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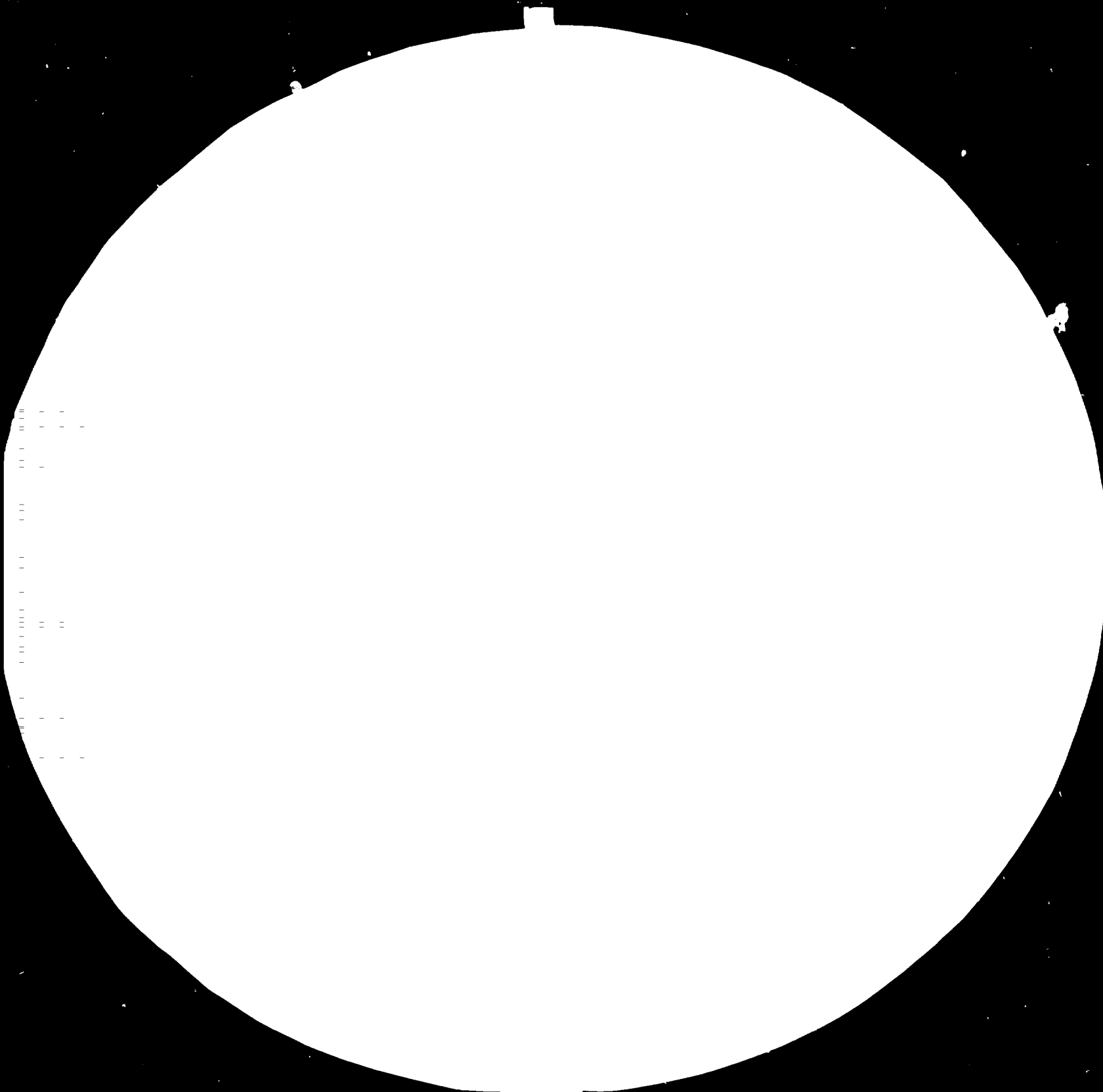

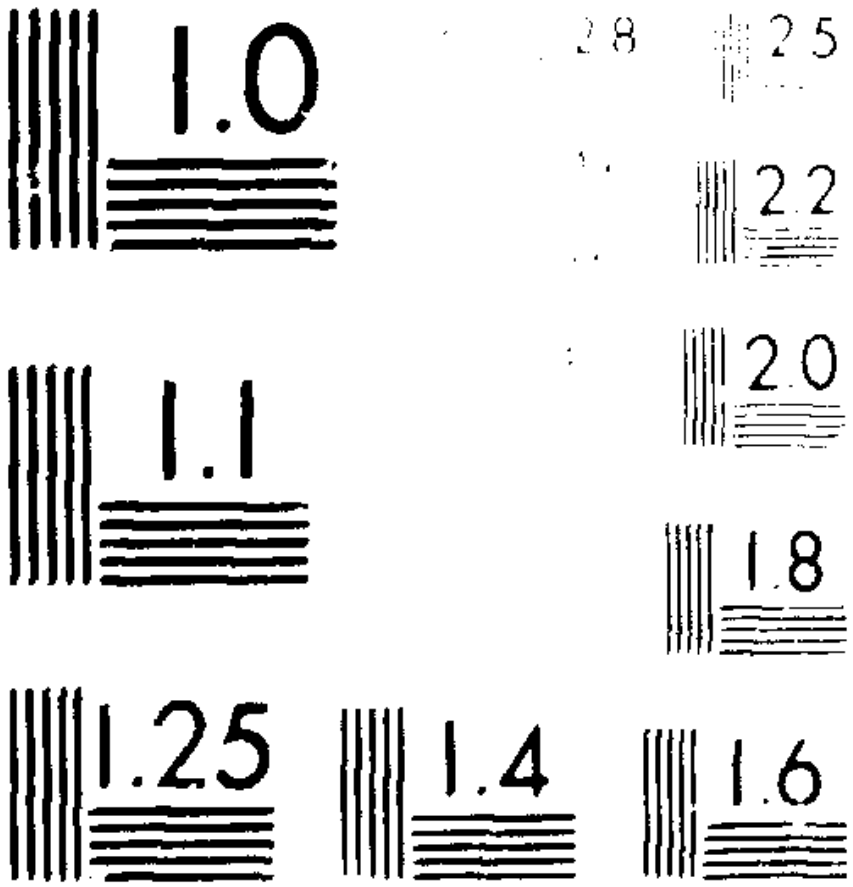
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TF/IRQ/77/004
Assistance to the State Organization
for Engineering Industries

12 June 1983
English

12776

Iraq.

TECHNICAL REPORT

Prepared for

The State Enterprise for Mechanical Industries.
The State Organization for Engineering Industries
Ministry of Industry

Republic of Iraq

by

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June 1982

ABSTRACT

The Report examines some of the management problems at CEMT and makes recommendations for suitable action. During the Project, three people were trained in Work Study and began to carry out studies in the factory. Terms of Reference for the Productivity Department are given, together with a Procedure Manual. This gives the procedures for carrying out projects and studies, for obtaining practical implementation and for the formal and regular reporting of progress to the Director-General. The Productivity Department should be expanded to 18 people, all to be trained under the guidance of the Section Leader. The Department should be used to study and improve methods and set standard times for work in the factory.

Production Management needs more technical support and it is recommended that technology engineers be given to Production to help to overcome the numerous technical problems in the factory. This is also needed to allow the Productivity Department to work more quickly in timing the jobs and setting Standard Times.

The existing Production Control System is Batch, and it should be Flow, because that is the way the factory works. The management control system is ineffective because the reporting of work actually done by the workers is very incomplete. This is the cause of much difficulty; worker performance is not measured; technical difficulties are hidden: and no one has a good view of what is happening so good control is not possible.

It is recommended that the follow-up system be put on the computer (the programme exists) and that new programmes be developed to provide Work Scheduling and Reporting. Changes are suggested for the Monthly Report to show performances and not tonnages. Management training, of all levels, is recommended so that everyone will understand and be able to use modern management controls to make the enterprise more effective.

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INTRODUCTION

Work began on this project on 9 January 1983 and continued until the end of June 1983. The project brief was established at a meeting held in Baghdad at the State Organization for Engineering Industries on 12 January 1983, with Dr. Walid Elias Khidr. The scope of the work to be done was given as follows; it was to be done at the State Enterprise for Mechanical Industries, Iskandariya:

(i) How to audit or check standards used for parts manufacture and process planning.

(ii) Programme for Work Measurement to set correct standards, including training staff and guiding the application.

(iii) Development of Standard Data Systems.

(iv) How to set standards and control procedures for Toolroom and Maintenance work.

(v) Review of adherence to planned speeds and feeds in machining and to planned process times in other activities.

(vi) Review of the organization of work (not of management) and of methods of working.

The overall objective of the work to be done is to provide for a better operation and monitoring of the on-going productivity plan of the factory. Appendix 1 shows the minutes of this meeting.

After a preliminary survey of the work at the factory, a report was prepared. This was submitted on 29 January 1983 and discussed at a meeting at Iskandariya on 31 January 1983. The recommendations in this report were as follows:

(i) Recruit, train and establish people in a Productivity Department at the Enterprise, with a strength of 15-18 engineers. The initial strength should be 4-5 engineers.

(ii) Set up a programme for changing the attitudes of factory management towards higher productivity.

(iii) Improve shop floor data recording by completing job cards correctly.

(iv) Use Time as the measure of performance, and not tonnage, in the monthly management reports.

(v) An outline programme of work for the Productivity Department was given.

The report included a timetable of work to be done during the assignment:

(1) Recruit and train initial staff February-mid April 1983.

(2) Explanatory talks to management February-April 1983.

(3) Job card recording - to start at once.

(4) Use of time as a measure of performance - to start discussions at once and develop changes to the computer programmes as soon as possible.

(5) Work areas: Mid April 1983 onwards.

The extent to which the Project Brief was met is discussed in Chapter II "Summary of Findings and Recommendations". Of the activities listed above in the Work Programme, as presented on 31 January 1983, the only one to be carried out was Item 1. An attempt was made to implement Item 2, but this failed through lack of interest among the members of Management and Supervision.

It is noted that this project, although done under TF/IRQ/77/004, has no relationship to the project or Project Document of that reference. Because of this, it was necessary to discuss and obtain a Project Brief in Baghdad after reporting for work on the project. The Work Plan has had to be evolved in a rather ad hoc way as the work itself developed.

As a result of this, some of the work done during the project differs somewhat from the original ideas.

The specific purposes of this report are:

(i) To outline the work carried out during the project.

(ii) To give an analysis of some of the management problems at SEMI.

(iii) To make recommendations for action to remedy these problems.

(iv) To give guidance on the use of the Productivity Department at SEMI.

Principal Activities during Project

The following were the principal activities which were carried out during this Project by the expert:

(a) Initial familiarisation with the Organization and the Enterprise.

(b) Prepare material for two Work Study Courses.

(c) Run two Work Study Courses - one for Productivity Engineers and one for Technology Engineers.

(d) Supervise and guide the practical work of the trainee Productivity Engineers.

(e) Prepare a one-day seminar on Work Study for the Specialized Institute for Engineering Industries, given on 11 June 1983.

(f) Study the Production Control System.

(g) Systems Analysis of the Follow-up System, to put it on to the computer.

I-SEMI

A Short Description of the Enterprise at Iskandariya

General

SEMI stands for State Enterprise for Engineering Industries. It consists of a group of factories at Iskandariya, which is some 50 km. to the south of Baghdad, close to the national Route 8 to Hilla. The installation was built in the 1960's and early 1970's with Russian advice and assistance, to provide cast iron and steel from scrap, to build tractors and agricultural equipment, to make nails, nuts and bolts and a few other miscellaneous products, all for use in Iraq. The tractors are built under licence from a Czech company and the design has undergone almost no change in a decade or more. Some of the tractor parts are made in the factory; engines and various special items are imported. The agricultural equipment has been re-designed over the years to make it suitable for Iraqi soil conditions, and is assembled almost entirely from parts made in the factory. Workshops have been added for the manufacture of lorry tipper bodies and semi-trailers (articulated trailers).

Products

The following table lists the principal products and indicates the approximate monthly quantity of each. (This is to give an idea of the scale of the Enterprise; actual quantities could differ from month to month).

	Monthly Quantity
Cast iron and steel	350-400 Tonnes
Tractor	500
Small trailer	500
Three-way plough	600
Scanifier	100
Cultivator	100
Digging plough	100
Channel-opening plough	250
Tractor shovel	30
Scania Tipper Bodies	150
Semi trailers	50
Bolts	110 Tonnes
Nuts and washers	30 Tonnes
Nails	200 Tonnes
Hand shovel	30,000

These are planned quantities. The actual output is rather less, and ranges from 50% to 95%, with quite large variations both between products and from month to month.

The annual turnover is of the order of 30 million Iraqi Dinars, of which about half is the tractor.

Labour

The labour force is a mixture of Iraqi and foreign people. The foreign workers are mainly from China, and the Far East, with a few Czech and other European workers in special jobs. The size of the labour force is appreciably reduced because of the war, although quite a number of people have been returned to work at the factory although still in the Army. The present approximate numbers are available for work:

Department	Labour	Staff
Production	1,146	123
Maintenance	402	70
Quality Control	11	42
Stores	56	22
Technology (incl. Planning)	2	138
Miscellaneous Technical	26	14
Administration	31	59
Accounts and Computer	3	37
Sales and Commercial	20	32
Secutiry, Safety and Health	70	7
Social Services (incl. creche)	78	-
TOTALS	1,895	504

The sub-divisions of numbers of workers in Production and Maintenance activities are given in the next table.

Production		Maintenance	
Foundry	162	Mechanical	136
Forging and Pressing	93	Electrical	72
Bolts and Nuts	20	Steam and Air Supply	80
Nails	40	Vehicles	64
Mechanical Treatment	199	Instruments	13
Welding	59	Buildings	37
Heat Treatment	14		
Paint and Galvanising	38		
Tractor Assembly	70		
Agricultural Assembly	40		
Woodwork	60		
Scania Bodies and Trailers	200		
Toolmaking	151		
TOTAL	1,146		402

The Enterprise has to carry a number of workers whose jobs are to service some of the housing in Iskandariya, to supply water and other services which in a larger town would be provided by the town and not the factory.

The total cost of employing people is about 20% of the total turnover of the Enterprise.

II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The Problem Situation

Manufacture of planned output is not fulfilled. There are many shortages of components, which are believed to be the cause of not fulfilling the plan. Much time is spent by Management in chasing shortages. The Technological Times for component manufacture are thought to be wrong, but not everyone agrees with this. It is said that there are not enough workers, and that the ones they have are not skilled enough for the work. Again, not everyone in the factory agrees with these statements.

A. Findings

Practical Manufacturing

1. Work studies show very clearly that work methods are not very good. The technology process is altered in the workshops by both Management and workers. Materials handling is not included in the Technology Process. It is done by methods decided in the workshop, and often done very inefficiently. This wastes labour, adds to scrap and loses parts.

2. Not enough attention is given to getting tools correct, properly sharpened or serviced often enough. The step of annealing is often left out, which leads to low tool life. Poor tool life and control loses output.

3. The need for an intermediate store after Forging and Pressing has been recognized and is being prepared. This will allow longer production runs in forging and pressing. The scheme prepared by the Technology Department had not been passed to Production Department, who are making their own layout.

4. Although Quality Control has detailed checking at the end of manufacture in each shop, it can happen that an operation cannot be done because the item is defective from a previous operation. This gives un-recorded scrap and lost output. Not all items passed as good can be assembled.

5. There is no direct technology support for the Production Department, who seem to be left to themselves to try to solve their production engineering problems. These include materials handling operations.

Systems

6. The manufacturing system is supposed to be by Batch, but it is never possible to identify any particular batch of parts in the factory. Manufacturing actually works as if it were Flow, and not Batch. Production Control is done with the help of a computer.

7. There is a manual system in the factory called the Follow-Up System. The way this works means that scrap quantities are not properly recorded, and the output figures used by the computer are distorted by the System itself.

8. The system of Daily Work Scheduling for each worker is only used in a few places; it is incomplete and not effective. It is not possible to know in advance when any particular operation is to be done.

9. There is very little actual recording of the work done by each worker. No quantities are put on to the Job Cards for the work actually done.

10. There is an elaborate set of computer programmes for production planning and monthly work loading, with reports of costs, time taken for each operation, work in arrears, etc. These all depend on figures from the Follow-Up System, which has some undesirable features, so the reports are of limited value.

Management

11. Fulfillment of output is rarely complete, whatever the plan. If the plan is increased, there is a greater output, which may be more than was given for a lower plan. This shows that the capability exists, but the control systems are not worked or used properly.

12. Because of the lack of proper figures for each worker about what he should do and what he did do, there is no very strong control over the workers by Management.

13. Factory discipline does not seem to be very good, and the general level of effort of the workers is not very high. A lot of time is wasted by not working.

14. Departments do not seem to be very well co-ordinated one with another. Official procedures and paperwork for getting things done by one department for another, or supplying things from stores, seem to be very slow and time-consuming. Lack of coordination means that new developments are not as well done as they could be.

General Comments

15. Technology effort and capital are used to bring in the latest in modern technology. Because the management systems and methods are not as advanced, the results obtained from modern technology are disappointing.

16. Iraq is in difficulties with foreign exchange. It could be better at this time to concentrate on getting better management and management systems than in buying the latest technology equipment.

B. Recommendations

In this section all the Recommendations are listed, but not necessarily in the order in which they are discussed in the report. Page references are given for the supporting discussions on each Recommendation.

Practical Manufacturing

1. Use the Productivity Department, according to the Terms of Reference in Appendix 4, to examine and improve present working methods (pp. 14 + 20).

2. Increase the strength to 18 people in the Productivity Department (pp. 25 + 24).

3. Train these people using the already-trained Productivity Section Leader to lead the training (p. 17).

4. Follow the detailed Procedures in the Procedures Manual (p. 19). The Productivity Manager should check their execution from time to time (p. 20).

5. Productivity Review Meetings to be held monthly as described in the Procedures Manual, to see that improvements are made in the factory (p. 20).

6. A proper work programme for the Productivity Department must be prepared and kept in being (p. 21).

7. Encourage internal training and discussions on Productivity (p. 22).

8. Allocate one quarter of the Technology Engineers to Production, to work in helping to overcome the technical production problems. They will be responsible to the Production Director for doing the jobs they are given, and to the Technology Manager for doing them properly (p. 14).

9. Simplify the procedures for getting tools from the stores and for getting one department to help or do work for another (p. 16).

10. Some review of Quality Control procedures seem desirable, to avoid loss of work and output inside the workshops (p. 9).

Systems

11. Work towards abandoning the Batch idea in favour of Flow for manufacture (p. 26).

12. Using the present Planned Output figures prepared monthly, give clear daily planned outputs for each machine or worker. These are to be put on the Daily Work Sheets already used in some places, as a guide (p. 32).

13. Extend these Daily Work Sheets to cover all of Forging and Pressing, Welding and Mechanical Treatment Workshops (p. 32).

14. Start using the computerized Follow-Up System immediately (p. 31).

15. Require output quantities to be written on the Job Cards each day (p. 31).

16. Develop an appropriate and advanced Follow-up Programme to receive daily output figures for each worker and to prepare suitable reports for Management on stocks, output, performance, etc. (p. 32).

17. Develop a Daily Scheduling Programme to receive figures from Follow-up Programme and to make daily work requirements for each worker (p. 32).

18. Amend the Production Control and Report Programmes to work on Flow rather than Batch (p. 32).

19. As an alternative to (16) (17) and (18), buy a ready-made suite of programmes from a commercial company or bring in foreign programmers for a time (p. 33).

20. Amend page 6 of the present computer-produced monthly report to show performances. These will have to be based for the time being on Technology and not Standard Times (p. 32).

Management

21. Have training for supervision and workers to take better care of equipment (p. 15).

22. Use working parties to get better coordination for new developments (p. 16).

23. Have training for all levels of Management in how to control manufacturing work and people, and in how to use computer and other reports (p. 31).

24. Establish Performance Review Meetings to raise performances and hence output (p. 32).

25. Give careful consideration to improving the motivation of the workers (p. 22).

C. Project Brief - Review

The original project brief is set out in the Introduction and at Appendix 1. In this section the extent to which it has been met is indicated.

(i) How to audit or check Standards. The Productivity Engineers have been trained to do this and a procedure is given in the Manual (Sections H and I).

(ii) Programme for Work Measurement. This must be drawn up by the Management of the Enterprise, having regard to the size of the Productivity Department, and the existence of correct methods.

(iii) Development of Standard Data Systems. This is not yet appropriate, and the Productivity Engineers are as yet too inexperienced to be able to receive instruction or attempt such work.

(iv) Standards for Toolroom and Maintenance work. This cannot be started with a team of only three trainees.

(v) Review of adherence to planned speeds and feeds: as for item (i) above.

(vi) Review of the organization of work. This has been studied in some depth. It is discussed in Chapter VI; some systems have been devised, and recommendations made. Actual implementation by the factory is awaited.

III. REVIEW OF MANAGEMENT PROBLEMS

The principle task of management is to meet the production plan. This does not happen very often, for two main sets of reasons:

(i) Low manufacturing efficiency;

(ii) Shortages of parts.

In reality, the second set of reasons - shortages - comes from low manufacturing efficiency. It is a more obvious set of reasons, and it always looks easier to try to overcome shortages each time they occur than to try to improve manufacturing efficiency.

There are many things that reduce manufacturing efficiency. They can be grouped under these headings:

Methods of Working

People

Equipment

Organization

Methods of Working

These are supposed to be given in the Technology Process. In fact, the practical details are often worked out in the factory by production supervision or even by the worker himself. To some extent this is not wrong, but it seems that not enough Technology Department thought is ever given to such matters as materials handling or the exact layout of the workplace.

Changes get made in the Technology Process by Production Management. Leaving out such operations as annealing, for example, brings appreciable problems elsewhere as tools do not last, and cutting speeds have to be reduced, rapidly causing a shortage of the part affected.

Tools are not properly serviced or looked after. In part this is a problem of organization, but is also one of control of the operation and of the worker - to see that tools are changed and properly looked after.

Materials Handling is done by production workers, often in very inefficient ways. It is not included in either Technology Process or Times. To get improvements in this area there are two things that can be done:

(1) Use the Productivity Department to carry out detailed studies of particular components or machines.

(2) Give Technology support to Production. One quarter of all the Technology Engineers should be given to the Production Director to carry out work in

the factory, to get the production operations working properly, before Productivity Department comes to set new Standard Times. These Engineers will be responsible to the Production Director for the work he gives them to do, and to the Manager of Technology for carrying this work out correctly. This arrangement of divided responsibility works perfectly well in **very many companies.**

The changes put forward by Productivity Department and the Technology Engineers must be carried out.

People

Nothing gets done except by people. Worker skills are said to be not good enough at SEMI, and certainly the amount of work done in a day by many workers is not very high.

Observation during Work Studies has revealed that **some** of the workers do not use the best methods; that they change to less good methods when being studied and that there is restriction of output by some (maybe all) of the foreign workers.

With no system of measuring performance, and with little understanding of this by members of management, such things will never be noticed. They reduce manufacturing efficiency, and nobody knows why. With no control by management, most of the workers are "NOT KEEN" or "NOT INTERESTED" (see page 73).

To remedy this, something must be offered to them. Payment for extra effort and work is one possibility, and giving time off is another. Payment for extra effort should be based on Work Measured Standard Times, and these are not yet available. Such payment schemes bring many problems of their own, and are not recommended for SEMI.

A "Time Off" arrangement is suggested. Each worker would be given a production plan for six days work, based on the planned assembly of product in the week. All workers who complete their plan, with good quality, by the end of the fifth day would be allowed to take the sixth day as holiday with no loss or penalty to them.

Equipment

It was often said to the expert that the plant and equipment is old and unable to work as it should because of its age. Machine tools which were installed new when the factory was built, or since then, should not be considered "old", at least by European standards. Plant and equipment that is not looked after by the workers, and may not have been properly maintained as well, will break down more often, and may not be able to work at the designed speeds and feeds. By now it is probably too late to do very much about such equipment, without investing more money in replacements. What can be done is to train the workers in taking care of equipment of all kinds. Such training can be done in part in a classroom, but mainly by the Foremen, during the working day. The Foremen, therefore, need some preliminary training in care and good use of plant and equipment.

It is not possible to comment on the maintenance of the equipment because the expert has made no study of this activity.

Organization

If the organization is wrong, then manufacturing efficiency will be reduced. The organization that affects manufacturing efficiency is the whole system of planning production and reporting what has been done, together with all the supporting work of tools, stores, maintenance and so on. The problems of production planning and follow-up are discussed in detail later in this Report (Chapter VI), and a number of recommendations are made.

Although other parts of the organization have not been examined in any detail, it does seem to the expert that the various departments at SEMI work in very isolated ways. Each one seems to work on its own, almost as if the others did not exist. For one department to get the services of another seems to need excessive official paper-passing.

For new developments, it would be better if definite small working parties were to exist, consisting of representatives of each department concerned. These would guide the development and see that important things did not get forgotten or done wrongly.

These working parties would be used for such things as, for example, these:

Installing the computerized Follow-Up System (Production, Planning and Computer Depts.)
New Shovel Production Line (Forging and Pressing, Technology, Productivity, Maintenance)
Any other new development

IV. DEVELOPMENT OF WORK STUDY

A. Training in Work Study

Training of Productivity Engineers

This training had the objective of giving Work Study skills to as many people as could be made available, so that they could carry out Work Study investigations in any area of the factory. Because time was limited it was not possible to do more than cover the very basic skills of Method Study and Work Measurement. Further development must depend on the persons trained making it their business to extend their knowledge by private study. There does not appear to be any person in Iraq who has any more than a rudimentary knowledge of the specialisation of Work Study.

Although on 31 January 1983 the recommendations made were for a team of 15-18 engineers, with an initial group of four or five, it was mid March before a small group of two engineers and one technician was formed. Their names appear in Appendix 2 "Productivity Engineers Course".

A complete course was constructed, which used the well-known Work Study textbook published by the International Labour Office (1969 edition). An Arabic translation was available for this book, and instruction was carried out in a mixture of English and Arabic (courtesy of Dr. Nabil Baker, who kindly assisted throughout the course as interpreter). Some notes were written specially for this course, and extracts from other standard works (in English) were used. Several films were borrowed from National Centre for Consultancy and Management in Baghdad. Although very useful, these films were all very old and rather dated in the presentation of Work Study.

The course contained plenty of practical work. In Appendix 2 the course structure is given. All the specially written notes and reading references to textbooks are collected separately from this report. Should it be desired to train more people in Work Study, this course can again be used, since all the material is available in SEMI and Baghdad.

The course was designed to last five weeks, five days a week, with 6 1/2 hours tuition and practice per day, giving a total of 162 1/2 hours. This was achieved.

On completion of the course the three trainees were given projects to carry out in the factory, under guidance. They were encouraged to make their own way with their projects, being guided to follow the procedures they had been taught. These were developed into specific application techniques, designed to meet the local situation. This was considered to be better training than the easier course (for the expert) of just sending them out to collect data for him to study. Such an approach would have done little to develop the trainees.

The level of understanding and skill reached by the three trainees is not less than that which would be reached by similar people under similar training in Britain. They are capable of taking a simple project - such as finding the causes for a particular manufactured component to be in short supply - and collecting the necessary data, making time studies, analysing what they find and presenting their findings to management. The difficulties they face in the future and those of maintaining enthusiasm in the face of management apathy or resistance, and of maintaining their own self-discipline and integrity of work. It will be all too easy for them to lapse into very slipshod ways of working, in the belief that many of the points of technique they have been taught do not matter and can easily be ignored.

Further training of Productivity Engineers should be done by, or at least directed by, the Section Leader (Mr. Jawad Kadham) because he has personally been trained and prepared by the expert.

Training for Technology Engineers

The interested generated on the course for Productivity Engineers was such that the trainees asked for, and got, authority for a suitable Work Study course to be given for Technology Engineers. This course had the objectives of giving Technology Engineers an understanding of what Work Measurement is about, and of giving them an insight into the use of Method Study when they are designing items for manufacture or developing the technology process for manufacture.

A total of eight Technology Engineers attended the course. Their names appear in Appendix 3 "Technology Engineers Course". A complete course was constructed, using in part the International Labour Office book on Work Study in English and Arabic, and with material specially written on the subject of **Method** Study in Design. Practical exercises in data collection and design analysis were carried out. No practical training in Work Measurement was given. Appendix 3 contains the course structure. The specially written notes and references are collected sheparately from this report. This course could be used again, but it will be more difficult to do so than to use the course in Appendix 2. The reason for this is that the ideas in **Method** Study in Design are rather more difficult to grasp, and if the instructor is not fully aware, the whole point of the training might be missed.

The course extended over three weeks, five half days a week, with three hours instruction each day giving a total of 45 hours instruction. It was held in the Training Department of the Enterprise. It seemed well received by those attending, and several were kind enough to say that they had found it interesting and stimulating, and that it had given them a new view of the way work is carried out.

B. Establishing the Work Study Activity

Introducing Work Study

In Britain it is fairly usual to make some formal announcement in a company when Work Study is to be introduced. This is so that everybody, including the workers and their trade union representatives, shall know what is happening and why. A definite policy also needs to exist, preferably as a written document. At SEMI these steps do not appear to have been taken, or at least, the expert was not involved or asked to advise on them when they did take place.

A short course was devised to introduce the idea of Work Study to members of production management. This was to last about six hours, at one hour per week. After the first meeting, attendance fell to one or two people only, although several re-arrangements of the day and time of the meetings were made. As a result, the course was not proceeded with. It has not been possible to give any instruction or training to the senior management or Director of the Enterprise. These circumstances make it more, rather than less, difficult for SEMI to use and obtain real benefit from its Productivity Department.

Office Accommodation

After some discussion, a suitable office was found for the members of the Productivity Department. This is in the main office building, near to the office of the Productivity/Planning Manager. A proposal to locate them in the factory itself was, fortunately, not carried out. Such a location would do nothing to give them either status or convenient working conditions. Neither would it ensure that they spend enough time in the actual observation of work. This will take place if the team are both motivated and controlled properly.

Organization

The Productivity Department is organizationally separate from any other Department. It is headed by a Productivity Manager (at present the same person is also Planning Manager), who reports directly to the Director General of SEMI. This is a sound arrangement. The Department neither has, nor requires, authority over any other Department at the Enterprise.

Procedure Manual

A Procedure Manual has been prepared and appears at Appendix 4 "Procedure Manual for Productivity Department". An Arabic translation has been made, but not included in this report. This manual contains procedures for uses of the Department, for the way projects and studies are to be carried out, for the way Department records are to be kept, for reporting progress, and, very important, a full procedure for the follow-up of implementation so that the Director General of SEMI can know what has not been done and bring pressure to bear on his managers.

One of the three trainees has been nominated as Section Leader of the Productivity Department, with responsibility to the Productivity Manager. An outline of his duties and responsibilities is given in Appendix 4 Section F.

C. Controlling the Productivity Department

Routine Control

The day-to-day work of the Department should be supervised directly by the Section Leader, as indicated in Appendix 4 Section F. In particular, he must maintain discipline within the team and see that work is always available. The Procedure Manual calls for a monthly report (Appendix 4, Section C) of man-days on each project, days absence, projects started and projects ended.

This report is based on daily diary entries, which are called for in Appendix 4 Section E. Keeping a diary up-to-date is important. It is very easy for the days to slip by when one is doing investigations work, and a record is essential if effort is not to be wasted or lost. These diary records are intended to provide information on the running of the Department.

Reporting Implementation of Projects

To check the effectiveness of the Department there must be a Monthly Productivity Review Meeting, as described in Appendix 4 Section D. This meeting, chaired or led by the Productivity Manager, with the Section Leader to take notes and write the report or minutes of the meeting, is intended to bring pressure to bear on the management of the Enterprise to take practical steps to carry out improvements found by the Department, and to which the management have agreed. The result of this meeting is intended to be a report to the Director General of all improvements which have been agreed to but not carried out. It is then up to him to bring pressure on to the members of management concerned. If he does not give this support, then the work of the Department will fail and nothing will happen to change [illegible] for the better.

Maintaining Departmental Performance

The technical control of the work of the Department is more difficult, as it requires that quality checks be made by a person with some knowledge and understanding of Productivity Studies.

The Procedure Manual in Appendix 4 gives very clearly the steps to be followed in carrying out any project. These are listed in Section G of Appendix 4, and can be checked or audited by seeing that the project papers are in fact correctly made up. For projects that are specifically "component studies", a more detailed procedure is given in Section H of Appendix 4. Again, the project papers should be made up in accordance with this procedure. Similarly, the detailed steps for a Time Study are set out in Section I of Appendix 4, and the Time Study papers and forms can all be checked for neatness, completeness and accuracy. It is very desirable that the Productivity Manager should make regular personal checks on all of these procedures, so that he can ensure that professional standards do not fall.

V. APPLICATION OF WORK STUDY

A. Using the Productivity Department

The recommended Terms of Reference of the Department are given in the Procedure Manual in Appendix 4. They are as follows:

* To assist the Enterprise in improving its activities, towards meeting its plans of output and profit.

* To do this by investigating any activity in the Enterprise and finding ways of improving it.

* To carry out such other investigations into productivity as may be required.

* To assist with putting results into practice.

* To advise Management at all levels on the measurement and improvement of Productivity.

* To train and advise other persons or departments on Productivity and improvement techniques.

These Terms of Reference have been drawn up to give the Department enough scope to be useful to the Enterprise. The Department should not be restricted to studies of Manufacturing activities, although at the start these may be the limit of its capability.

The operation of the Department is by having individual projects. Each project is self-contained and can be assigned to a Productivity Engineer according to his capability and the expected difficulty of the project. The work load of the Department must therefore consist of a list of projects to be done. A project can be to investigate the manufacture of a particular part; to audit its technology method and time; or it might be to carry out some other investigation or study. A work programme needs to be drawn up, and if it contains studies of particular parts, it must be noted that enough of these must be listed so that there is always work available to the Department. This is because it may be a week or more before a particular part can be found in process of manufacture, and there is no reason why members of the Department should wait in idleness over such periods.

From time to time projects will be required that were not foreseen at the time of preparing the programme. The Productivity Manager, possibly with advice from the Director General, must determine the priorities of completing projects. This should not be left to the Section Leader or members of the Department.

It is very desirable that when discussions take place about Productivity (but not Production, usually), there should be present a representative of the Department. This should usually be the Section Leader.

Too much must not be expected from this very small team of only three people. At SEMI there is much to be done, and this Department needs to be strengthened as soon as possible. All persons who come to work in Productivity must be given at least as much training in Work Study as the original three people. To do Productivity work without either the training or discipline of Work Study is a waste of time. This has **already** been proved at SEMI in the earlier attempts to study and improve Productivity.

B. Future Work Programme

Discussion

The small size of the team means that any work programme must be modest. To carry out a thorough investigation into a component that is always in shortage (for example) will take from two to three and a half man-weeks for a Productivity Engineer. A simpler investigation which is only to check a Technological time will require two or three days. However, as soon as any investigation is begun, so many things are found to be wrong that a lot of work is immediately created to try to put them right. It is these things that are causing poor output, along with some serious failures in management systems and attitudes. These are discussed in Chapter VI.

There are over 2,000 different parts listed in the Technology Data Base on the computer, with some 10,000 different operations and Technology Times. This indicates the magnitude of any Work Measurement or Method Study programme.

The Project Brief (Appendix 1) gives a list of activities. These summarise as:

(i) Audit or check of standards

(ii) Set correct standards

(iii) **Development of Standard Data System**

(iv) **Standards and controls for Toolroom and Maintenance**

(v) **Review of adherence to Planned Speeds and Feeds**

(vi) **Review of the organization of work**

Of these, item (vi) is not for Work Study. It is discussed in Chapter VI.

Items (i), (ii) and (v) are linked together. Studies made by the Productivity Department after Work Study training have shown- as did earlier studies - that in nearly every operation there are things that are wrong. Tools are not in good condition, material has not been properly heat treated or annealed, materials handling is badly arranged and carried out, parts are not properly checked or inspected, and the original Technology process is not being followed. It is not unusual to find that the information held on the computer for the Technology process is different from what is actually being done. Noting that there seems to be a very rigid official system for changing

the Technology process records, it is rather surprising that such differences should be allowed to exist. Of course, the very rigidity of the system could well be the cause of changes being made in the factory and not being recorded on the computer data base.

This leaves three activities for Productivity Department:

(i) Re-measurement of operations.

(ii) Standard Data Systems.

(iii) Standards and controls for Toolroom and Maintenance work.

(i) Re-measurement of operations. Of the 2,000 or so parts listed, about 18% are bolts, nuts, washers and nails. This leaves about 1640 manufactured parts. To audit each of these, including all the work of trying to get tooling and workplace methods improved, represents 1640 x 3 = 4,920 man-weeks of work. One Productivity Engineer will give 48 weeks in a year, after allowing for holidays and sickness. From this must be taken 2 1/2 weeks to allow for the internal administration of the Department, leaving 45 1/2 weeks per year. The 4,920 man weeks of work is therefore equal to 108 man years of work. This may seem a lot. It includes correction of the defects in present methods. If this were done - and not avoided - by Production, then a simple re-measurement and setting new standards would take about one sixth, or 18 man-years of Productivity Department effort.

From a practical viewpoint, the correction of the things that are wrong in manufacturing operations is going to take a large amount of time - both in man years and actual years, because there is so much to be done and changes cannot be made very quickly at SEMI. If the man years for correcting the methods are not provided by Productivity Department, then they must be provided by Production and Technology Departments. No change or improvement can occur without this substantial effort.

The present available capacity of the Productivity Department is 144 man weeks in a year. This could be divided up for the first full year like this:

	Man-weeks
Component Studies 35 at 3 weeks each	105
Other productivity projects	13
Training more Productivity Engineers	18
Internal administration of the Department, progress reports, meetings, etc.	8
	144

The 18 man-weeks for training is to allow the Section Leader time thoroughly to prepare himself to run a training course; to run a course of five weeks for new Productivity Engineers, and to supervise their work for the first eight weeks after training. The upper limit of size for such a course would be six people. If it were decided to train more, then assistance

with the training would be needed, perhaps from the Specialized Institute for Engineering Industries or one of the training establishments in Baghdad. Any training given must be based on the course given in Appendix 2, to ensure uniformity of understanding.

From this, it follows that the first year's work programme should consist of Component Studies, and a list of these should be drawn up by Production Management and the Productivity Manager. It would be good if the same list were used as a programme for Production and Technology to get the tooling and Technology processes correct in advance of the Productivity Department work of making studies. If this is done, a larger list can be covered in the year.

(ii) Standard Data Systems. These are technically difficult to create, and are outside the capability of the existing Productivity Engineers. There are not very many places in production where they would be of value. They would be of use in developing standard times for such operations as guillotining, possibly some in forging and in welding, and not very much else. In Mechanical Treatment all the machinery times are controlled by the speeds and feeds chosen, so there is no requirement for a new standard data system in this workshop.

The main benefit from Standard Data Systems is when there are always new products to be manufactured. This is not the case at SEMI. In any event, to construct Standard Data it is essential that the manufacturing methods, whether they are machine-controlled, manual, or a mixture of both, are properly carried out. To create Standard Data Systems on the basis of the present chaotic methods of working would be a waste of time and would lead to the perpetuation of these methods. For these reasons, no formal proposals are offered on the subject of Standard Data Systems.

(iii) Standards and Controls for Toolroom and Maintenance Work. This is an area of considerable importance. It is usual to set standards for this kind of work by estimating methods - either Analytical or Comparative. In Analytical Estimation the Estimator uses a mixture of Standard Data and his own experience in the trade for which he is estimating. This means that a lot of studies have to be made at the beginning to get Standard Data. In Comparative Estimating a more limited number of studies is made, to cover a range of work. The tasks studied range from 15 or 30 minutes to two weeks in actual duration. Future tasks are assigned times by comparison with the original tasks, which are grouped into time bands. To carry out this for both Toolroom and Maintenance activities at SEMI would require eight to ten man-years of Productivity Engineer work, a much stronger control system for ordering and recording the work done than exists at present, the training and appointment of Estimators and a system for reporting work performances.

No formal proposals are offered in this report for the creation of Standards and Controls for Toolroom and Maintenance Work because the Productivity Department capability has not been created.

What To Do

From the above discussion, it is suggested that the original proposal of a Productivity Department of 15 to 18 engineers, training in Work Study, be carried out. They will need to be engineers with some experience of manufacturing work, and it would be useful if a few had Toolroom or Maintenance experience. Their training should follow the course in Appendix 2.

For the first year's work, a list of components for detailed study must be drawn up. As far as possible, manufacturing conditions should be put right before the Productivity Engineers make studies. This will give a greater coverage than if the Productivity Engineers must themselves get correct methods working.

If the Department is increased as suggested, then a larger list of parts can be worked upon. Any attempts to install estimating procedures in Toolroom and Maintenance should not be made until the larger team has become established and experienced. This would be late 1984 if recruitment and training began later in 1983.

VI. ORGANIZATION OF WORK IN THE FACTORY

A. Production Control

The Present System

The Production Control System was installed in 1971 by consultants from the Arab United Nations Centre for Industrial Development. As it stands, it is a good system, and no doubt was chosen on the best information available in 1971. They way in which the Enterprise has developed is such that the system is not wholly suitable in 1983. In its original idea, the system is for a factory in which many different final products are made, each in quite small numbers. It can have manufacturing batches of different sizes. There are route cards to specify the sequence of operations, and each operation has its own job card that relates to the batch and product being worked on. This paperwork is produced by spirit duplicator - a system well adapted to many and differing small batches. It is, in fact, a system that is for a jobbing shop. SEMI has a small range of products, none of which have any variations. This puts SEMI in the position of being provided with the physical facilities for jobbing work, a system for the control of such work, but a volume production type of work load. It is not too surprising that there are difficulties in achieving production plans.

There is a further and most serious lack in the total system. The system is designed to give information about what is to be done. It includes very little about recording and reporting what has been done, or how well it was done. This part is essential to the control of work by management. The recording systems that exist at SEMI are ones created locally to try to fill the need to know what is going on. They are neither good enough, nor taken seriously enough, to be of any real help to management. In technical terms, the Feed-back System is defective, and a poor Feed-back system causes bad operation of the manufacturing system.

Batches

The Production Control System is a Batch system. With a factory manufacturing a small range of products, each in appreciable quantity, a Batch system is not suitable. The idea of a Batch system is that each batch of parts shall travel through the factory as a separate group. At all times, it must be possible to find the parts for a particular batch, to know where they are, and how much work has been, or remains to be, done on them. When we are talking about 500 identical tractors in a month, all in one batch, this becomes silly. The same applies to all the products listed in Chapter I. At SEMI it is not possible to identify any particular part, or box of parts, as belonging to a particular batch. The recording of movement through the factory is by a system of transfer tickets. These record daily the quantities of each part that are moved from one workshop to the next. Each shop adds these quantities to a running total for each part number; when the total equals the nominal Works Order quantity (usually one Work Order equals two batches), the Works Order is taken to be complete in that shop. Current Job Cards are withdrawn and Job Cards for the next Works Order are then issued. Scrap is ignored. No quantities are ever entered on the Job Cards, only the time spent. As a result, when these cards are used to try and compare actual time taken with the expected time using Technological Times, the results are meaningless.

In truth, manufacture at SEMI is Flow, and not Batch. The only place where Batch manufacture is sensible is in Forging and Pressing. An Intermediate Stores is being created to allow this workshop to have much longer runs, and to allow Mechanical Treatment, Heat Treatment and Welding to draw parts in small quantities. At the present time parts travel through the manufacturing process in small quantities. These are nearly always less than a batch, and very often only a few parts move together. They move in handfuls rather than boxfuls. There is nothing wrong with this for flow manufacture. What is wrong is that such movement cannot be controlled by a batch-type system.

The detailed work scheduling is not very well done at SEMI. Individual workers are often not told how many pieces they must make, and little attention seems to be given to occasions when output falls far short of what has been planned. The Batch system as used at SEMI does not easily lead to daily work schedules. By changing to the idea of the Flow system (which is what actually happens) and using the help of the computer, it will become possible to issue daily work instructions for each worker, and to check what he does against both the plan and a standard of performance.

In changing to Flow system, it will be necessary to make a new, or at least modified, computer programme so that the Forging and Pressing shop can be given longer runs of work. In some cases these runs will represent several month's planned output. The other shops will all be given monthly and daily plans according to the planned assembly of each product. It will also be necessary to change the computer programmes that report the costs of individual parts as manufactured because the data input will be different.

The various sections of the system are discussed in the next part of this Chapter.

B. Management Control

What Management Control Means

Management Control is, very simply, the whole process or task of organizing the work and seeing that it is carried out in the way, and quantities, intended or planned. This means there are these things to do:

(i) Work out what is to be done- which products are to be made, and how many of each.

(ii) Work out when each one is to be made, where, and on what machine or process.

(iii) Issue this as instructions to the people who will do the work.

(iv) Find out what was actually made or done.

(v) Compare this with the Instructions (iii) and use this to change the next set of instructions in a suitable way.

(vi) Compare the time taken to make what was actually produced with how long it should have taken. Use this comparison to know if the people doing the work are working properly (Performance reporting).

(vii) Take action on (vi) if results are not good.

(viii) Produce weekly and monthly reports of quantity, achievement of plan and worker performance.

(ix) Use the information in (viii) to guide the work of the Enterprise at all levels.

The idea of "Performance" may need explanation. The performance of a worker is given by:

$$\text{Performance} = \frac{\text{Total Standard Minutes of Work Done}}{\text{Total Minutes at Work}} \times 100 \text{ BS}$$

BS stands for British Standard. Refer to Appendix 4 Section L for more discussion on this matter. If there are no Standard Times, then Technology Times must be used.

Performance can be calculated for individual workers, groups of workers, whole workshops or the whole Enterprise.

Most of the steps given above are quite mechanical and a lot can be done with a computer. There are two steps which cannot be done by computer. These are Steps (vii) and (ix). The practical work of manufacture is done after Step (iii) and before Step (iv). Whoever is in charge of this practical work needs to know what has been done and how well it has been done. The people in charge are the Director General, Production Director, Production Manager, Shop Managers and Foremen in the Workshops. These are the people who must do Steps (vii) and (ix). These two steps cannot be done by a computer, and if they are not done, or done badly, then output will not fullfil the plan, neither will a suitable profit be made by the Enterprise.

These two steps are the ones in which Management actually <u>does</u> something to make things go properly the next time. This is hard work - much harder than chasing shortages all the time. To do this kind of work, it is very necessary for everyone in management to be given training and for their ways of thinking and understanding of the way to run a factory to the changed.

Training should contain such subjects as these:

Objectives and Purpose of the Enterprise, of Separate Departments and of Individual Workers

People and Motivation to Work

How to Manage Workers and getting results from them

Productivity and Performance - what these mean and how they are measured

Management Reports and How to Use Them

No training of this kind will succeed unless the very top people of both the Organization and the Enterprise itself believe strongly in wanting to improve SEMI, and everyone knows that they believe, that they want to see improvement at SEMI, and that it is their intention that SEMI shall improve.

The Management Control System

The diagram on the next page shows the main parts of the complete Management Control System for SEMI. Each part is now discussed.

Production Control System: This is already in existence. It needs to be changed to give larger batches for Forging and Pressing, with suitable orders for the issue of raw materials, tools, etc. For all the other shops, raw materials and tools will be worked out from the planned assembly of final products.(This is now possible because the Tree-graphic data file is created).

Scheduling System: This is a new requirement. It must be done on the computer, and will work out each day the exact quantity to be made of each part required, having regard to what was made the previous day, and the time available for each machine and worker.

Daily Work Plans: These are the papers that will be issued to the Foremen of each workshop so that they can tell the workers exactly how many of which part they must make.

Follow-Up System: This is a system, in part working now, for collecting every day a report of how many parts were actually made by each worker, and how many were sent from each workshop to the next workshop. The present Job Card System will be stopped. There are four tasks to be done by the Follow-Up System:

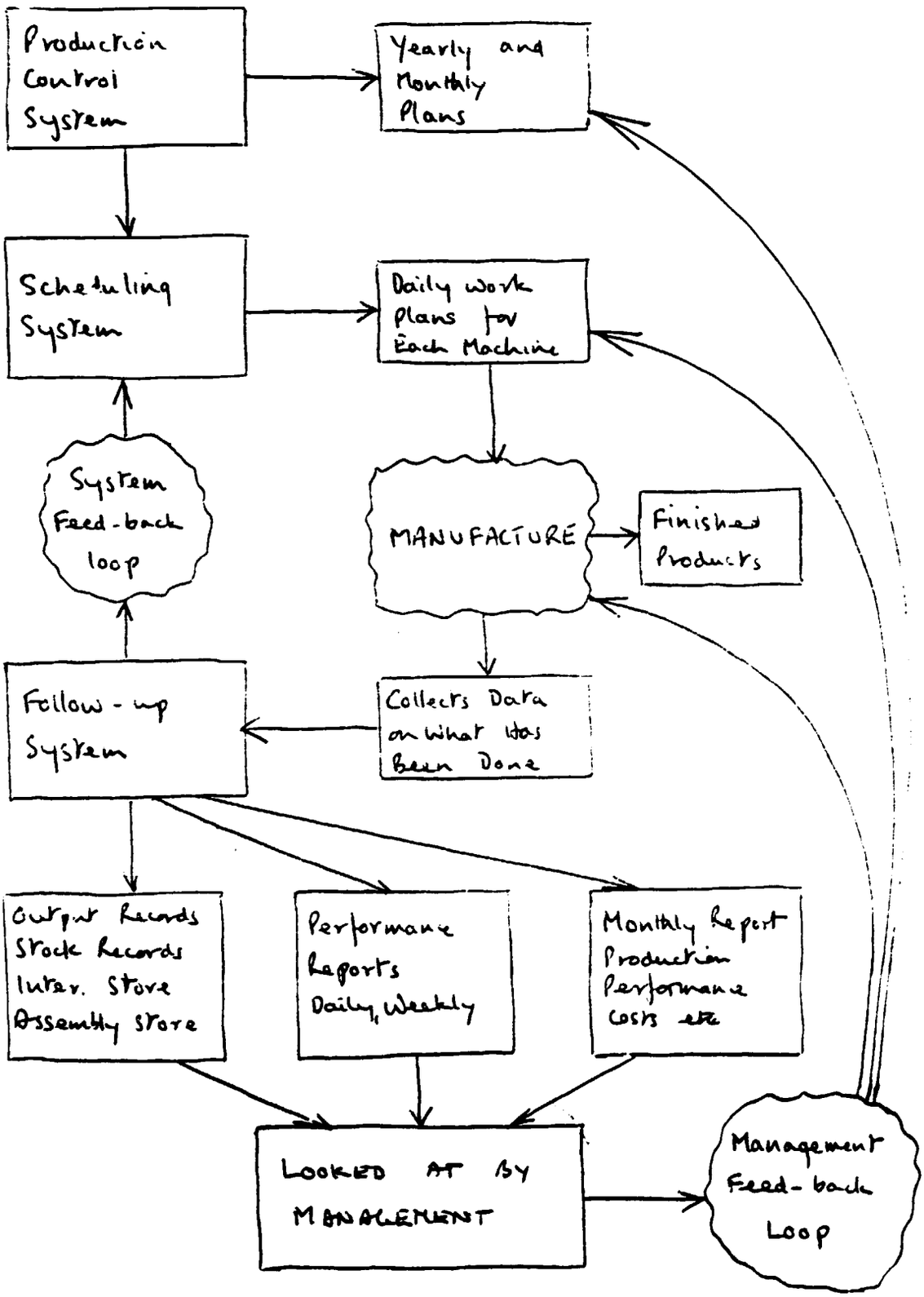
(i) System Feed-back loop. This sends information to the Scheduling System about what has actually happened, so that the daily work plan for the next day will take account of what has, or has not, been made.

(ii) Stock and Output Records. The Follow-up System will keep records of how many parts are in stock in the Intermediate Stores, and in the Assembly Stores. It will also record parts rejected by Inspection. Daily lists could be printed to show, for example, all parts for which there is less than one day's supply for Assembly the next day. If computer terminals are put in Production Offices, then any part could be shown with its stock at any time. The Follow-up System will also give a daily report of quantities of parts moved from one shop to the next (as at present).

(iii) Performance Reports. Daily reports would show each worker with less than, say, 75 BS Performance, or less than, say 80% fulfilment of his planned work. Weekly reports would give performance of all workers for each shop.

(iv) Monthly Report. The present computer-based report should be modified (on page 6) to show shop performances. It will also be possible to show the Assembly outputs.

Management Control System



Collects Data on What Has Been Done: This is the part of the system to be fed by people in the factory. It already exists in part. The Transfer Tickets record the movement of individual parts between shops. A new arrangement is needed for recording daily the quantities of parts made by each worker. The Transfer Ticket system would be used for recording completed Assembly of Products, and also scrap.

Looked At By Management: This is the most important part of the whole system. It is for this part that management training, as suggested above, is needed. After looking at the figures in the reports, everyone in management has the responsibility and task of using the information to decide what to do to prevent the same wrong things from happening again. They do this by giving suitable instructions or orders to the people who they control.

Management Feed-Back Loop: This is the task just described - decide what to do, give the orders to get it done, and see that they are carried out.

In studying this diagram, notice particularly the directions of the arrows.

What is Wrong Now

All the parts of the Management Control System shown in the diagram exist at the present time. SEMI could not work if they did not. The reasons why output plans are not achieved is because some of the parts do not work very well. The ones that are not very good are these:

Scheduling System: In some parts of the Mechanical Treatment Workshop papers are written each day to say how many parts are to be made - based on what is supposed to be going to be assembled. Often, the quantity is just "as available". In other parts, and other workshops, no such papers are prepared. The scheduling is done day-by-day and hour-by-hour, by the Foremen, with last-minute changes to try to supply shortages as they arise.

Follow-Up System: This is all done by hand. It uses the Transfer Tickets as its source, and stocks of parts and requirements are worked out by hand. It makes daily reports of output and assembly, but these are not ready until some time after the day's work has started.

System Feed-Back Loop: Because the Follow-Up System is done by hand, and does not report until nearly halfway through the next day, it is very difficult to get good work scheduling for any day. This contributes to shortage problems.

Output and Stock Records: Because the Follow-Up System uses Transfer Tickets and the Batch system, it has to pretend that each Works Order is 100% complete, and by withdrawing the Job Cards at that time it prevents proper figures from being used to calculate stocks, costs or comparisons between actual and Technological Times.

Performance Reports: Proper performance reports do not exist. The daily work plans produced in parts of some shops give a few comparisons between actual work done and required output.

Monthly Report: This contains no performance reports at all. It does not even show the total Technological Time worked in each shop. Page 6 of the report shows tonnage comparisons. These are uncertain indices, not worth calculating for a factory such as SEMI because they mean so little.

Looked At By Management: Because the pressure is for production and supplying shortages, the only things that Management seem to look at are the figures relating to these problems. There is not very much evidence that much attention is paid to other matters. Chasing shortages seems to take up so much time that other things are not done because people are "too busy".

Management Feed-Back Loop: Because of "too busy", the things that should be done to correct problems are not carried out and the Feed-back Loop is very weak.

What To Do

The present Management Control System needs to be improved, and this can only be done a little at a time. The steps to be taken are given below in a practical sequence. Some things can be done at the same time that others are going on, while it will be better to leave other jobs till later in the sequence. To carry out the whole sequence will take one to two years.

Stage I - These steps can all be done at the same time.

1. Job Card Quantity Recording. Although Job Cards will eventually disappear, the quantities made each day, for each time-stamping of the cards should be entered by the worker. The reason for not doing this has been given that the workers are not able to do so. Workers who are able to do machining and other factory tasks can surely count and write numbers in Arabic or English. It may be necessary to give them counting boards to help them. (A counting board is a piece of wood with notes in it and a movable peg. Move the peg one hole for each piece finished).

2. **Use the computerized Follow-Up System. The programme has been written and is ready to run. Several people need to be trained to enter the figures from the Transfer Ticket to the computer. These people must then enter the Works Order records from the stock books in each shop, to transfer this information to th- computer. After that, the computer will keep record of the Works Orders and all stock figures, including the intermediate Store and Assembly Shops. If the computer Follow-Up System is not used, then someone will start to keep records of Intermediate Store stocks by hand - which is a waste of work.**

3. Daily Work Quantities for each machine to be worked out by hand, using the month's planned Assembly quantities. This need only be done once a month, to give figures that will go on the daily work sheets for each shop or section of a shop, as a practical guide.

4. Daily Work Sheets to be used for all work in Forging and Pressing, Welding, Mechanical Treatment and Heat Treatment. This is no more than extending the present system and using the figures calculated in (3) above.

5. The actual outputs, as recorded on Job Cards, to go on the Daily Work Sheets in (4) above.

6. Management Training for all levels of Production Management should be started as soon as possible. A course based on the suggestions already given (p.28) should be constructed with help from specialists of the Specialized Institute or National Centre for Consultancy in Baghdad. This course would be for ten weeks, three hours per week, and be run several times until everyone has attended.

7. Monthly Management Report. Page 6 of this report should be changed to report Performances. Until Work Measured Standard Times exist, it will be necessary to use Technology Times. To make this change is not a large task in altering the computer programme. All the Technology Times for the production recorded in the month are known to the computer, and the adding up of these figures shop by shop and calculation of shop performances is not difficult.

Stage II. Some of these steps could be started before those in Stage I are finished.

8. Establish Performance Review Meetings. These should be held weekly and monthly. These meetings are to:

   Examine performances in each shop

   Discuss reasons for bad performances or low output

   Decide what to do about it

   See that it is done

   The weekly meeting is for Production Manager and shop managers. The monthly meeting is for Director General, Production and Technology Directors, Production and Planning Managers. It would be unwise to start these meetings before the people who will come have been trained under (6) above.

9. Follow-up Programme. Develop the advanced version of the follow-up programme that will receive the actual daily production figures for each machine as well as the Transfer Tickets. The outputs from this programme should meet the requirements in the system diagram on page 29A. These are printouts of reports and transfer of data to the Scheduling Programme.

10. Scheduling Programme. This needs to be developed. It must take planned assembly outputs for each product, get the parts required from the Tree-graphic data base, and work out the loading for each machine. By knowing (from the Follow-up programme) what was done the previous day it can give a list of work for each machine for the next day. This programme will have to be run, with the Follow-up programme, every night so that all the printouts are ready before work begins at 7 a.m.

11. Production Control Programme. This, along with the costing and other associated programmes, must be changed to various batch sizes for Forging and Pressing, and Flow manufacture in the other shops.

C. Computerisation of Management Control

Management Control systems can be worked entirely by hand. To do so requires a lot of people and the results always seem to be too late to be of very much help to management in their work of running the factory. The changes proposed in the previous section of this report call for a lot more use of the computer than seems to have been intended a the time of writing this report. In particular, the development plans for future computer programes do not seem to recognize the need for using the computer to give a strong feed-back of information as to give any kind of performance reportin- for management.

The proposals in this report call for a substantial amount of development of new programmes. There are three possible ways of doing this:

(i) Buy ready-made programmes from Hewlett-Packard or another company.

(ii) Write the programmes with the existing people at SEMI.

(iii) Bring in expert programmers from abroad.

The first idea is feasible if, and only if, a suite of programmes can be bought which will fit the way work is done at SEMI, and which will include the very important feature of Performance Reporting.

The second way will take a long time, as the existing programmes do not yet have the experience to set up a well-designed suite of programes. By doing this work as proposed, they would gain a lot of experience, but at the price of slow development.

The third idea should be taken seriously; a small team of foreign expert programmers would not only generate the programmes quicker, but would give very valuable training to the local staff.

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APPENDIX I

12.1.1983

Meeting: Dr. Waleed Khidr
Mr. Mustafa Refaat
Miss Thanaa Kamil
Dr. A.L. Minter

Scope of work to be done:

(a) Prepare programme of work to be done by ALM at Mechanical Industries factory at Iskandariyah.

(b) Programme is to provide for:

(i) How to audit or check standards used for parts manufacture and process planning.

(ii) Programme for work measurement to set correct standards:

Work Measurement Staff
Training
Application

(iii) Development of standard data systems.

(iv) How to set standards and control procedures for Toolroom and Maintenance work.

(v) Review of adherance to planned speeds and feeds in machinery and to planned process time in other activities.

(vi) Review of organization of work (not of management) and of methods of working.

(c) The overall objective of the work to be done is to provide for a better operation and monitoring of the on-going productivity plan of the factory.

APPENDIX 2

WORK STUDY COURSE

FOR

PRODUCTIVITY ENGINEERS

State Enterprise for Engineering Industries

Iskandariya - Iraq

19 March 1983 - 20 April 1983

Persons attending:

Mr. Jawad Kadham
Abas Mohammed
Khodeir Hamsa
Dr. Nabil Baker (Interpreter)

NOTES

This course was held to train Productivity Engineers in basic Work Study techniques.

The following books were used or referred to in the course. Copies of parts of these books were given to those attending. In the course notes which follow, the books are referred to by the names of their authors.

Introduction to Work Study Revised Edition (ILO)
International Labour Office, Geneva, 1969
Arabic translation published 1971 by Arab United Nations Centre for Industrial Development.
This book is now out of print, but a few copies may be obtained from National Centre for Consultancy and Management, Baghdad.

Problem Solving for Management (Raybould and Minter)
Institute of Management Services, London, 1971

Work Study (Faraday and Currie), Pitman, London 1973

Glossary of Terms Used in Work Study, Organization and Methods ((O + M). British Standard 3138:1979.

Films: All of the films used on the course were borrowed from National Centre for Consultancy and Management, Baghdad.

State Enterprise for Mechanical Industries - Iskandariya

Work Study Course for Productivity Engineers

Purpose of Course:	To give basic training in Work Study to Productivity Engineers
Duration:	Five weeks basic training. Eight weeks guided practice in the factory.

This course is to train Productivity Engineers in Work Study so that they can understand it and use it in factories and elsewhere.

To the Trainee:

The course is basic, to give you a foundation on which you can build more knowledge and understanding by reading and studying the subject over the next few years. Work Study is about what people do. It is a deep subject that will give you plenty of new thoughts, new ideas, and a new understanding of people.

The course lasts five weeks. The timetable is attached. We will have teaching on five days each week with the sixth day for private study, revision or group work. There will be classroom lectures, films, practical work in the classroom and in the factory.

You will be working sometimes separately, and sometimes in small groups. The course will be intense and demanding. You will be given a lot of new ideas and new knowledge, and you should prepare yourself to change your ways of thinking.

The spoken language of teaching will be English. You will be given a book on Work Study which has been translated into Arabic, and there will be important extra information written in English from other books and written specially for this course.

It is very important that if you do not understand what is said or written - in English or in Arabic - you will say so. Between all of us we can then find an answer or explanation that will help you.

You have been spcially chosen for this work because it is believed that you can learn Work Study well and be able to use it for the factory.

As course tutor I welcome you to this course and to Work Study. I hope you will find it both interesting and rewarding.

This is the daily timetable:

1st Session (A)	8:00 a.m.	to	10:00 a.m.
2nd Session (B)	10:15 a.m.	to	12:45 p.m.
3rd Session (C)	1:00 p.m.	to	3:00 p.m.

WORK STUDY COURSE for PRACTITIONERS - TIMETABLE

WEEK 1

Day	Session A	B	C
1	Introduction I	Introduction II Film "Intro. Work Study"	Method Study 1 (Define)
2	Method Study 2 (Charting)	Practical exercises in classroom	
3	Method Study 3 (Multiple Activity Charts)	Practical exercises in classroom	
4	Method Study 4 (Critical Examination)	Exercise in classroom	
5	Method Study 5 (Motion Study) Film "Motion Study Principles"	Plant Layout	Film "Planning & Layout of Work"

WEEK 2

1	Method Study 6 (Choosing Solutions)	Method Study 7 (Approach to people)	Practical
2	Factory Exercise in charting		
3	" " "		
4	Development of results of factory exercise		
5	Method Study 8 (Report writing and presentation of results)		Method Study 9 Other Techniques

WEEK 3

Day	Session A	B	C
1	Work Measurement 1. BSI Glossary Film "The Unforgiving Minute"		Work Measurement 2 (Element Descriptions)
2	Element Description Practical	Use of Stop watch Practical	
3	Work Measurement 3 (Rating)	Rating Practice	
4	Timestudy Practice in classroom		
5	Timestudy Practice in factory.		

WEEK 4

1	Rating Practice (1)	Factory Timestudy Exercise	
2	Rating Practice (2)	Work Measurement 4 (Analysis of Studies)	Practical work on Analysis.
3	Rating Practice (3)	Work Measurement 5 (Variable Elements)	Practice in classroom
4	Rating Practice (4)	Work Measurement 6 (Machine Studies)	Practice in classroom
5	Private Study		

WEEK 5

1	Rating Practice (5)	Timestudy Exercise in factory and full writing-up of study documents	
2	Rating Practice (6)	Work Measurement 7 (Activity Sampling)	Work Measurement 8 (Allowances)
3	Activity Sampling Practice in classroom		
4	Activity Sampling Practice in Factory		
5	Operation of Dept.	Work Measurement 9	Course Summary

Work Measurement 10

APPENDIX 3

APPRECIATION OF WORK STUDY COURSE

FOR

TECHNOLOGY ENGINEERS

State Enterprise for Engineering Industries

Iskandariya - Iraq

7 May 1983 - 24 May 1983

Persons attending:

Mr. Jusuf Musa
Hussain Ali
Abdul Kardum
Mohammed Jasim
David Mohammed
Alyasin Munim
Fathi Awda
Mrs. Suhaila Jabbor

NOTES

This course was held to give an introduction about Work Study to Technology Engineers.

The first part of the course - Week 1 - was to introduce techniques for recording work as charts and diagrams. The second week was to introduce the ideas of Method Study, with particular reference to the design stage for products or processes, and to teach about the analysis of the true needs of a new design or process. The fact that the designer by his thinking fixes the actions and work of everyone who will deal with the product is stressed. The third week was about Work Measurement, standard times and their application.

The same books and films referred to in the Work Study course were again used.

State Enterprise for Mechanical Industries - Iskandariya

Work Study Course for Technology Engineers

Purpose of Course:	To give an introduction to Work Study, and in particular Method Study, to assist Technology Engineers in their work.
Duration:	Ten days of four hours each.

To the Trainee:

In this course we can only bring to you a few of the ideas of Work Study. We will give special attention to Method Study, which can be used to get better designs, layouts and working methods in the factory. By improving these - and getting them right before installation, it is more possible that they will be truly successful in practice.

The course will give you a lot of new ideas and knowledge, and you should prepare yourself to change your ways of thinking.

It is very important that if you do not understand what is said or written - in English or in Arabic - you will say so. Between all of us we can then find an answer or explanation that will help you.

Timetable

Session A 12.00 To 13.20

B 13.30 To 14.50

	A	B
Sat	Introduction I	Method Study II
Sun	Record III	Practical Work
Mon	Practical Work	Practical Work
Tues	Factory work	Factory work
Weds	Multiple Activity Charts	Practical work
Sat	Other charting Methods IV	Motion Study V
Sun	Practical Work (Film - Motion Economy)	Practical Work
Mon	Define the Work VI	Critical Examination VII
Tues	Practical Work	Provide a Means VIII
Weds	Practical Work	Practical Work
Sat	Work Measurement IX (Film - Unforgiving Minute)	Work Measurement
Sun	Timing Jobs X	Studies
Mon	Using Times XI Allowances	Using Times
Tues	Discussions and summary of Course.	
Weds	-	-

APPENDIX 4

PRODUCTIVITY DEPARTMENT

PROCEDURES MANUAL

State Enterprise for Mechanical Industries

Iskandariya

Baghdad

Iraq

14 May 1983

TERMS OF REFERENCE OF THE PRODUCTIVITY DEPARTMENT

* To assist the Enterprise in improving its activities, towards meeting its plans of output and profit.

* To do this by investigating any activity in the Enterprise and finding ways of improving it.

* To carry out such other investigations into productivity as may be required.

* To assist with putting results into practice.

* To advise Management at all levels on the measurement and improvement of Productivity.

* To train or advise other persons or departments on productivity and improvement techniques.

CONTENTS

A. Introduction

B. Project work - for users of the Department

C. Monthly Departmental Report

D. Productivity Review Meeting

E. Diary and Registers

F. Section Leader - Duties and Responsibilities

G. Project Work - Department Procedure

H. Component Studies

I. Time Studies

J. Standard Forms

K. Time Study Code of Conduct

L. Standard Times and Rest Allowance Policy

A. Introduction

This Manual is written to give the complete procedures and technical policies to be followed by the Productivity Department in carrying out studies and project work in the Enterprise.

It includes a procedure for people who wish to use the Department, and procedures whereby the Director General and Technical Director of the Enterprise may be kept informed of what work the Department is doing and how successful the Enterprise is in using the results obtained by the people working in the Department.

Also included are the detailed procedures to be followed inside the Department in carrying out its work.

An important note on policy is given at Item L where the standard times are defined and the method of applying Rest Allowance is stated.

B. Project Work - For Users of the Department

Step	What To Do
(1)	Discuss your problem with the Productivity Manager and/or the Productivity Section Leader. Explain what you want done and how you would like to be helped.
(2)	The Productivity Engineer who is to do the Project for you will discuss it with you from time to time.
(3)	When he is ready he will ask for a Report Meeting. At this meeting he will explain his findings and ideas and ask you to take and agree suitable action, or to say why his ideas cannot be accepted.
(4)	He will send to you a written Minute or report of this meeting.
(5)	All the Minutes of these meetings will be reviewed once a month by the Productivity Review Meeting and progress on each project will be reported to the Director General and Technical Director.

C. Monthly Departmental Report

Every month on or before the 4th of the month the Productivity Manager shall make a report to the Director General of work done during the month.

The report will contain these sections:

(1) Attendance of Productivity Engineers.
Available Days in month.
Name of each person, how many days worked,
how many days absent, and reason for absence.

(2) Project work during month
Number for each Project
Name of Project
Name of Productivity Engineer
How many days on each project

(3) Projects finished during month
Number and name for each Project closed in month
Total days work on the Project since it started
Date closed

(4) New Projects started during month
Number and name for each new Project
Date started

(5) Remarks

(6) Date prepared and signature of person making this report.

D. Productivity Review Meeting

The purpose of this monthly meeting is to make sure as far as is possible that the Enterprise shall get some real benefit from the Productivity Department. It is held to find out what changes have been made for each project undertaken and to produce a progress report for the Director General and Technical Director. It must meet once a month.

Those present at the meeting shall be:

Productivity Manager (chairman of meeting)

Technology Manager (or deputy)

Production Manager (or deputy)

Productivity Section Leader (secretary)

Planning Manager

This is the work of the meeting:

(1) Examine all the Minutes of Productivity Report Meetings held during the month past.

(2) Note all cases where no action has been taken on recommendations and find out why.

(3) Prepare a report to the Director General and Technical Director listing all the cases where it is not satisfied with the reasons for no action being taken.

(4) Add to the report a list of projects where it is satisfied that the project has been properly put into practice.

(5) Send the report to the Director General and Technical Director.

E. Diary and Registers

There are three important record books to be kept by the Productivity Department. These are a daily Diary and two Registers.

Diary: In this book, there must be for each day of work at the Enterprise a record of what work was done by each Productivity Engineer, saying the number of the project or projects worked on, what work he did, meetings attended, etc.

Project Register: Every project undertaken must be entered to the Register with its own number, name, person for whom it is done, person doing it, dat started and date finished.

Study Register: Every Time or other study shall be entered to this register with its own number, name, project number, date studied, person doing the study.

F. Productivity Section Leader - Duties and Responsibilities

The Productivity Section Leader is the Responsible Person for the Productivity Department. He is responsible to the Productivity Manager. His main responsibilities are:

(1) To see that each member of the Department has enough work to do and that he does it in the best way possible.

(2) To lead the Department and maintain discipline.

(3) To see that the Diary and Registers are properly kept up to date at all times.

(4) To see that each project is carried out according to the Procedures in this Manual.

(5) To guide and advise each member of the Department.

(6) To guide and advise members of Management on Productivity and Work Study matters.

His main duties are:

(7) To carry out activities necessary for the fulfilment of these responsibilities..

(8) To carry out personally projects that may be given to him by the Director General or Productivity Manager.

(9) To take his share in the work of the Department.

(10) To act as secretary for the monthly Productivity Review Meeting.

G. Project Work - Department Procedures

Step	What to Do
(1)	Enter details in Project Register and get the Project Number.
(2)	Write out the Project Terms of Reference and prepare a folder for the papers.
(3)	Carry out the Project.
(4)	Make a list of your Recommendations or other results.
(5)	Have a Report Meeting with the people who are interested in the project.
(6)	Get them to agree and promise to take action on each Recommendation, or to explain why it is not possible.
(7)	Write a Minute of the Meeting to show who was [illegible], when it was held, each of your Recommendations and the action or agreement for each Recommendation.
(8)	Send a copy of the Minute to each person at the meeting and put the original in the Project folder.
(9)	Follow-up to see that something is done.
(10)	Make a copy of the Minute for the monthly Productivity Review Meeting and send it to this meeting.
(11)	When action is complete, or for other good reason, close the Project.

H. Component Studies

Component Studies are a special form of Project, when a particular individual component or detail is to be studied, for example, to find reasons for it being a shortage. There can be other reasons also. In Section G Project Work, Step (3) you will find it says " carry out the Project". This section tells how to do this for a component study.

Step	What to Do
Preparation	
(1)	Get Technology sheets for the part.
(2)	Make a Flow-Process Chart Material Type - by seeing for yourself. Look specially for places where there are unofficial inspections or parts being rejected or counted. Make outline Process Chart.
(3)	Talk with the Foreman and each worker. Ask about the shortage and find out what they know or think about the problems they have.
Collect Information	
(4)	Start Production History Sheets. If you can tet true (or nearly true) information about the two weeks already past, do so. Collect every day from now for at least two weeks the daily number of how many pieces made at each operation. Avoid writing down guesses.
(5)	Collect the information by going every morning to the factory.
(6)	Find exactly the effect the shortage is having on the Enterprise. Plan not fulfiled? Incomplete final assembly? What else?
Make Studies	
(7)	Time study each operation on your outline Process Chart. Start with the worst or slowest. You may have to go back to some operations more than once, especially if there are some important occasional elements.
(8)	Look out for delays like heating furnaces, slow transport, waiting for tools, and so on.

(9) As you make each study ask yourself:

How can we ELIMINATE the operation?
Can we ELIMINATE any element?
Where is time being lost or wasted? Why?
How to remove this loss of time?
Can we make it easier for the worker? How?
Is quality ok? If not, why not?
Are tools good? If not, why not?
What else is wrong? Why?

Find Answers

(10) Decide the real causes of shortage you have found. Work out what must be changed to stop the shortage:

What must be done?
Who must do this?
What can stop this being done? Why?
Who must give the orders to do it?

(11) Make a list of all your Recommendations and ideas.

(12) Using your Standard Times, work out the daily output for each operation, including all work that is done by each worker. Use a day of 480 minutes, or 8 hours (85% of 8 hours for Basic Times). Make a table like this:

Part Number _____

Operation	Op. No.	Technology Time	Standard Mins/part	Standard Daily Output

Get Something Done

(13) Arrange a Report Meeting and continue with the Project Work Procedure - Section G Step (3).

I. Time Studies and Activity Sampling Studies

These are the steps to take when you decide to make a Time Study or Activity Sampling Study in the factory:

(1) See that the Foreman and the workers know you will come to make a study.

(2) Get study number from Study Register, and make entry in the Register in pencil (so that you can rub it out in case you do not do the study after all).

(3) Observe the work and make your Element and Breakpoint descriptions. You may want to change these later on. Talk with the workers.

(4) Look to see if there are old studies of the same job, and if there are, compare.

(5) Do the study itself according to the procedure: Time Study - Steps (11)-(28). Activity Sampling - Steps (30)-(45).

(6) Make Element Description sheet and enter study details and results to Study Summary Sheet.

(7) Collect papers together. Complete Study Register.

(8) Do you want another study? Yes - go to (2)
No - go to (9)
Don't know - see step (27)

(9) Finish calculation of Standard Time on Study Summary Sheet, and to Collation Sheet if more than one study.

(10) File papers. The Study Work is now finished.

Details of Time Study Procedure

(11) Prepare Study board with Study Top Sheet, some continuation sheets and your watch. Wind your watch. Have spare pencil ready to use.

(12) Go to the Work and talk with the worker you will study.

(13) Fill in the information on the Study Top Sheet. Take and record check time.

(14) Observe, Rate and Time each element as it occurs. Write your figures on the Study sheet. Record any unusual elements or happenings.

(15) Avoid personal interruptions. Do not sit or smoke while doing a study.

(16) When finished, take and record check Time.

(17) Thank the worker for his/her help in being studied.

(18) Return to the office.

(19) See that all sheets are properly numbered and dated. Put in order and make tidy.

(20) Add up all your observed times. Total must be within 2% of Elapsed Times. If not, seek advice from Section Leader.

(21) Calculate (extend) Rated observations to Basic Times.

(22) Using Study Analysis Sheets, work through each Element in sequence and take each Basic Time from Study Sheet to Analysis Sheet. Mark each Basic Time on the study sheets so that you neither omit nor repeat any times. Do the same for lost time and rest time.

(23) Calculate the average Basic Time for each Element and write it on the Analysis Sheet.

(24) Prepare Study Summary Sheet and take the average Basic Times from the Analysis Sheets.

(25) Work out the correct frequencies per part for each element on the Summary Sheet.

(26) Go to step (6).

(27) Do you want another study? More studies may be needed if:

* There are several different workers who do the operation.
* You are not sure about frequencies of the occasional elements.
* There are big variations in Basic Times for some of the Elements inside a study.
* There are big differences in Average Basic Times for an Element from one study to another study.
* You find the studies already made are not satisfactory in some way.

  Why is this?
  Can next studies be better?

(28) Go to (8).

Details of Activity Sampling Procedure:

(30) Check that your element descriptions are suitable, simple, and few in number. It may be enough to have only these:

El. No.	Description
1	Technology work
2	Non-technology work
3	Talk Foreman or other worker about the work
4	Wait for work
5	Other delay, not the fault of the worker
6	Delay or lost time caused by the worker

(31) Give a code letter or number to each element if you are not using the ones in (30)

(32) Go to the work and talk with the workers you will study.

(33) Make a list of their names, machine or operation numbers, part number they are making, works order number. Put a column number for each worker.

(34) Decide how you will get your count of how many pieces produced. You may be able to get a count yourself, or you may need to find some other way.

(35) Run a trial study for half an hour, to learn what to look for and to practice yourself.

(36) Analyse the study. You may wish to make some changes in elements or method of counting.

(37) When ready, make the full study. It should last for at least two hours. The longer the better. Look out for changes in part being made.

(38) Rate only one worker each minute, and rate them in turn. Record your rating in the column for that worker, on the line for the minute when you rated him.

(39) When you have finished the study, collect your information on outputs and take your leave of the workers.

(40) Return to the office.

(41) Work out the average rating for each worker.

(42) For each worker, count up how many times you saw each element. Each time represents 1/2 minute, so the total time spent is given by number of times multiplied by 1/2 minute.

(43) Convert to Basic Minutes using the average rating.

(44) Complete the Activity Sampling Summary Sheet.

(45) Go to Step (6).

J. Standard Forms

Examples of each of the Standard Time Study forms are included in this Manual. These forms are based on those given in the ILO book "Introduction to Work Study - Revised Edition" 1969, and are translated to Arabic.

The diagram on the next page shows how they are used:

List of forms:

(i) Element Description Sheet

(ii) Study Top Sheet

(iii) Study Continuation Sheet

(iv) Analysis Sheet

(v) Study Summary Sheet

(vi) Study Collation Sheet

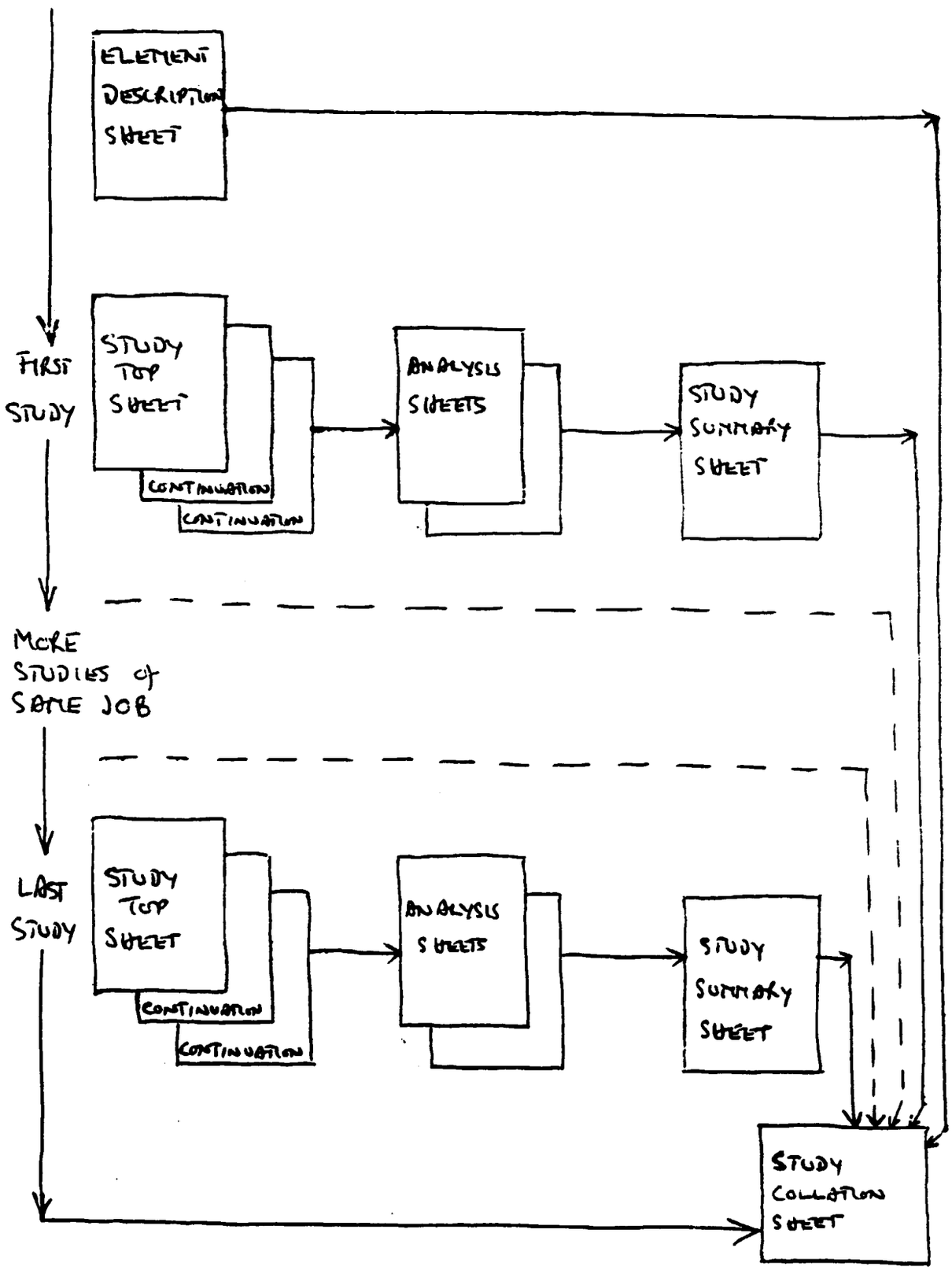
(vii) Activity Sampling Sheet (used separately or in place of (ii) and (iii)

(viii) Project Terms of Reference

(ix) Minutes of Report Meeting

(x) Reciprate Graph for Rating Practice

STUDY FORMS


ELEMENT DESCRIPTION SHEET
FIRST STUDY
STUDY TOP SHEET
CONTINUATION
CONTINUATION
ANALYSIS SHEETS
STUDY SUMMARY SHEET
MORE STUDIES of SAME JOB
LAST STUDY
STUDY TOP SHEET
CONTINUATION
CONTINUATION
ANALYSIS SHEETS
STUDY SUMMARY SHEET
STUDY COLLATION SHEET

التاريخ	وصف العنصر	رقم الدراسة
العملية		صفحة رقم من
		المشاهد
		قائمة الدراسات
الوحدة/ المكنة		رقم / التاريخ
رقم الجزء		

التسلسل	وصف العنصر ونقاط التعلم
	(i) ELEMENT DESCRIPTION SHEET

تابع الى الصفحة التاليه

التاريخ	الصفحة العليا لدراسة الوقت	رقم الدراسة
العملية		صفحة رقم من
		وقت الايقاف
		وقت البدء
		الوقت المنقضي (1)
الوحدة / المكنة		الوقت الملاحظ (2)
		فرق الوقت بين (1) و (2)
		نسبة الوقت المنقضي
		العامل
		رقمه
رقم الجزء		المشاهد
		التدقيق

وصف العنصر	م	و س	و م	وصف العنصر	م	و س	و م

(ii)
TIME
STUDY

TOP
SHEET for
OBSERVATIONS

دراسة رقم				صفحة استكمال دراسة الوقت			صفحة رقم من
وصف العنصر	م	ق س	و آ	وصف العنصر	م	ق س	و آ

(iii)
TIME
STUDY

CONTINUATION
SHEET FOR
OBSERVATIONS

دراسة رقم	صفحة تحليل الدراسة	صفحة رقم من
وصف العنصر	الأوقات الأساسية	المجموع
	(iv) TIME STUDY ANALYSIS SHEET	

التاريخ	صفحة ملخص الدراسة	دراسة رقم
العملية		صفحة رقم ص
		تاريخ الدراسة
		المشاهد
		العامل
الوحدة/المائنة		رقم العامل
رقم الجزء		

التسلسل	وصف العنصر ونقاط الفصل	و أ	ت	و أ ت	س ر	و ف
	(V)					
	TIME					
	STUDY					
	SUMMARY					
	SHEET					

(vi)
STUDY
COLLATION
SHEET

FOR SEVERAL
STUDIES of
the SAME
OPERATION

التاريخ		صفحه من		الوقت		صفحة الأنشطة بالعينات								دراسة رقم
ت	1	2	3	4	5	6	7	8	الملاحظات	ت	1	2	3	4	5	6	7	8	الملاحظات
1										16									
2										17									
3										18									
4										19									
5										20									
6										21									
7										22									
8										23									
9										24									
10										25									
11										26									
12										27									
13										28									
14										29									
15										30									

(vii)
ACTIVITY
SAMPLING
STUDY
SHEET

Activity Sampling Summary Sheet			Study No.		Date
Total observations		Total mins		Shop	
Time Start Study		Time Stop		Observer	

6	5	4	3	2	1	
						Worker Name
			(vii)			Machine No.
			ACTIVITY			Part No
			SAMPLING			Operation No.
						W.O. Number
						Qty produced
			SUMMARY			Tech Work BM's (1)
			SHEET			Tech BMs / piece
						Non-Tech BM's (2)
						Non-Tech BMs/piece
						Total BMs/piece
X	X	X	X	X	X	Tech. Work %
X	X	X	X	X	X	Non-Tech Work %
						Talk Foreman mins (3)
X	X	X	X	X	X	Talk Foreman %
						Wait Work mins (4)
X	X	X	X	X	X	Wait Work %
						Other delay mins (5)
X	X	X	X	X	X	Other Delays %
						Worker Delay mins (6)
X	X	X	X	X	X	Worker Delay %
						Missed Mins

موجز المشروع

رقم المشروع

الموكل Client _____

الباحث _____

التاريخ _____
Date

موضوع الدراسه —
Subject of Study

الخلفيه (ماهو المشروع) Background (what is the project about?)	(viii) PROJECT TERMS. of REFERENCE p1
عدم التحقيق (ماهو الخطأ) Dissatisfaction (what is wrong)	
الهدف (ماذا يمكن انجازه) Objectives (what is to be achieved!)	
التبرير (فائدة الكلفه) Justification (Benefits & Costs)	
تقيد (تحديد ماممكن عمله) Constraints (Limits on what can be done)	

(viii)
PROJECT TERMS
of REFERENCE p 2

مدى المشكله
Scope or scale of problem

تخطيط البحث
Plan of the Investigation

تاريخ البحث
تاريخ الدراسات، اللقاء، التقارير
History of the Investigation
(Dates, meetings held, reports, etc)

تاريخ الانجاز
Implementation History.

(ix) Form for Minutes of Report Meeting (A4 paper)

Part No. .....

Project No.....

Report Meeting

Present:.....

.....

.....

Date:.....

Agreed Action

Recommendations

Signed

Productivity Engineer

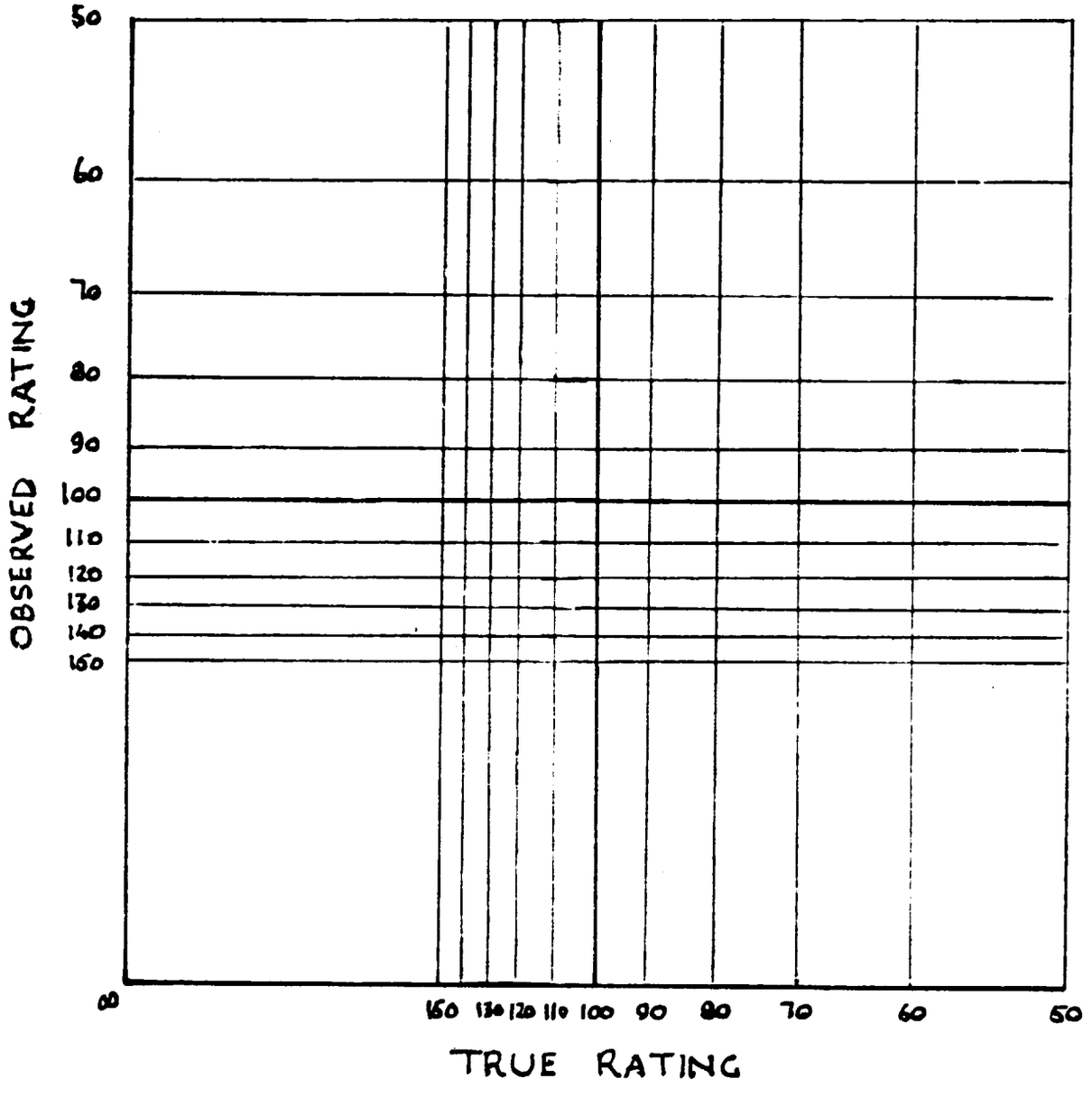
Distribution:

Project File 1

Those at meeting one copy each

(x)

RECIPRATE GRAPH



K. Time Study Code of Conduct

Carrying out a Time Study is a personal matter between the observer and the worker. It is important that the observer does certain things to make sure that the worker understands, accepts, is not frightened in any way and will co-operate with him. This Section of the Manual gives a list of the things that each person must do for a Time Study to be successful.

Before a study is done:

(1) Productivity Engineer must see that the Foreman knows that studies will be done.

(2) The Foreman must make sure that the workers to be studied know that studies will be done.

(3) The Productivity Engineer meets the workers and is ready to answer any questions they may have.

During a study:

(4) The Productivity Engineer does not give orders to the worker, only through the Foreman.

(5) The Productivity Engineer must not comment or criticise any person to the worker.

(6) Worker and Foreman to answer all questions about the work that the Productivity Engineer may ask.

(7) The Productivity Engineer should only answer questions about Work Study, and his own work, and not about technical parts of the work being studies unless he is already qualified to do so.

(8) On completion of study, to thank the worker for his cooperation.

After a Study

(9) Productivity Engineer may seek help and advice from any person, including the Foreman and the workers.

General

(10) The Productivity Engineer can go to any department of the Enterprise or to any person to get what additional information he may need in connection with the study.

(11) Productivity Engineers shall conduct themselves in a professional way at all times. Information they collect, or things people may say to them, are to be treated as confidential and not for general talking or gossip.

L. Standard Times and Rest Allowances

Standard Times

The Productivity Department works out times for jobs by Work Measurement Methods, and these are called "Standard Times". The British Standard 3138:1979 "Glossary of Terms used in Work Study and Organization and Methods (O and M) gives this official definition for Standard Times, as Reference 43032.

> 43032 The total time in which a task should be completed at Standard Performance, i.e. basic times plus contingency allowance plus relaxation allowance.

Standard Times may be given in Standard Minutes or in Standard Hours.

How long a task will take will depend on how hard the worker is working, if everything else stays the same. We can name five distinct levels of "how hard" and put a number to each level:

Very keen	125 BS	
Keen	100 BS	= Standard
Not keen	75 BS	
Not interested	50 BS.	
Not working	0 BS	

These numbers form a scale of "how hard" and you can have any value on this scale. "BS" stands for British Standard, and British Standard Performance is 100 BS - or "Keen".

Standard Performance is defined by British Standard as:

> 51004 The rate of output which qualified workers can achieve without over-exertion as an average over the working day provided they adhere to the specified method and provided they are motivated to apply themselves to their work. This is represented by 100 on the BS Scale.

In other words: Standard Performance is the rate of work which a KEEN worker can keep up all day and every day without harming himself, so long as he does the work by the correct method and is qualified for the work.

To see how long a task might take at any other performance you may choose, as XBS, simply multiply the time (standard or basic) by 100 and divide by X.

The Productivity Engineer takes into account the rate of working that he sees when making a study and converts the times he records on his stopwatch to 100 BS ("KEEN"). Machines are always taken as 100 BS.

Relaxation (Rest) Allowances:

Standard Times include an allowance or amount of time for rest by the worker. At SEMI this amount is taken as 17.6% for normal work. This is the same as saying that 85% of the day must be occupied by actually working as if "KEEN". For work with lifting or moving heavy weights, or work near hot furnaces, the 17.6% is increased according to the ILO table. There are therefore two results for a study. The BASIC Time and the STANDARD Time. The standard time equals basic time plus rest allowance plus contingency allowance (if any).

Application

The Standard Output is the output (number of pieces) in 8 hours if the worker gives Standard Performance (= "Keen") and takes the proper rest.

$$\text{Standard Output in 8 hours} = \frac{480}{\text{Standard Minutes per piece}} \text{ pieces}$$

If there is no heavy lifting or near furnace, this is the same as

$$\left(480 \times \frac{85}{100} = 408 \right) \qquad \frac{480 \times 85}{\text{Basic Minutes per piece} \times 100} \text{ pieces}$$

Certain questions may be asked and answered:

Q. How long will it take to make one piece in the factory?

A. If the worker is KEEN, the time to make one piece is the Basic Time. If the worker is NOT KEEN, the time to make one piece is Basic Time x 100 divided by 75.

Q. How does the Study result compare with the Technology Time?

A. If the Technology Time is for the same method and machine, then there is some agreement when the Standard Time is equal to or more than the Technology Time AND the Basic Time is less than the Technology Time.
Otherwise: NO AGREEMENT.
This is because Technology Time contains from 7% to 20% allowance for rest.

Q. What should be used for Planning?

A. The Standard Time should be used for Planning with a day of 8 hours. If the Planning Day is less than 85% of 8 hours the Basic Time should be used.

Q. What times should we tell to the people in the factory - management or worker?

A. Give the Standard Output of pieces in one day of 8 hours. If a time is asked for, give the BASIC Time, not the Standard Time. This is because it is easy for the person in the factory to compare the BASIC Time with the time taken to make one item or to do one operation.

Q. How do you compare Technology Time with the actual times in the factory?

A. You cannot do this because Technology Times contain within them an allowance for R.A. You do not know exactly how much this allowance might be, so you cannot take it out of the Technology Time.