Report on the organization and operation of the wage incentives, time standards, and labor grades departments by E.C. Tessman. 1936.

REPORT ON THE ORGANIZATION AND OPERATION OF THE WAGE INCENTIVES, TIME STANDARDS AND LABOR GRADES DEPARTMENTS

The following report is intended for the general information of the Industrial Research Department of the Hawthorne Industrial Relations Division. The objective is to bring out information relative to the functions and procedures of the departments listed in the report title. This should serve to aid in the clarification of the wage system and we should be better able to cope with labor problems that involve questions of wages.

The departments mentioned in the title of the report are a part of the staff organization, Engineer of Manufacture. (Exhibit I) The following analyses will be made of each of the departments:

A. Function of the department.

B. Listing of Departments who formulate requests for the services of the department.

C. Approvals required on recommendations made by the department.

D. Scope of the work of the department.

E. Method of procedure in conducting departmental functions.

I. Time Standards Department

A. Function.

The purpose of the above department is to study the human and mechanical elements of each of our general classes of work and to determine the time for constant and variable elements by fundamental time and motion study. After their establishment the time standards are used by the Piece Rates Organization to

establish rates of output for the various operations in the Plant.

B. Departments formulating requests for the services of the department.

Although there is no definite procedure for other divisions to request the services of this department, it is found that the Planning and Development Departments instigate most requests. In the final analysis the department makes its own conclusions as to where Time Standards studies will be made. However, they also work in close cooperation with the Piece Rates Department, so that if the Piece Rates Department should request the setting of Time Standards for some specific operation, the Standards Department will usually do so.

C. Approvals required to make the recommendations of this department official.

The following approvals are required:*

1. (a) Section Chief (Time Standards)

   (b) Department Chief "

   (c) Planning Engineer (Engineer of Manufacture)

   (d) Assistant Engineer of Manufacture.

2. Piece Rates Organization

(The approval of the affected operating department is not required. Any discussion that they might see fit to have concerning the application of time standards will be carried on with the Piece Rates Organization, who apply the time standards.)

*Hawthorne Time Standards are sent to Kearny, Point Preeze and Queensboro to become effective , if applicable to their work, subject to their acceptance by the other Plants.

D. Scope of Work.

The Time Standards Department is authorized to set standards in all Operating Departments, except in those where the establishment of Time Standards would involve changes in fundamental Company policy. The department chief would not have the sole authority to instigate time standardization study in the tool makers' department. This involves a question of major Company policy, since this department has the reputation ~~prestige~~ of being composed of craftsmen, and output requirements have never been established here. It is the opinion of Mr. Nelson, Department Chief of Time Standards, that there are no occupational limitations to Time Standard establishment at Hawthorne. The only limitations are those imposed by the cost of (producing the standards establishment.) Aside from this time standards might be established from the simplest low grade operation to setting accurate standards for office workers and highly skilled Plant operators.

To elaborate upon the cost limitation factor, the following example is cited. A certain Plant operation may involve only a very small number of workers or a job may be on a temporary basis. Because of the intense analysis and multiplicity of timing necessary the cost of establishing satisfactory time standards may render it inadvisable. (In a situation such as this, the Piece Rates Organization would take the necessary timings to set a rate for the job.)

It is probable that the Time Standards Department will set time standards in all Plant operations where the cost limitation does not prohibit it. This is desirable because of the

ultimate rate setting economies and the increased accuracy and uniformity of output rates required per hour for the Plant operators. (Standards show time in minutes per part for the operation involved.)

The following expected results of Time Standardization study may aid in the clarification of the scope of the work.

1. The application of carefully determined time standards offers a means of approaching the best way to perform work involving human motions.

2. It minimizes fatigue by a simplification of motions, elimination of wasted effort and development of uniformity and rhythm.

3. It increases skill and overall efficiency through the development of precision.

4. Through time standardization and micro motion analysis the time standards engineers are able to detect faulty arrangement of equipment and need for the redesign of tools, machines and work places.

5. Engineers are given the opportunity to suggest changes in manufacturing layout and order of process.

6. Employee cooperation should be engendered because of the greater accuracy and uniformity of time standards throughout the Plant, and because it is possible to show workers more efficient and less fatiguing methods of work.

The past history of time standards study at Hawthorne may aid in bringing out a picture of the present Time Standards Department. The department was begun in a very modest way in 1922. By 1929 the organization had a personnel of about sixty people, and the work was being pushed very rapidly, especially in view of the need for standards at the Eastern Works in connection with the transfer of products from Hawthorne to the Eastern Area. In 1932 as an economy measure this department,

along with others not required in the direct operation of the Plant, was discontinued.

In the spring of 1935 the work was again resumed under the direction of Mr. S. O. Nelson. At the present time only a small portion of the jobs in the Plant have approved Time Standards in use, many of the old standards have become obsolete or require revision.

Since the reestablishment of the Time Standards Department, standards have been established for some of the Principal Plant operations.*

At present the engineers are engaged in analyzing a varied group of operations.**

E. Methods of procedure in performing the departmental function.

The organizational setup of the department can most easily be visualized by referring to Exhibit I. A brief elaboration on the duties of the personnel of the department follows.

Mr. Nelson, as department chief, chooses his engineering personnel (subject to the approval of the division chief) makes decisions as to what standardization work will be undertaken (subject to limitations of fundamental company policy), puts final approval or rejection on time standards before they proceed to a higher staff authority, places his men on particular studies and discusses their work with them.

Under the direct supervision of the department chief are two section chiefs, and three specialized assistants, the

*See exhibit II for complete list.

** See exhibit III for complete list.

latter including Mr. Schaeffer, Mr. O'Shea and Mr. Perkin, who operate the micro motion camera and do the analysis work in addition to developing standards. The two section chiefs reporting to the department chief are Mr. Warch and Mr. Hunefeld. The administration of the departmental work is roughly functionalized between these two men. Mr. Warch has charge of setting metal finishing, cabling and wiring and assembly standards. Mr. Hunefeld has supervision over the machine standards.

The work of time standardization involves intensive study and analysis of a job in the Operating Department, micro motion camera studies where physically possible and advisable from a cost standpoint, and where the minuteness of the motion study demands it. By way of making further analysis to arrive at acceptable time standards a small laboratory has been established to permit laboratory study of motions and apparatus necessary for a particular job. The reproduction of the work process is conducted in such a way that an accurate analysis of the time required for an operation is possible. Mr. Schaeffer has constructed an experimental tabulation arrangement so that when a beam of light is broken at the completion of an operation, (such as the eviction of a processed part from its place in the machine) a pencil falls and registers a mark on a roll of adding machine paper which is being unrolled at a constant predetermined rate. After the laboratory test of the work situation the engineers can take the paper roll on which the pencil marks are recorded and study the length and uniformity of timing for each operation. The results of this study are used in aiding the search for correct time standards

for fundamental motions, and to verify or discredit timings taken in the operating departments.

A time study engineer after having been assigned to a job has rather a uniform method of procedure in attacking his problem. First, he spends enough time in the Operating Department to acquaint himself with every mechanical detail of the job to be studied. This involves a thorough detailed study of the machine or assembly process, study and analysis of the parts to be processed and an understanding of the job requirements placed on the operators. Each machine or assembly operation may involve hundreds of different parts, thousands of motions and operations. There are parts of a different size, shape, weight and material and many operations to be performed on each part such as drilling various sized holes, burring, polishing, etc. As stated previously the objective of the time standards engineer is to break the job down into its minutest operations for time and motion analysis, and later to rebuild the overall job timing for the purpose of setting permanent standards. (A sample Time Study Observation Sheet is included as Exhibit IV.)

However, before timings are taken to arrive at standards, the engineer first is concerned with making changes in machines, work situation or operator motions which will permit more efficient work operations. Machine changes may be developed by the Time Standards Engineer or he may report his findings to the Development Department for action. Changes in the work situation or in operator movements are discussed with operating supervisors and with the workmen. Often inefficiencies are detected by micro motion

film analysis. To facilitate change in the Operating Department the operators and their supervisors are occasionally called into the laboratory to have the analysis of their motions explained to them. As a supplement to this work and a formal acknowledgement of its necessity the Motion Economy Course is now being considered.

After the engineer has satisfied himself that all practicable improvements have been made, he is ready to begin building for his time standard analysis. He begins his search for the elemental motions upon which basic times can be established. For instance, the time required for sand-blasting may be dependent upon area covered, number and degree of angles on the part, shape, length of stroke, size of sandblast nozzle, or distance that part is held from the nozzle. Whichever one or combination of elements that is found to be a basis for uniformity of timings, is used as the starting point. Stop watches which can be read accurately to $\frac{1}{100}$ and others to $\frac{1}{1000}$ minute and a micro motion camera are used.

A job is studied from two distinct angles. Timings are gathered on the elemental, minute motions and timings are also taken on the completed cycles. The purpose of the minute study has already been explained. The purpose of the overall timing is to establish allowance times for an operation. Following are the principal allowance factors:

1. Machine care
   - (a) Oiling
   - (b) Sharpening tools
   - (c) Removing tools, etc.
2. Porterage
3. Stocking up
4. Gauging

5. Delay due to defectives

6. Interference (busy at another machine)

7. Machine warm-up.

Timings taken on an operation are taken up to the time standards department for calculation and analysis.

After spending from a few weeks to eight or ten months on an assignment (depending upon the complexity and size of the job) the engineer is ready to establish his final standard. He, of course, gives consideration to all factors that he has come to conclusions on, and also compares his findings with similar work of his fellow engineers and the micro motion film analysts.

It may be noted incidentally that it is not necessary to make special allowances for operator fatigue. Company policy dictates that a five minute allowance per hour be allowed workers in the establishment of output rates. Therefore, this standard allowance is included in every time standard formula. Exhibits VI to XXVII inclusive are attached for further reference on methods used for establishing time standards.

The Time Standards Department makes a very special effort to have the concluded time standards clear, concise and understandable. Files are kept of all time standards. As the standardization program expands more extensive file maintenance will be necessary. The ultimate objective is to establish standards for the various Plant operations and also to establish records of standard times for fundamental motions and therbligs.

After time standards have been approved by the Assistant Engineer of Manufacture, they are sent to the Piece Rates Organization for their use. If they have well founded disagreements to the standards the Time Standards Department is willing to alter them to the mutual agreement of the two departments. Differences are usually settled before final approval is obtained from the Engineer of Manufacture. After their acceptance by the Piece Rates Organization, along with the labor grades, they are used as a basis for the establishment of Piece Rates for the departments wherein the time standards were set.

II. Labor Grades Department

A. Function

The Labor Grades Department has established a system under which a type of work may be graded so that an employee can be placed on work in accordance with his grade of skill and receive compensation in accordance with the skill and the varying characteristics of the job.

B. Listing of departments who originate requests for the services of the department.

1. Operating Departments
2. Development Department (Engineer of Manufacture Organization.)
3. Piece Rates
4. Planning (Development and Planning now combined.)

C. Approvals required to make labor grades effective.

1. (a) Local Representative (Mfg Engineer)

   (b) Assistant Engineer of Manufacture

2. Superintendant of Operating Department where the Labor Grade is to be applied.

D. Scope of the work of the Deparment

The established labor grades cover between 5000 and 6000 various Plant operations. There may be different labor grades for the same machines, in addition to the rate range within a labor grade. Every day rate and piece rate in the Plant is covered by the twenty distinct labor grade symbols covering piece work and twenty-two grade symbols covering day work. (see labor grade books.) A brief statement as to the purpose of labor grades may aid in picturing the scope of the department.

Labor grades are utilized:

(a) by the Employment Department for hiring help of the proper grade.

(b) by the foremen in classifying employees and adjusting rates of pay.

(c) to estimate costs.

(d) supply base rates for incentive method of payment and also to establish rates for day work.

(e) to provide a formal classification of jobs to maintain equality and stability in the various Plant jobs.

E. Method of Procedure in fulfilling the departmental function.

Labor grade setting does not involve time study

analysis such as the Time Standards and Piece Rates Organization does. Their purpose is to grade the job (not the individual) in accordance with criteria set up by the department. In other words their purpose is to evaluate the qualitative characteristics of a job rather than the quantities.

Labor grades are designated by numerical symbols. The symbols set at Hawthorne never change and are applicable to all other Western Electric Plants. The wage rate may change however, either as a single labor grade or a movement of the entire grading scale, and interplant rates may vary for the same type of work. The shifting of the money values of the rates may be due to the changing external wage levels as a whole, or for a particular grade of work, or it may be due to the fluctuating cost of living. It may be mentioned here that periodical wage surveys are made by the Wage Incentive Department with the cooperation of an Industrial Relations Representative. The purpose of the survey is to collect wage figures of these other companies for the purpose of comparing them with Hawthorne wage rates. Decisions as to rate changes in labor grades are made by high management officials.

In making a specific labor grade study the following method is used: (Labor grades symbols once established on a job are seldom changed.) (Labor grading will be called for when a new job is being introduced into the plant, or if an established job is greatly changed.)

There are four labor grades engineers who conduct the actual job analysis; they are men with either shop experience

or engineering school training, or both. All of these men have been in the employ of the Company for a number of years, with the possible exception of the depression layoff.

The work of the labor grades engineers is not formally functionalized, but as a rule the engineer best acquainted with a particular job is given the assigmment of establishing a labor grade.

Upon the receipt of a request for a labor grade the request is referred to one of the engineers. First, he gathers all facts relative to the operation in question. This he does by going down to the operating department to get a first hand look at the job. He then studies work layout sheets provided by the planning department. These sheets specify the detail of the particular job. (similar to job specifications in labor grades books) After all available facts are before him he is ready to rate the job. This rating consists of a process of evaluating the job with respect to the following criteria:

(a) Technique
(b) Judgment
(c) Importance
(d) Supervision
(e) Working Conditions
(f) Information
(g) Equipment
(h) Set Up

In rating a particular job it should be understood that each job might entertain varying degrees of importance for each of the above criteria. After the labor grades engineer has decided in his own mind the rating to be accorded each of the above factors, he consults the already established labor grades to find comparable jobs and their ratings. The purpose of this comparison is to place the job in the proper labor grade with other

grades of work in the plant.

After the labor grades engineer has evaluated the job and placed it in its proper grade he must next consider the presentation of the grades for approval. He prepares a formal statement of the job, (as demonstrated in the labor grades book) giving all details of the job. Then he prepares his substantiating data. This comprises his definite recommendation as to the grading of the job, backed up with sufficient data to give a clear idea of the reasoning back of his recommendation. One of his principal tasks is to clearly bring out differences between the job just graded and jobs which are graded higher or lower.

His next step is to establish the suitable symbol to the grading work, giving consideration as to whether or not the job will be on day work or piece work. The recommendation for grading is then sent through the necessary lines of authority of the Engineer of Manufacture, and Works Organization for approval.

The following files are maintained by the Labor Grades Department.

(a) Labor Grades by Occupation
(b) " " " Work Departments
(c) " " " Grades
(d) Photostatic copies and original copies of all established grades.

Labor Grades applicable to other Western Electric Plants as stated before, are established at Hawthorne and sent to the other Plants for their approval. If they request a grade for a job not established at Hawthorne the Hawthorne labor grades engineers study the job requirements and recommend a rate.

The output requirements and wage rates for work are

beyond the jurisdiction of the Works Departments. The operating Department supervisor comes into the wage picture when he assigns his workers to the various types of work at the established rates. If the work done by an operator during the day involves working on several grades of work his remuneration depends on his output of each type of work.

III. Wage Incentives Department

A. Function

The range of activity of the above department is widespread and diverse. Mr. Snell, the department chief cites three general functions.

1. Consideration and recommendations on questions of Company wage policy.

2. Analyze and make recommendations on specific wage problems.

3. Gather statistics and analyze confidential materials on outside conditions affecting wages to aid management in making administrative decisions.

B. Requests for the services of the department.

Because of its widespread activities, requests for the services of this department come from many sources. The department holds itself ready to consider and make wage question recommendations for nearly all levels of authority both under the Engineer of Manufacture Organization and the Hawthorne Works. The Piece rates division, operating departments, and the development and planning departments are prominent with regard to the number of requests made.

C. Approvals required on recommendations made by the department.

Because of the varying importance and the widespread field

of origination of requests, the approvals required on the work of the department also vary. The approvals required depend largely upon the inclusiveness of the job. If the problem considered involves questions of fundamental policy, involving all works the approval of the Vice-President in charge of Manufacture is necessary. If the question involves the extension or clarification of existing policies at Hawthorne, the approval of the local works manager may be sufficient. On specific questions involving one group or department, the approval of the Superintendant will suffice.

D. Scope of work of the department.

The scope of the work has been suggested in the preceding pages. By way of being more specific, some of the actual problems considered recently are listed as follows:

1. New employee policy (concerning the rate of pay and learning period for new employees)
2. Supervisors excluded from group piece work rates.
3. Elimination of definite group piece work.
4. Elimination of "A" groups. (Employees put on day work and paid average piece work earnings.)
5. Wage survey investigations of wages and working conditions of outside companies.
6. Performance standard rating plan.
7. Incentive for non-extensive orders in the Specialty Products Department.

E. Method of procedure in conducting the departmental function.

Under the above heading, a brief discussion of the departmental personnel and some specific problems handled by the department will be made. The number of engineers working in

Mr. Snell's department varies greatly, depending upon the number and complexity of the assignments at hand. At times there may be ten or more engineers devoting all or part-time to wage incentive problems. At present there are two men devoting their full time to the department, and several labor grade engineers are contributing part time services.

Because of the wide variety of the work the procedures followed in some of the more common wage problems will be briefly noted. In a request from an operating organization for enlightenment on a specific wage problem a regular mimeographed request sheet is filled out by the operating organization. This sheet is to be filled out with routine information and notations as to whether the job is a repetitive type, automatic, semi-automatic, etc.

In conducting the wage surveys of outside companies, great care must be exercised to see that the data accummulated is really comparable with Hawthorne data. Personal visits are made to the outside plants by a Wage Incentive and Industrial Relations Division representative. During these visits a thorough analysis is made to acquire data so that really comparable median or arithmetical averages may be calculated and so the frequency of distribution of certain wage rates may accurately be arrived at. The accummulated data is classified by occupations, grades, by types of companies, by individual Companies. After the arrangement and analysis of the data the conclusions drawn are very useful for the general information of management and it also serves as a basis for taking action on Hawthorne labor grade rates.

The wage incentives department also carries on a good deal of informal work. Its representatives sometime attend management meetings to aid in the discussion of proposed plans, and to make interpretation of existing policies. This department is really the right hand of management regarding the wage question. It aids in the formulation of wage policies and is also instrumental in putting a policy into action.

SUMMARY

An idea as to the formal interrelationships of the three departments discussed can best be had by referring to the organizational chart Exhibit I. Together these three departments of the staff organization Engineer of Manufacture handle all phases of the wage problem at Hawthorne and other Western Electric Plants. (Other Works have similar departments who conduct special studies peculiar to their plant but the Hawthorne Wage Incentive and Labor Grades Division is the parent one and must approve all wage questions applicable to all Plants.)

These departments should not be confused with the Piece Rates Division of the Technical Branch of the Hawthorne Works. The function of the Piece Rates Organization is to apply the labor grades, time standards and wage incentive plans to the operating Departments. Because of the close physical proximity of the three departments herein discussed and because they are all concerned with the same basic problems there is a good deal of formal and informal exchange of views and information between them.

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