amount to as much as thirty per cent of total manufacturing expenses. With the trend of increased mechanization of the productive processes, the influence of repair and maintenance costs on profits will become increasingly more important. The need for constant vigilance, sound thinking, and carefully devised cost reduction plans to improve upon present costs is obvious.

Industrial accountants' data with respect to maintenance costs are generally expected to serve two purposes. One pertains to financial results, the other to operation or department control records. The accountant is required to interpret to top management the effects of maintenance costs on net income. Reports to management are often expressed in broad terms and show these dollar costs in ratio to sales dollar income, to productive labor, to the installed value of plant assets, to the electric energy consumed, or to some other common denominator representative of either plant activity or plant value. These rather intangible figures may serve the engineer as indicators of accomplishment, but they are not sufficiently concrete, even when shown by plant production or service cost centers, to be very helpful to him.

More reliance must be placed on detailed records in the control of repair and maintenance than for any other business function, because it is difficult to envisage the parts in relation to the whole. The objectives become plainer when unrelated maintenance jobs are clearly separated by records which reflect their basic difference by kinds and purposes, when expenditures are shown by labor and materials or services purchased for each cost center, and when the records show separately all work performed for machinery, tools and buildings. Information showing the costs for a particular area indicates the general causes of expenditures, but it is still general and unimaginative. It does not stimulate thinking. For this reason, it is better to support this information with supplementary data which more fully describe the cost, by showing the descriptive classes of the major cost factors involved. Here is a case where the use of a descriptive classification of costs, in addition to the usual ratio analysis of the costs, will increase the usefulness of the report to the engineer. The accountant is required to post all work performed on the job and to maintain a complete system of records showing labor and materials used. A record showing labor costs and materials used is of little value unless telling of the job it is applicable to. If the job is a major one, the record must be significant of the part, of the job, and of the equipment or machine affected.

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major equipment on which the work was performed. Such information, showing that the expenditures were made for motors, storage tanks, roofs or lighting systems, will be found helpful and permit better understanding of maintenance costs, because the information provides a definite point of reference.

However, most satisfactory results are obtained when the engineer is furnished with facts representing a complete descriptive record of all the maintenance costs for each unit of equipment which becomes troublesome or affords the greatest opportunity for making cost savings. These individual machine records should be posted currently and should show all work order costs by descriptions of the jobs performed. Descriptions may be omitted for small repetitive routine jobs unless or until they become numerous, when special analyses are required. Such continuous records of all maintenance work performed on important equipment give the engineer fact-control information he can use. They indicate, if the costs are excessive and work orders are numerous over a period of time, that:

1. The machine should be rebuilt or overhauled.
2. There is weakness in the machine design or its parts.
3. Correct materials having the right physical and chemical properties were not used.
4. Mechanics with the required skills were not assigned to the jobs.

Adequate records will help in the intelligent conduct of preventive maintenance programs and they will enable the engineer to more effectively administer his important function in industry.

II. Cooperative Budgeting of Maintenance

by CHARLES W. POWELL

IN THE HIGHLY-MECHANIZED industrial plant of today, maintenance must be recognized as a very definite cost factor. With this recognition, the problem of control rears its head and the logical answer is a maintenance budget. Apparently, at this point, many companies run into trouble in placing the responsibility for establishing the budget with reasonable accuracy. This problem, like most others, can be solved by a logical approach and the full cooperation of the several parties or departments involved.

First of all, no one person or department in any plant, in my opinion, is capable of setting up a maintenance budget. The information necessary to do this must come from several places:

1. The plant engineer who has the files on all the equipment. He is also in a position to know what is being planned. He is the thinking function with respect to maintenance.
2. The maintenance supervisor who is on the "firing line" and can supply information which might not be contained in the plant engineer's files. He represents the doing function.
3. The cost accountant who can, by analyzing past performance, supply a great deal of information regarding frequency of repair, time required, cost, etc. He exercises the recording and reporting function.

4. The plant manager and the production manager who are charged with the responsibility of getting the finished goods out of the plant as efficiently as possible. They are definitely interested in keeping the plant and equipment in top-notch condition.

It would seem that the logical approach would be to determine first of all what we wish to control and then set up the control mechanism. This may require some change in procedures, change of existing expense accounts or the addition of new ones. The machinery for recording the costs must be geared to the required information. At this point, let me emphasize that all the people enumerated in the previous paragraph should be in on the discussion.

After determining what is to be controlled and setting up the accounts and procedures to accomplish this control, the basic data, if not already existing, can be prepared. This consists primarily of working up departmental schedules of repetitive maintenance functions, such as inspection, oiling, etc., on all equipment and also schedules of expected repairs to plant and equipment, which can be made periodically by use of the inspection reports. After these schedules are prepared by the plant engineer and the maintenance supervisor, it is comparatively simple for the cost accountant to fill in the costs of the various functions.

When the work of budgeting the maintenance costs for the various departments or cost centers gets underway, the supervisor of each should be consulted and the budget determined in each case with his assistance and approval. Only in this manner can the freely-given cooperation of everybody concerned be expected. It cannot be doubted that much work will be necessary in setting up the budget for maintenance costs. Any budget requires work. However, in this particular field, in addition to the work, the cooperation of people with widely divergent views is necessary. It can be achieved with a little understanding of the other fellow's problems.

Whose responsibility is the maintenance budget? It is the responsibility of everybody who is concerned with maintenance, whether he be an engineer, accountant, maintenance man or a production man. It is all a matter of cooperation.

### III. Featuring the Full Cost of Breakdowns

by EARLE N. MARTIN, SR.

THE COST ACCOUNTANT should not direct the maintenance program. The plant engineer should not set up accounting procedures. Both men should...
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A maintenance program is not static and is subject to constant change to meet the challenge of "new machine" development. A planned program of advance or preventive maintenance, considered adequate when machine units are installed, might rapidly become obsolete as experience in operating the units is gained. Usually a preventive maintenance program can be developed and modified in the engineering department, with the cost accountant assisting in setting standards of man hours and material costs for each item of periodic inspection or repair.

Of far greater concern is what I term operating or "on-the-run" maintenance or repairs. In spite of an adequate program of inspections and advance maintenance, there are hundreds of unexpected and emergency breakdowns. At such times, it is not possible to waste time in estimating costs, since the problem is to get the plant back into operation as quickly as possible. It is in this area that the cost accountant and the plant engineer can work best together. In addition to recording the actual cost of the repair, segregating labor and materials, the cost accountant can also accumulate the cost by machine or operating unit numbers. In addition to this, the cost accountant should tabulate and code the cause of the breakdown and the part of the unit which had to be replaced, such as, "electrical automatic switch," "conveyor belt," "drive shaft," etc.

The tabulation of this additional information from daily repair reports is best done in the accounting department and reports can be issued disclosing frequency of recurrence of the various classes of breakdown. With this information in hand, the advance maintenance program can be broadened to minimize future breakdowns during operating periods and specific studies can be started by the engineering department to determine whether or not a change in the machine design might correct future trouble. The cost of changes in machine design should, of course, be justified on the basis of the cost information and incidence of the breakdown, as accumulated by the cost department.

It must be remembered also that the cost of repairing units during operating periods is not restricted to the labor and materials actually used on the job. By far the most important cost item of an operating breakdown is in the lost time and lost production factors. It may take fifteen or twenty minutes to replace a shear pin in a rigid drive gear on a conveyor but, if there are ten or twelve of these conveyors in operation and, due to
loading, the pins require replacement often, the problem is not just a matter of a small-cost individual job. The problem is the accumulated effect of all replacements in this category and the accumulated lost time when operators stand around waiting for the machine to begin to run. Time lost can be multiplied when more than one unit goes out at the same time and has to wait for a busy repair crew to get around to it.

In such cases, the cost accountant is the most valuable man in the chain of control of maintenance and repair costs. The plant engineer may not realize the cumulative effect of these small jobs unless they are placed before him in a revealing tabulation. The cost accountant should add to the cost of repairs a listing of the number of idle hours resulting from recurring breakdowns during the month and should show the labor cost of this idle time. To this he should add the effect of lost or reduced production on fixed overhead unit cost and burden charges. When he has done this, he has told the plant engineer the real and full story and prodded him into action.

In a case from actual experience, a simple hydraulic slip clutch was constructed at the plant and installed on the conveyors by replacing rigid drive gears. This allowed a quick relief of the overload, with the machine continuing in production, in a matter of two or three minutes with no cost for repair involved. I could cite numerous similar cases of repair hazards which were quickly corrected as a result of adequate interchange of information between the cost accountant and the plant engineer and which have resulted in savings of thousands of dollars through less down-time and more production. A sharing of responsibility and adequate communications is the answer to this problem.

IV. Administration of Preventive Maintenance

by HAROLD W. ALBRECHT

THE MAINTENANCE DEPARTMENT is a fertile field for cost analysis and planning, as Mr. W. T. Brunot points out in the June 1951 N.A.C.A. Bulletin. As he has well stated, “Efficiency and proper control of operations in the maintenance department are especially important, since the work is performed by skilled, highly paid employees who often have to work overtime at premium rates, and the equipment used is usually important”.

Many are using a formula for determining and distributing the maintenance budget. The ratio may be old or new, based on past performance or the result of good “estimating,” but,
in any case, since the expense is usually a fair-sized item in the budget, I believe we should start refining the formula we use. In our company, the problem is certainly not simplified by the fact that the maintenance department performs the following functions:

1. Preventive maintenance
2. Emergency maintenance
3. New installations and plant re-arrangements.

In larger plants, where new installations and plant re-arrangements are handled by a separate crew, maintenance may be more systematically planned. However, preventive maintenance, at least, may be conducted under a well-planned program.

Emergency maintenance, as the term implies, involves unanticipated repairs resulting from machine breakdowns. Such breakdowns are costly, not alone because of the repair expense involved but also because of the loss of production and the stand-by labor costs. They are to be avoided, insofar as possible, and they may be held to a minimum by a sound preventive maintenance policy coupled with a sound program for replacing machines which are approaching the expiration of their useful lives.

Maintenance expenditures do not necessarily have to reflect a fixed ratio to plant values, because the age pattern of the capital assets is an important factor influencing year-to-year expenditures for maintenance and upkeep. Maintenance expense in relation to plant investment for a new plant varies widely from that required for a relatively old plant.

A good property record with provision for recording maintenance expenditures by machine units is an essential for a sound preventive maintenance program and is also important in deciding when machines should be replaced. Mounting repair costs is a signal that a machine is becoming too expensive to operate and should be replaced to reduce operating costs and to avoid costly breakdowns in production. Therefore, a good subdivision of maintenance expense helps show the way to a good capital investment program. Also, when major equipment replacements are made, the appropriate time has arrived to revise the maintenance budget.

The logical approach to maintenance budgeting lies through a well-integrated plan of preventive maintenance. Usually such a program involves the adoption of a regular maintenance schedule for each major property unit and group of minor units. In instances in which such an approach has been adopted, results have often exceeded expectations. In one case, the program was first adopted on a limited basis and included electric motors only. Two maintenance men were hired who worked during hours when the plant...
was shut down, oiling motors and systematically testing them for wear by means of "feeler gauges." When, in their opinion, the condition of the motor warranted removal from the machine unit, it was done immediately and a record made of the repairs. If breakdowns later occurred, they were called to the attention of these maintenance men. In the space of one year, virtually all breakdowns due to electric motor failure were eliminated.

At our plant, as in others, we have not been able to put in force as complete a preventive maintenance program as we would like, due to a shortage of skilled maintenance men but, with what preventive maintenance we do have, we always look ahead and plan major overhauls according to the most urgent need. This "anticipating" is the first step in any preventive maintenance program. Everyone follows it in one extent and, with a little more analysis, we can all have a planned preventive maintenance program on paper—and then in fact. The cost of this preventive maintenance becomes the basis for budgeting maintenance. Some allowance should be made for extraordinary repairs, but these emergencies should—as the program develops—become fewer and less costly.

The maintenance department needs accounting help for suitably classified and detailed maintenance cost records to guide maintenance personnel in the more efficient use of its labor force. Maintenance cost will be reduced by better maintenance planning, with more equitable budget and cost control. As a result of other cost studies, industrial accountants have stopped "lumping" expenses. It is time they stopped here, too!

V. Services of Detailed Maintenance Records
by ROLLAND P. RICE

IN THE ARTICLE by Frank L. Palmer, entitled "Charging Maintenance Department Costs," in the N.A.C.A. Bulletin for January 1952, the author outlines and briefly discusses a dual purpose accounting procedure, through which maintenance department costs find their way into plant maintenance costs and fixed asset costs. Many points of similarity become apparent on comparison of the author's procedure and the procedure we have employed for years. The only difference seems to be in terminology. We utilize a system of work-orders to accumulate and develop plant maintenance and fixed asset costs, which is basically a job-order cost accounting system separate from the process cost accounting system which we utilize to accumulate and develop product manufacturing costs. The two systems flow into our general accounting system to produce the general ledger records.

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and balance sheet data. We heartily agree with the author that, with separate records of the jobs done (work-order forms), the greater part of the detail may be eliminated from the subsidiary ledgers which, of course, reduces accounting and clerical costs, and accelerates period closings and preparation of operating reports.

To illustrate briefly, we use a form titled "Machine Repair, Maintenance, or Millwright Request," which shows details of service required, dates requested and required, department and/or operation number, machine number, etc. It is issued by the foreman requiring the service and goes to the maintenance department general foreman, who assigns the job to the proper work-group under his supervision (i.e., machine repairmen, millwrights, electricians, etc.). Upon completion of the job, the maintenance department general foreman fills out the form by recording the completion date and the total work-hours of each job-classification of labor performed. The record is permanently filled in the accounting department.

These records are used in the accounting department and in the plant engineering department to determine maintenance and repair hours required for any piece of major equipment in the plant. The data in these records are invaluable for the preparation of maintenance and repair cost analyses for determination of:

1. Average life revisions and depreciation rate adjustments.
2. Frequency and extent of partial and/or complete overhaul of equipment.
3. Optimum point of replacement in life of equipment.
4. Dollar-expense comparisons of past and current operation periods for one or more departments or operations or pieces of major equipment.
5. Hours-budget and dollar-expense-budget data, both estimated and actual.

These records are not a part of payroll preparation but can be reconciled to the total hours and dollars entered to the maintenance department control account through the payroll distribution. Our experience over the years has proven that this accounting procedure produces accurate and valuable basic maintenance and repair data at a minimum of clerical and accounting expense, eliminates delay in preparation of payroll and cost accounting records and thereby enhances the value of the operating statements by accelerating their final preparation.

VI. Feeding Maintenance Data to the Engineer's Office

by CHARLES G. BURDETT

THE RESPONSIBILITY FOR the control of plant maintenance lies wholly in the hands of the plant engineer. However, he must receive full cooperation
from the accounting section of the plant, from foremen in charge of maintenance, and from foremen in charge of operations.

I see no reason for there being any dispute between accountants and plant engineers on who will do the work of maintaining records. In most cases, regardless of plant size, the plant engineer must have either a secretary or file clerk in his office. There should be no problem in having the records maintained by this individual on the basis of information received from the cost department, payroll department and purchasing department.

The system to be followed should be set up by the accountant and the plant engineer so that the information desired may be obtained with a minimum of clerical help. This is the reason that I feel the clerk or secretary in the plant engineer's office can do the actual record work. In addition, it would be perhaps cheaper in time and money for the records to be kept in the plant engineer's office. If this is done, any questions concerning charges can be asked and answered immediately, rather than tabbed for later phone calls or interview. The clerk or secretary referred to could undoubtedly find time to do this work.

As to the responsibility for control, it would appear that the individual closest to the work should be responsible. It follows that the plant engineer, whose men actually perform the work, must assume this responsibility. An accounting department clerk may receive a multitude of orders on one maintenance job and post merely on his way with no realization of any existing incorrectness or indication of trouble, while the plant engineer, by a visual check of the daily postings to the various machinery records, may be able to correct a situation immediately. Does the accountant know that a lathe does not have a hole? The plant engineer does and generally his assistant will know through experience gained in correspondence.

Naturally, if the accountant does feel that the plant engineer has the responsibility for the control, he must give his complete cooperation. This may be done very simply in the following manner:

1. Route all maintenance orders to the plant engineer's office daily or weekly, as may be desired, for posting after costing.
2. Route all time slips or job tickets to the plant engineer's office daily before submitting them to the payroll department.
3. Check account distribution of invoices on direct charges to maintenance accounts to see that the plant engineer or his maintenance foreman has ordered the machinery for the specific job.
4. Route one copy of direct charge invoice to plant engineer's office.
5. Verify the plant engineer's maintenance report with monthly figures on book and check out any differences with him.

Editor, N.A.C.A. BULLETIN

IN THE DEVELOPMENT of any new industry, or the development of any new product, it is essential that the cost of this product be properly determined. This type of work is usually done by a field organization. In the case of new products, the cost of development, as well as the cost of the product, is usually the burden of those laboratories employed specifically for this purpose.

Before entering into the development of new work, it is important that the laboratory be supplied with complete and reliable information as to the cost of developing the product. To obtain the necessary data, it is often wise to supply the laboratory with partial information on the various stages of development, such as the cost of supplies, the cost of equipment, and the cost of labor. It is also important to supply the laboratory with a special cost sheet, on which the various costs are itemized.

A chart, or a schedule, may be used as a check for the classification of costs. This chart should include all the necessary information. It is important that the chart be used as a guide in the classification of costs, and that it be kept up to date.

The chart should be regularly reviewed, and any changes or additions should be recorded. The chart should be kept in a convenient location, and should be easily accessible. It is important that the chart be regularly reviewed, and that any changes or additions should be recorded. The chart should be kept in a convenient location, and should be easily accessible.
THE COST FORUM

SALESMEN KNOW COSTS OF DEVELOPMENT WORK FOR CUSTOMERS

Editor, N.A.C.A. Bulletin:

In the paint, varnish and lacquer industry, a large amount of laboratory development work is necessary in order to properly serve customers and to keep current with the latest developments in the field. It has been our practice for the past several years to inform our salesmen of the cost of processing and developing new products to meet customer demands. We supply the salesmen with costs on only those laboratory jobs which result from their specific requests for customer service. Before a formulator or chemist can begin work, it is necessary for him to be supplied with a considerable amount of information regarding color, type of material, drying time, what goes under the finish—such as primer, washcoat, sealer, etc.—and many other properties. This information is supplied by the salesman and is shown on a special form. This form is sent to the sales department for approval before being forwarded to the laboratory supervisor. He, in turn, assigns the work to the chemist who is most familiar with the product.

A chemist working on a job in this classification records his starting and stopping time on a laboratory job time record. He may work on the particular job for long or short periods and on many different occasions. He records his time whether it is ten minutes or eight hours. After the job is completed, the cost department figures the total time and extends this time by the rate which has been determined to be applicable. The rate is determined by estimating the total amount of time which will be reported on all jobs and dividing this figure into the related expense anticipated for the ensuing year. Checkups have proved the rate so developed to be realistic and only slight variations have entered into the picture since the inception of this procedure.

After the job cost has been determined, a form is sent to the salesman and the laboratory form is returned to him. The new form reads as follows:

"This laboratory request required—— hours, ——— minutes work by our research laboratory technicians at a cost of $——— per hour. Total cost, therefore, is $———.
If this cost is to be offset by sales, we would require sales of $——— because we figure allowing a maximum of ———% of sales to cover laboratory costs."

In this manner, the salesmen know how much of the product has to be sold before development expense has been recovered. The procedure has proven to be so satisfactory that we are now instituting it for our studio. There we develop panels for the type of finish customers anticipate using in future patterns—especially in the furniture line. We develop the entire finishing system for producing the desired effect.

When the salesman is armed with costs for these types of services, he has added ammunition when confronted with certain sales problems. If a customer begins placing only small unprofitable orders and neglects to place orders for large quantities, the account becomes of no value to either the salesman or the company. With the information which we have supplied, the salesman can realistically emphasize the
high cost of developing the smaller specialized items, as well as the higher manufacturing cost which results from handling only small orders. With his ability to paint this picture, he oftentimes is able to re-sell the customer, with the result that the larger orders are returned to his account. Because of a better understanding of the problems involved, better relationships exist. In most cases, the competitor who may have been getting the bulk business is unable or unwilling to handle the smaller orders, so the entire business is once again returned to the salesman who has the proper information at the proper time.

We are wholeheartedly sold on the idea of accumulating and supplying this information in order to keep the salesmen informed. It has paid dividends, not only for the salesmen, but also for the company.

RONALD F. DE PUIT, Grand Rapids Chapter

PUTTING IDLE FACILITIES EXPENSE IN ITS PLACE

Editor, N.A.C.A. Bulletin:

IDLE FACILITIES EXPENSE is made up of those factory overhead expenses which cannot be reduced in proportion to production load or activity. Its segregation into a separate classification is based on the principle of relieving the manufacturing department of expenses which must be continued even at zero activity.

These are the fixed expenses or the fixed element in expense. Factory management is ordinarily not in a position to reduce the fixed element of factory overhead expense by its own efforts. Therefore, for purposes of proper administrative control, it is desirable to measure that portion of the fixed element of factory overhead expense which is attributable to idle factory facilities and to relieve factory management from responsibility for it.

To calculate idle facilities expense, which does not include any category of expense which can or should be reduced with idleness, the following three factors are needed:

2. Gauge for stating actual activity.
3. List of agreed upon factory overhead expense accounts which are eligible for relief (proportionate to idleness).

Normal activity for any month in each productive cost center should be stated in terms of machine hours operated or direct labor hours worked when operations are at full or normal capacity. Actual activity for any month in each productive cost center should be stated in terms of actual machine hours operated or direct labor hours worked. The rate of actual activity to normal activity is the ratio of activity and this, deducted from one hundred per cent (100%) is the ratio of idleness.

The ratio of idleness for each productive cost center is applied to the eligible factory overhead expenses in that particular productive cost center and the result is the idle facilities expense for that cost center. The overall ratio of idleness for all productive cost centers combined is applied to the eligible factory overhead expenses in the nonproductive or service cost centers and the result is the idle facilities expense of those cost centers.

In calculating idle facilities expense, it should be obvious that all of the fixed expenses and a portion of the semi-controllable expenses, so far as applicable to idleness, will be eligible to be removed from the factory's area of responsibility. It should be equally obvious that none of the controllable expenses will be so eligible.

Often, the exact proportion of semi-controllable expenses which should be eligible for relief is difficult to determine and for that reason, in actual applications of the
Idle facilities expense procedure, the segregation to this classification is usually confined to the fixed expenses.

Idle facilities expense, when calculated, is credited to the factory overhead expense account and charged to an idle facilities expense account. The idle facilities expense sometimes appears as a separate item on the monthly statement of selling expense on the theory that its existence is due to lack of sales. More often, however, it appears as a separate item in the "other deductions" section of the monthly statement of income. In any case, the expense of idle factory facilities, usually due to lack of sales volume, is by this procedure, periodically brought to the attention of top management which is in the best position to take corrective steps where and when necessary.

ALEXANDER W. LANSBERG, Hartford Chapter