GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: 2/20/81

Project Title: Productivity Measurement System Design

Project No: A-2859

Project Director: Mr. Phillip Loveless

Sponsor: Macon Prestressed Concrete Co., Inc.

Agreement Period: From 2/1/81 Until 4/1/81 (Perf. & Rpts.)

Type Agreement: Standard Industrial Agreement

Amount: $2,500

Reports Required: Monthly Letter reports

Sponsor Contact Person (s):

Technical Matters
Mr. Gordon Huddleston
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Defense Priority Rating: N/A

Assigned to: EDL/IED

COPIES TO:

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Division Chief (EES)
School/Laboratory Director
Dean/Director—EES
Accounting Office
Procurement Office
Security Coordinator (OCA)
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SPONSORED PROJECT TERMINATION SHEET

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

Date: 10/5/81

Project Title: Productivity Measurement System Design

Project No: A-2859

Project Director: Phillip Loveless

Sponsor: Macon Prestressed Concrete Co.

Effective Termination Date: 4/1/81

Clearance of Accounting Charges: 4/1/81

Grant/Contract Closeout Actions Remaining:

- [x] Final Invoice and Closing Documents
- [ ] Final Fiscal Report
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Assigned to: EDL/IED (School/Laboratory)

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Computer Input
Project File
Other
Since 1978, Macon Prestressed Concrete Company, Inc. has attempted to implement a productivity measuring program which is based on standard hours for producing a product. This program is used to measure the performance of foremen as it relates to their ability to utilize labor. This program has had some success but has not been fully accepted, implemented or utilized by the foremen or plant management.

Company management requested that Philip D. Loveless, Georgia Tech Engineering Experiment Station, provide an overview analysis of the productivity measuring program and attempt to determine why implementation of the program was being met with indifference and resistance. During the month of February 1981, personal interviews were conducted with each plant manager and superintendent as well as the individuals who set standards for production. These interviews were basically unstructured and allowed each person to state why he felt the program was not working and what could be done to improve the program.

From these interviews, it was determined that many reasons exist for the problems being experienced in implementing the standards program. Because of the large number of reasons, it is very difficult to pinpoint the specific problem(s) that can be easily solved and return the program to what it was intended to be. The following pages will discuss the reasons that are most obvious and offer suggestions as to how improvements may be made.
I. The management of Macon Prestressed Concrete Company does not have a clearly defined idea of what a productivity measuring system is. Each person understands the concept of productivity, but adequate information and training as to practical use of productivity information has not been fully disseminated.

Productivity is defined as a measure of the rate of change over various time periods in output per unit of input. Output is generally defined as value added, physical units, or usually, value of production expressed in constant dollars while input is defined as labor, capital, materials, or a combination of these. Commonly, output per manhours is used as the standard productivity measure. This measures real output per hour of work and, while dealing only with the labor factor in the production process, it is also used in following the performance of the total business operation.

Productivity data, properly used, can provide management with valuable information for improving company operations. It is helpful in giving better perspective for long-range planning, in identifying problem areas and in diagnosing the causes of sub-standard or decreasing performance. It is a tool for top management that is not found in conventional analysis techniques or in a conventional control system.

II. M.P.C. has no cohesive productivity measuring system. It does have three programs which attempt to measure productivity. The first program, which this study has addressed itself to, is the stand-
ards program to measure the ability of foremen to utilize labor more efficiently.

The second program is one that is used by plant management, including the plant manager and the plant superintendent, to determine how effective they are in manufacturing the product based on an estimated labor cost versus an actual labor cost.

The third is a return on managed assets computation which is used to gauge the performance of the plant manager. None of these are tied together in any form that could be determined. Because two measurement programs exist, it is difficult for plant management to understand the reasoning for having a third program, the standards program, implemented.

There is a need to have a single program, a productivity measuring system, that will measure the performance of the foreman, plant superintendent, plant manager, etc., along the same lines, instead of having three types of measurement programs as now exists. There would still be different measures for various individuals, but there would not be the question of why we have another program when two programs already exist.

III. There is no accountability connected with the various measuring programs as they now exist. Plant managers are given a bonus based on return on managed assets. They were not given an employee evaluation, but were given pay raises. Normally, a pay raise is tied to a person's performance and a pay raise is announced at the time of the employee evalu-
ation or shortly thereafter. The managers of the four plants can see no clear connection between performance reports and their pay increases or their future with the company. The foremen are evaluated based upon the standards and given bonuses but there are very few corrective actions taken nor does it affect their future with the company if they are not productive.

Because of the lack of accountability, plant management and the foremen are not totally committed to either accepting standards or to really working on a productivity improvement program. Yet they do say (100% of them say this) that productivity improvement is necessary.

A single program that will include an overall productivity measuring system with assigned accountabilities is needed. The exact design of a program will require input from the foremen, plant superintendents, plant management, as well as top management. Productivity is not something that is mandated. There must be involvement on the part of all people in the company. Hourly workers would not be involved to the extent that the plant management is, but all M.P.C. employees must know and understand what the company is trying to do in the area of productivity improvement.

IV. The standards program, as it now exists, was rushed into implementation. Normally, standards are set, evaluated, tested, re-evaluated, improved and then implemented. The standards, as I understand them, were implemented piecemeal as they were developed. There have been explanations of the standards program but there has not been true involvement on the part of company management. I am told that there is
involvement, but according to several of the plant managers, involvement was more being told that this is the program - "Here's what it's going to do and you will do it." That is not the way it should be.

The system that is designed in the future should have all the plant management working on it and it should be tested and refined until all participants are in relative agreement that this is the way it needs to be done. It should not be mandated and have everyone expected to accept it.

V. The standards, as they are now applied, are not a positive tool but are a negative device. A foreman is told that he is performing adequately at 67% of standard and in no other company that I am aware of, is standard anything but 100% performance. The company has, in effect, through the applications of the standards and the bonus system for the foremen, said that 67% is equal to 100%. If you perform at 67%, you are doing acceptable work. This needs to be changed and the standards need to be revised so that any foreman, given normal performance - not exceptional performance - can reach 100% of standard. Otherwise, this person is, in effect, being given a negative feedback every-time he is told that he is performing at 67% or 80% or 95%. He is exposed to the fact that he did not quite make 100% and he knows that 100% performance is normal.

VI. M.P.C.'s objectives on production versus quality versus standards is not clear. The overall objective, as could best be determined, was to get the product out the back door on time with adequate quality. The
paperwork for example, that is required by the company on the reporting of bed labor, etc., requires that the foremen do some work that is not related to getting the product out the back door. Yet, when it gets down to it, getting the product out the back door is much more important than having accurate information on the bed labor report. The company should establish its goals in these three areas and have an overall educational program that explains the importance of productivity, the reporting of data for productivity analysis, and the benefits that can be realized to the company because of productivity improvement programs.

VII. The bonus program has resulted in blackmail and an inequitable treatment of the foremen. Blackmail exists in one case, where a particular foreman has offered some members of his crew part of his bonus if they speed up. In another case, a foreman was told that "we can speed up, but you'll have to give us part of your bonus." This leads into a question of whether or not the bonus is really a good thing where a group effort is required to produce a product.

Normally, a bonus is only given based upon individual performance and in the case of an eight-man crew, the foreman cannot necessarily affect the performance to the point that he would like to. He can improve the way that labor is utilized to a certain extent. He can partially eliminate wasted labor, but there are many things that he cannot control and consequently, he may not be able to perform at standard. If the group, as a whole, were committed to productivity improvement, and were rewarded for that, they should be able to improve performance with no loss of quality.
Another situation that exists is the best foreman, in many cases, is given the hardest jobs and is not able to draw a bonus for the efforts that he gives the company. He is punished, in effect, for being good. A good foreman that can interpret drawings and do difficult placements and designs on the beds, may not be as efficient, but he can do the work that is important to the company. Yet, another foreman who stays on the same job day-after-day, week-after-week, and in some cases, year-after-year, is continually drawing a good bonus because he is more productive. Of course, he is more productive. He has time to get the job design down to the very best possible way of doing it while the foreman who is given a different job every 5-6 days, has no way of doing this. He is only on the job long enough to barely learn what needs to be done then the job is over. This can breed discontent and has already to a certain extent.

VIII. The standards that have been developed are more normally used for long-term or high-quantity production. Short-term production standards take into consideration things which are easily measured and it is possible to make fast improvements. Historically, work measurement and the establishing of standards centered mainly on repetitive work which was easy to measure and control and methods improvements were normally concentrated in these same areas. The ability to achieve results appeared to rely on lots sized large enough to justify detailed methods analysis and time study. Management and industrial engineers have begun to use the same types of procedures and techniques for less repetitive work but have achieved mixed results.
There are economic justifications for measuring low-quantity work. This has occurred because of advances in work measurement procedures. In the development of work measurement data for low-quantity work, the most important concept is that pinpoint accuracy and detailed individual standards are not necessary. They are not an essential factor in realizing really worthwhile cost reductions on low-quantity work. Acceptance of overall methods improvement and an "average condition" concept for work measurement, combined with less detailed methods and controlled procedures have made possible economically justifiable measurement of low-quantity work. The application procedures for this type of work measurement installation must be as simple as possible. A simple work card with only a brief outline of the work to be done in a good suggested method, along with the standard time which is within a chosen range of accuracy, something less than exact, achieves the desired results for the low-quantity production items. The calculation of several hours of standard time becomes a matter of minutes instead of hours.

The question of how to specify methods improvement for low-quantity work, invariably arises. How can you achieve cost reductions if you do not improve methods and how can you make changes if you are not able to analyze, improve and teach better methods for individual operations. The answer is to concentrate on the optimum use of the best method for both equipment and hand tools. This does not necessarily mean the most expensive and the most complex tools. The realistically, justifiable items must be available and must be used in the proper manner. Specifications of methods for the best use of standard tools and for repetitive
elements of work is essential.

For successful measurement of low-quantity work, data must be accurate enough for the class of work they are intended to cover, but simple enough to apply easily and quickly to the wide variety of work found within that class.

Problems have arisen from the acceptance of the word universal applied to simplified work measurement data. There is a risk that data may be used without adequate validation with a result that good data are applied to the wrong work. I think this had happened with M.P.C. where it was stated that Paul Coleman said that this is the way it has been done in other plants, and consequently, this is the way it should be here. This has given, in some cases, bad results which tend to undermine confidence in the data and has developed strongly negative reactions. Even the best data must be carefully checked and validated against the type of work which they are intended to cover. They cannot accurately be used universally for all types of conditions and work areas. In addition, it is necessary to stress that successful work measurement of low-quantity work relies also on the standardization of general procedures and overall methods. Carefully analyzed averages and typical conditions must be developed and used as a basis for standard data which apply to low-quantity work. Yet, they cannot be too detailed or too specialized or the development and application, again, become completely uneconomical.
M.P.C. needs to re-evaluate its standards based on the principals of low-quantity work measurement and re-evaluate just exactly how much information is required to really measure performance at the foreman's level or at any level of management.

IX. M.P.C. should establish a company-wide productivity measurement system that ties together, under a common measurement base, all people involved in management from the first line supervisor to the president of the company. It should be a positive measurement program, not a negative program, and it should provide an avenue of assistance instead of the hindrance that is now perceived. The company management should be evaluated based upon it and their future with the company should be based upon their performance in the productivity measuring program. The current practice of bonuses for foremen are not necessarily good and should be re-evaluated by the top management of the company.

X. What does it take to establish a productivity measuring system?

Establishing a company productivity measurement program requires several steps that are necessary for success to occur. There are basically eight (8) steps. These are general steps and do not necessarily apply to every company, but have been determined to be primarily the ones that are undergone in any company establishing a productivity measurement program.

1) The decision is made to MEASURE productivity. This has been done at M.P.C.
2) A task force, a committee if you prefer to call it that, is established that represents company leadership in the development of a suitable system consistent with the prescribed guidelines. In attempting to translate its mandate into a measurement system, the task force may either find it feasible to devise a monitoring system that satisfies the company needs and meets the stated time and cost restraints or decide that a minimum is desired in some important aspect. In the latter case, the task force should seek early renegotiation of its charter with regard to the scope or scale of the anticipated system, the time required, or the cost entailed. Revision of expectations is better than disappointment of them.

3) Program information and communication is very important. From the very beginning, the task force should take the initiative to advertise its constructive intent. Spelling out its mission, it should spread the word to lower management and the operating staff that no revolutionary new order is coming. It should establish communications with the hourly workers. It should take advantage of a company newspaper or other inhouse media to tell its story. Another challenge to the task force is to convince managers of other controls systems to cooperate, to assure them that the introduction of productivity measurement is not part of a plan of some rival manager. The task force may invoke two (2) other tactics if extensive cooperation in the measuring process is required at all levels of the organization.
One is to designate productivity officers throughout the company. These may be middle level and lower level managers or persons selected by them. The officers would continue their regular duties at their usual work places, but would have a liaison function assisting two-way communication. The other way of selling the system as it develops, is to conduct briefings, seminars and dry run demonstrations.

4) Data and skill resources have to be considered. A major undertaking preparatory to design of the measurement system, is to make a methodical survey of the company's data and skill resources. The review should cover existing data bases, routine print-outs of the management information systems, earlier special studies and analyses and current and past programs of work measurement. Such a review, often leads to discoveries of private or local data files, primitive quasi-productivity measures, prior initiatives that failed to be used and isolated groups of knowledgeable but underutilized personnel. For example, very few production managers and engineers seem to be aware that the controllers of their company regularly supply productivity-related data in the annual survey of manufacturers. With better inhouse communication, the completed form or the underlying factory records could be exploited more effectively in a company measurement program. About 70,000 manufacturing establishments annually submit this form to the Bureau of Census.

5) Outside consultants may be required in addition to resident productivity officers for expeditious accomplishments of the task
force mission. A consultant working with rolled up sleeves like a member of the measurement team is far more useful than a white gloved academician of a prestigious hit-and-run expert. He should tailor prescriptions and formulas to fit the needs, strengths, and data supply, etc. of the company that has engaged him. The more detail required in the measurement system, the greater will be the reliance of the task force on the liaison services of the productivity officers. By virtue of location, these officers already have, or could obtain needed information on sub-products and sub-activities down to the work or cost center level.

6) Another incidental function of the task force that cannot be slighted, is to assure that a sufficiently trained resident staff is on hand to operate and maintain the measurement system after it is installed. The task force is able to perform some of this training, having learned by doing, and from being in consultation. The briefings, seminars and dry-run demonstrations already mentioned could be used as training vehicles. The productivity officers are also being trained by their association with the project. They constitute valuable assets for the post-development period.

7) The chief obligation of the task force is to arrive at a first generation monitoring system that satisfies the company needs and constraints as set forth in the original and amended charge. First generation suggests that the system will be evolutionary. The words, and amended, further suggests that the task force will, if desirable or necessary, on the basis of its learning experience,
make changes in the system. Documentation of major changes in the
time schedule or budgeted cost is essential for avoiding disappoint-
ment at top level management or below.

8) Actions of the task force, apart from actual design, should
have paved the way for initiation of measurement on a trial basis
and for routine operation of the system by others after a shake-
down or debugging period which may last several months. These
actions already mentioned include discovery of inhouse sources of
appropriate data, the dissemination of information intended to
encourage understanding, cooperation and acceptance at all staff
levels; the prepositioning of liason officers, and the conduct
of a minimal indoctrination and training program. The task force
remains in charge during the shake-down period and the consultant
should still be available even if the ties have been loosened.
Trial operations of the system should disclose needs for different
data for revision of techniques or for modification of administra-
tive procedures.

Before the task force is disbanded, and preferable with the
oversight of the consultant, an instruction manual has to be
written for guidance of operators of the system for helping them
to make the system their own. The manual should have at least
two (2) parts; the first should disclose the nature of the system,
its structure data sources and methods, and uses of the results.
The second part should concentrate on the measuring process itself
and procedures for carrying it out, on data acquisition and pro-
cessing, the period of time that data will be required of - daily,
Daniel H. Gray who wrote *Organizational Productivity - The Human Dimension*, makes this statement, "Faced with the impossibility of exact answers to questions that we would dearly like to answer, we have three options. We can forget about it, we can willfully force the answers and try to use our authority to make them stick, or we can devise an acceptable and believable process for generating answers even if the answers themselves are known to be imperfect." Gray's law states, "Purity, precision, and perfection kill productivity." Currently, M.P.C. is attempting to have precision and perfection in the measuring of productivity. It is killing it!

XI. The current group, headed by Gordon Huddleston, that sets standards should become a corporate productivity division with the primary purpose of assisting plant management to make improvements. These people would become what is classically known as the methods improvement staff with the overall charge to assist plant management, including foremen, in determining ways that they can improve productivity. Why is this? First, the foreman on the line is charged with getting the product out the door. He does not normally have time to just think about how a job can be improved. Someone has to assist him and that someone is not necessarily the plant manager or the plant
superintendent, in most companies. Although plant management is interested in improving, they too have many other problem areas that must be given attention. They will be an important part of any recommendations since it is their responsibility to implement recommended changes.

There are several areas in setting the standards that need to be looked at based on prior discussions of short-term versus long-term standards and a real question exists in my mind as to whether or not the standards program needs to be continued in its current format. Unless the company is willing to establish an overall productivity measurement program, under which all involved are evaluated along the same guidelines, I would suggest not having a program at all, but having a very simple goal for the plant management to operate under, such as a 10% improvement in labor costs this year, based upon the volume of product, or something of that nature, which would have to be determined.
TYPICAL COMMENTS

No format outlining entire program - lot of verbal, some written documents - have to use own judgement to determine variables. Foreman's time goes into job even if sick.

Lot of distortion in data. Foreman - no incentive to try when he knows standard is wrong.

Data used in one plant not necessarily same for another. Tying steel (example) - may be harder to tie.

Incentive versus overtime - sometimes foreman paid incentive and three months later find bad parts - takes rework and salvage time.

Standard pretty well set up around how we operate. Have had recommendations for changes and used some and not used others.

Standards set hastily - because of pressure from Paul.

Took long time to get foremen to put down off time. Very little time spent on explaining system.

One fallacy - very low class labor situation - time best workers - no consideration made for slower, less skilled people.

Paul Coleman - Paul Jones was pushing for program - Boswell was pushing for other things such as production. Created problems.

Have foreman (one who produced bad stuff) who splits incentive with two of best people on crew - this has encouraged sloppy work.

Lot of problems with engineering - called on phone, given data to make bid - then drawings come in and everything is screwed up and different.

Finishing time - big problem.

Not always familiar with operations of bed. Sometimes, when standard was written, that was it. No negotiation.

On feedback - Paul is overly sensitive to criticisms. Uses or advocates open door policy but may not be receptive. Makes employees hesitate to make suggestions.

Conflict in knowledge being used to set standards between productivity and engineering.

Feels very little communication between industrial engineering and productivity management. Standards must be accepted as realistic.
Management on profit sharing plan - evaluated on profit and not productivity.

Had standards crammed down throat without good explanation. More like monitoring team than co-op effort involving plant management.

Irritation when someone tells you you're not productive when doing better than the past.

No say-so in setting standards. Done with Gordon under direction of Paul C. Standards have been down hill.

Against bonus system - if gets dependent upon money. Acts as a deterrent.

No correlation between standard of cost performance and standard of productivity performance.

Standards are not related to quality considerations.

No clear understanding of a definition of what the program is among the participants.

Productivity group is not involved in setting cost estimates.

Goal - 75% of productivity

Tools have to be integrated from a people standpoint.

No program definition on productivity techniques, purposes, etc.

No chain of command for evaluation based on performance for salaried employees.

Evaluated on ROMA - no one looks at anything but profits.

Hard to justify bottom line evaluation when have no control on sales but yet volume depends upon sales.

If don't have volume of work, can't have good return on assets managed.

Needed in standards - number of manhours required plus supervisory hours required. Foreman's incentive shouldn't be cut because of complexity of job.

Best foreman in plant gets least incentive. Gets worse jobs because he is best at working out the complex jobs. Gets same salary as one who does same job for years. Being penalized because he's good.
Feels like being accused of poor decision making without full understanding of problem.

Some days plant superintendent changes what foreman does and foreman is penalized for work he can't do until later. Brushing of curbs after two days instead of one - takes twice as long.

Had very little involvement in setting up productivity program. Was told here is the program and you will make it work.

Studies reports every week to try to determine why things occur. Can't explain, so delves into it to find out what went wrong.

Foreman hours not in standard times. Sometimes, foreman does things himself and saves time in labor. Showed up more favorable than was really the case.

Need something that is equitable while achieving its goals.

Have poured products that were supposedly OK and foreman paid -- 3 months later, get failure or reject; how do you reclaim this?

Questions that come up because of engineering errors. Things that don't fit right, etc. Will have delays due to this. When foreman gone to office, crew less efficient.

In many cases, engineers do not provide enough details. Nature of business is job shop, not production oriented.

Do not fully understand the productivity program. Have not had the mechanism set-up to resolve the problems.

"DO NOT HAVE THE TOOL YET THAT WE NEED"

Paul Coleman came in and said "These are the standards." He came in with standards that were set at a plant that had gone out of business.

Coleman did some things but very spasmodic - standards started out wrong.

Indirect foreman - no incentive. Team incentive perhaps would rather see no incentive and just pay what foreman is worth.

Establish standards off of most efficient operations at any one plant.

Estimates made without drawings. Get burned on walls, double TT, inverted T's, rectangular beam; these were worst performance.
Typical Comments
Page 4

Until last four months, told could not question standards. Could not talk to Gordon about it without a problem occurring.

Finishing times a problem.

Richard - if not familiar, does spend time on yard to make a better decision.

Incentive - can be paid before on-site problems found. Cannot get incentive back when problem found.

From an MPC manager - G.H. vs. MPC - don't see much of G.H. Don't feel much of the we/they. G.H. plant was total profit center - all decisions made there - some now taken away and they were not used to getting things just crammed down throat.

Things not explained to people, just told that this is way it is. Paul and Bill think that they discuss and explain things but are pre-occupied with other things. (over all)

Bill and Paul are spread too thin. Concerned with volumes, revenues.

Paul too impulsive. Too concerned about daily operating problems. Paul goes around supervisors, plant managers to get things done.

Learning curve not considered.

What quality time allowance is in the standard?

Labor estimate often made without knowing all the variables. Use worst cases to make estimates.

Delays - how expensive are they? Accurate reporting - down time, etc. Accurate reporting of above will help to justify.

Standards - sometimes standards written as job is finished.

Feel like it's biggest problem - standards writers not enough knowledge on amount of hours to produce.

Do not get out and really do the timings that were being done.

Short-run products are ones having problem with on standards - small columns.

Learning curves - factor not included or does not appear to be on standards for short-run products.
System would have worked if everyone had put in a positive effort toward making it work.

Bonus - (crew) why should we bust butt for this so he can draw a bonus?!
INTRODUCTION

Since 1978, Macon Prestressed Concrete Company, Inc. has attempted to implement a productivity measuring program which is based on standard hours for producing a product. This program is used to measure the performance of foremen as it relates to their ability to utilize labor. This program has had some success but has not been fully accepted, implemented or utilized by the foremen or plant management.

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From these interviews, it was determined that many reasons exist for the problems being experienced in implementing the standards program. Because of the large number of reasons, it is very difficult to pinpoint to what it was intended to be. The following pages will discuss the reasons that are most obvious and offer suggestions as to how improvements may be made.
SUMMARY

Many reasons exist for the problems experienced by Macon Prestressed Concrete Company, Inc., in its efforts to implement a standards and productivity improvement program. The statements below summarize the principal findings of this analysis and are discussed in greater detail in the Observations and Recommendations section of this report.

I. The management of Macon Prestressed Concrete Company does not have a clearly defined idea of what a productivity measuring system is.

II. Macon Prestressed Concrete Company has no cohesive productivity measuring system.

III. There is no accountability connected with the various measuring programs as they now exist.

IV. The standards as they are now applied, are not a positive tool but are a negative device.

V. The bonus program has resulted in blackmail and an inequitable treatment of the foremen.

VI. Macon Prestressed Concrete Company should establish a company-wide productivity measurement system that ties together, under a common measurement base, all people involved in management from the first
line supervisor to the president of the company.

VII. The current group, headed by Gordon Huddleston, that sets standards should become a corporate productivity division with the primary purpose of assisting plant management to make improvements.
I. The management of Macon Prestressed Concrete Company does not have a clearly defined idea of what a productivity measuring system is. Each person understands the concept of productivity, but adequate information and training as to practical use of productivity information has not been fully disseminated. This is not unusual and is a problem experienced by many companies.

Productivity is defined as a measure of the rate of change over various time periods in output per unit of input. Output is generally defined as value added, physical units, or usually, value of production expressed in constant dollars while input is defined as labor capital, materials, or a combination of these. Commonly, output per manhours is used as the standard productivity measure. This measures real output per hour of work and, while dealing only with the labor factor in the production process, it is also used in following the performance in the production process, it is also used in following the performance of the total business operation.

Productivity data, properly used, can provide management with valuable information for improving company operations. It is helpful in giving better perspective for long-range planning, in identifying problem areas and in diagnosing the causes of sub-standard or decreasing performance. It is a tool for top management that is not found in conventional analysis techniques or in a conventional control system.
II. M.P.C. has no cohesive productivity measuring system. It does have three programs which attempt to measure productivity. The first program, which this study has addressed itself to, is the standards program to measure the ability of foremen to utilize labor more efficiently.

The second program is one that is used by plant management, including the plant manager and the plant superintendent, to determine how effective they are in manufacturing the product based on an estimated labor cost versus an actual labor cost. While top company management does not feel it evaluates plant management with this information, plant management perceives that it is being evaluated and gives a lot of recognition to how effective performance is based on this report.

The third is a return on managed assets computation which is used to gauge the performance of the plant manager. None of these are tied together in any form that could be determined. Because two measurement programs exist, it is difficult for plant management to understand the reasoning for having a third program, the standards program, implemented.

There is a need to have a single program, a productivity measuring system, that will measure the performance of the foreman, plant superintendent, plant manager, etc., along the same lines, instead of having three types of measurement programs as now exists. There would still be different measures for various individuals, but there would not be the question of why we have another program when two programs already exist.
III. There is no accountability connected with the various measuring programs as they now exist. Plant managers are given a bonus based on return on managed assets. They were not given an employee evaluation, but were given pay raises. Normally, a pay raise is tied to a person's performance and a pay raise is announced at the time of the employee evaluation or shortly thereafter. The managers of the four plants can see no clear connection between performance reports and their pay increases or their future with the company. The foremen are evaluated based upon the standards and given bonuses but there are very few corrective actions taken nor does it affect their future with the company if they are not productive.

Because of the lack of accountability, plant management and the foremen are not totally committed to either accepting standards or to really working on a productivity improvement program. Yet they do say (100% of them say this) that productivity improvement is necessary.

A single program that will include an overall productivity measuring system with assigned accountabilities is needed. The exact design of a program will require input from the foremen, plant superintendents, plant management, as well as top management. Productivity is not something that is mandated. There must be involvement on the part of all people in the company. Hourly workers would not be involved to the extent that the plant management is, but all M.P.C. employees must know and understand what the company is trying to do in the area of productivity improvement.
IV. The standards, as they are now applied, are not a positive tool but are a negative device. A foreman is told that he is performing adequately at 67% of standard and in no other company that I am aware of, is standard anything but 100% performance. The company has, in effect, through the applications of the standards and the bonus system for the foremen, said that 67% is equal to 100%. If you perform at 67%, you are doing acceptable work. This needs to be changed and the standards need to be revised so that any foreman, given normal performance - not exceptional performance - can reach 100% of standard. Otherwise, this person is, in effect, being given a negative feedback every-time he is told that he is performing at 67% or 80% or 95%. He is exposed to the fact that he did not quite make 100% and he knows that 100% performance is normal.

V. The bonus program has resulted in blackmail and an inequitable treatment of the foremen. Blackmail exists in one case, where a particular foreman has offered some members of his crew part of his bonus if they speed up. In another case, a foreman was told that "we can speed up, but you'll have to give us part of your bonus." This leads into a question of whether or not the bonus is really a good thing where a group effort is required to produce a product.

Normally, a bonus is only given based upon individual performance and in the case of an eight-man crew, the foreman cannot necessarily affect the performance as much as he would like. He can improve the way that labor is utilized to a certain extent. He can partially eliminate wasted labor, but there are many things that he cannot control and consequently, he may not be able to perform at standard. If the
group, as a whole, were committed to productivity improvement, and were rewarded for that, they should be able to improve performance with no loss of quality.

Another situation that exists is the best foreman, in many cases, is given the hardest jobs and is not able to draw a bonus for the efforts that he gives the company. A good foreman that can interpret drawings and do difficult placements and designs on the beds may not be as efficient, but he can do the work that is important to the company. Yet, another foreman who stays on the same job day-after-day, week-after-week, and in some cases, year-after-year, is continually drawing a good bonus because he is more productive. He has time to get the job design down to the very best possible way of doing it while the foreman who is given a different job every 5-6 days, has no way of doing this. He is only on the job long enough to barely learn what needs to be done when the job is over. This can breed discontent and has already to a certain extent.

VI. M.P.C. should establish a company-wide productivity measurement system that ties together, under a common measurement base, all people involved in management from the first line supervisor to the president of the company. It should be a positive measurement program, not a negative program, and it should provide an avenue of assistance instead of the hindrance that is now perceived. The company management should be evaluated based upon it and their future with the company should be based upon their performance in the productivity measuring program. The current practice of bonuses for foremen are not necessarily good
and should be re-evaluated by the top management of the company.

VII. The current group, headed by Gordon Huddleston, that sets standards should become a corporate productivity division with the primary purpose of assisting plant management to make improvements. These people would become what is classically known as the methods improvement staff with the overall charge to assist plant management, including foremen, in determining ways that they can improve productivity. Why is this? First, the foreman on the line is charged with getting the product out the door. He does not normally have time to just think about how a job can be improved. Someone has to assist him and that someone is not necessarily the plant manager or the plant superintendent, in most companies. Although plant management is interested in improving, they too have many other problem areas that must be given attention. They will be an important part of any recommendations since it is their responsibility to implement recommended changes.

There are several areas in setting the standards that need to be looked at based on prior discussions of short-term versus long-term standards and a real question exists in my mind as to whether or not the standards program needs to be continued in its current format. Unless the company is willing to establish an overall productivity measurement program, under which all involved are evaluated along the same guidelines, I would suggest not having a program at all, but having a very simple goal for the plant management to operate under, such as 10% improvement in labor costs this year, based upon the volume of product, or something of that nature, which would have to be determined.
HOW TO ESTABLISH A PRODUCTIVITY MEASURING SYSTEM

Establishing a company productivity measurement program requires several steps that are necessary for success to occur. There are basically eight (8) steps. These are general steps and do not necessarily apply to every company, but have been determined to be primarily the ones that are undergone in any company establishing a productivity measurement program.

1) The decision is made to measure productivity. This has been done at M.P.C.

2) A task force, a committee if you prefer to call it that, is established that represents company leadership in the development of a suitable system consistent with the prescribed guidelines. In attempting to translate its mandate into a measurement system, the task force may either find it feasible to devise a monitoring system that satisfies the company needs and meets the stated time and cost restraints or decide that a minimum is desired in some important aspect. In the latter case, the task force should seek early renegotiation of its charter with regard to the scope or scale of the anticipated system, the time required, or the cost entailed. Revision of expectations is better than disappointment of them.

3) Program information and communication is very important. From the very beginning, the task force should take the initiative to
advertise its constructive intent. Spelling out its mission, it should spread the word to lower management and the operating staff that no revolutionary new order is coming. It should establish communications with the hourly workers. It should take advantage of a company newspaper or other inhouse media to tell its story. Another challenge to the task force is to convince managers of other controls systems to cooperate, to assure them that the introduction of productivity measurement is not part of a plan of some rival manager. The task force may invoke two (2) other tactics if extensive cooperation in the measuring process is required at all levels of the organization. One is to designate productivity officers throughout the company. These may be middle level and lower level managers or persons selected by them. The officers would continue their regular duties at their usual work places, but would have a liason function assisting two-way communication. The other way of selling the system as it develops, is to conduct briefings, seminars and dry run demonstrations.

4) Data and skill resources have to be considered. A major undertaking preparatory to design of the measurement system, is to make a methodical survey of the company's data and skill resources. The review should cover existing data bases, routine print-outs of the management information systems, earlier special studies and analyses and current and past programs of work measurement. Such a review, often leads to discoveries of private or local data files, primative quasi-productivity measures, prior initiatives that failed to be used and isolated groups of knowledgeable but underutilized personnel.
For example, very few production managers and engineers seem to be aware that the controllers of their company regularly supply productivity-related data in the annual survey of manufacturers. With better inhouse communication, the completed form or the underlying factory records could be exploited more effectively in a company measurement program. About 70,000 manufacturing establishments annually submit this form to the Bureau of Census.

5) Outside consultants may be required in addition to resident productivity officers for expeditious accomplishments of the task force mission. A consultant working with rolled up sleeves like a member of the measurement team is far more useful than a white gloved academician of a prestigious hit-and-run expert. He should tailor prescriptions and formulas to fit the needs, strengths, and data supply, etc. of the company that has engaged him. The more detail required in the measurement system, the greater will be the reliance of the task force on the liason services of the productivity officers. By virtue of location, these officers already have, or could obtain needed information on sub-products and sub-activities down to the work or cost center level.

6) Another incidental function of the task force that cannot be slighted, is to assure that a sufficiently trained resident staff is on hand to operate and maintain the measurement system after it is installed. The task force is able to perform some of this training, having learned by doing, and from being in consultation.
The briefings, seminars and dry-run demonstrations already mentioned could be used as training vehicles. The productivity officers are also being trained by their association with the project. They constitute valuable assets for the post-development period.

7) The chief obligation of the task force is to arrive at a first generation monitoring system that satisfies the company needs and constraints as set forth in the original and amended charge. First generation suggests that the system will be evolutionary. The words and amended, further suggests that the task force will, if desirable or necessary on the basis of its learning experience, make changes in the system. Documentation of major changes in the time schedule or budgeted cost is essential for avoiding disappointment at top level management or below.

8) Actions of the task force, apart from actual design, should have paved the way for initiation of measurement on a trial basis and for routine operation of the system by others after a shake-down or debugging period which may last several months. These actions already mentioned include discovery of inhouse sources of appropriate data, the dissemination of information intended to encourage understanding, cooperation and acceptance at all staff levels; the prepositioning of liaison officers, and the conduct of a minimal indoctrination and training program. The task force remains in charge during the shake-down period and the consultant should still be available even if the ties have been loosened.
Trial operations of the system should disclose needs for different data for revision of techniques or for modification of administrative procedures.

Before the task force is disbanded, and preferable with the oversight of the consultant, an instruction manual has to be written for guidance of operators of the system for helping them to make the system their own. The manual should have at least two (2) parts; the first should disclose the nature of the system, its structure data sources and methods, and uses of the results. The second part should concentrate on the measuring process itself and procedures for carrying it out, on data acquisition and processing, the period of time that data will be required of — daily, weekly, monthly, the forms and reports and the staffing.

The final act of the task force perhaps is to make delivery of early results of the measurement system, the scope of the manual with recommendations for use of the numbers and for continuing evolution of the system.

Daniel H. Gray who wrote Organizational Productivity - The Human Dimension, makes this statement, "Faced with the impossibility of exact answers to questions that we would dearly like to answer, we have three options. We can forget about it, we can willfully force the answers and try to use our authority to make them stick, or we can devise an acceptable and believable process for generating answers even if the answers themselves are known to be imperfect."
Gray's law states, "Purity, precision, and perfection kill productivity." Currently, M.P.C. is attempting to have precision and perfection in the measuring of productivity.
TYPICAL COMMENTS

No format outlining entire program - lot of verbal, some written documents - have to use own judgement to determine variables. Foreman's time goes into job even if sick.

Lot of distortion in data. Foreman - no incentive to try when he knows standard is wrong.

Data used in one plant not necessarily same for another. Typing steel (example) - may be harder to tie.

Incentive versus overtime - sometimes foreman paid incentive and three months later find bad parts - takes rework and salvage time.

Standard pretty well set up around how we operate. Have had recommendations for changes and used some and not used others.

Standards set hastily - because of pressure from Paul.

Took long time to get foremen to put down off time. Very little time spent on explaining system.

One fallacy - very low class labor situation - time best workers - no consideration made for slower, less skilled people.

Paul Coleman - Paul Jones was pushing for program - Boswell was pushing for other things such as production. Created problems.

Have foreman (one who produced bad stuff) who splits incentive with two of best people on crew - this has encouraged sloppy work.

Lot of problems with engineering - called on phone, given data to make bid - then drawings come in and everything is screwed up and different.

Finishing time - big problem.

Not always familiar with operations of bed. Sometimes, when standard was written, that was it. No negotiation.

On feedback - Paul is overly sensitive to criticisms. Uses or advocates open door policy but may not be receptive. Makes employees hesitate to make suggestions.

Conflict in knowledge being used to set standards between productivity and engineering.

Feels very little communication between industrial engineering and productivity management. Standards must be accepted as realistic.
Management on profit sharing plan - evaluated on profit and not productivity.

Had standards crammed down throat without good explanation. More like monitoring team than co-op effort involving plant management.

Irritation when someone tells you you're not productive when doing better than the past.

No say-so in setting standards. Done with Gordon under direction of Paul C. Standards have been downhill.

Against bonus system - if gets dependent upon money. Acts as a deterrent.

No correlation between standard of cost performance and standard of productivity performance.

Standards are not related to quality considerations.

No clear understanding of a definition of what the program is among the participants.

Productivity group is not involved in setting cost estimates.

Goal - 75% of productivity.

Tools have to be integrated from a people standpoint.

No program definition on productivity techniques, purposes, etc.

No chain of command for evaluation based on performance for salaried employees.

Evaluated on ROMA - no one looks at anything but profits.

Hard to justify bottom line evaluation when have no control on sales but yet volume depends upon sales.

If don't have volume of work, can't have good return on assets managed.

Needed in standards - number of manhours required plus supervisory hours required. Foreman's incentive shouldn't be cut because of complexity of job.

Best foreman in plant gets least incentive. Gets worse jobs because he is best at working out the complex jobs. Gets same salary as one who does same job for years. Being penalized because he's good.
Feels like being accused of poor decision making without full understanding of problem.

Some days plant superintendent changes what foreman does and foreman is penalized for work he can't do until later. Brushing of curbs after two days instead of one - takes twice as long.

Had very little involvement in setting up productivity program. Was told here is the program and you will make it work.

Studies reports every week to try to determine why things occur. Can't explain, so delves into it to find out what went wrong.

Foreman hours not in standard times. Sometimes, foreman does things himself and saves time in labor. Showed up more favorable than was really the case.

Need something that is equitable while achieving its goals.

Have poured products that were supposedly OK and foreman paid--3 months later, get failure or reject; how do you reclaim this?

Questions that come up because of engineering errors. Things that don't fit right, etc. Will have delays due to this. When foreman gone to office, crew less efficient.

In many cases, engineers do not provide enough details. Nature of business is job shop, not production oriented.

Do not fully understand the productivity program. Have not had the mechanism set-up to resolve the problems.

"DO NOT HAVE THE TOOL YET THAT WE NEED"

Paul Coleman came in and said "These are the standards." He came in with standards that were set at a plant that had gone out of business.

Coleman did some things but very spasmodic - standards started out wrong.

Indirect foreman - no incentive. Team incentive perhaps would rather see no incentive and just pay what foreman is worth.

Establish standards off of most efficient operations at any one plant.

Estimates made without drawings. Get burned on walls, double TT, inverted T's, rectangular beam; these were worst performance.
Until last four months, told could not question standards. Could not talk to Gordon about it without a problem occurring.

Finishing times - a problem.

Richard - if not familiar, does spend time on yard to make a better decision.

Incentive - can be paid before on-site problems found. Cannot get incentive back when problem found.

From an MPC manager - G.H. vs MPC - don't see much of G.H. Don't feel much of the we/they. G.H. plant was total profit center - all decisions made there - some now taken away and they were not used to getting things just crammed down throat.

Things not explained to people, just told that this is way it is. Paul and Bill think that they discuss and explain things but are pre-occupied with other things. (over all)

Bill and Paul are spread too thin. Concerned with volumes, revenues.

Paul too impulsive. Too concerned about daily operating problems. Paul goes around supervisors, plant managers to get things done.

Learning curve not considered.

What quality time allowance is in the standard?

Labor estimate often made without knowing all the variables. Use worst cases to make estimates.

Delays - how expensive are they? Accurate reporting - down time, etc. Accurate reporting of above will help to justify.

Standards - sometimes standards written as job is finished.

Feel like it's biggest problem - standards writers not enough knowledge on amount of hours to produce.

Do not get out and really do the timings that were being done.

Short-run products are ones having problem with on standards - small columns.

Learning curves - factor not included or does not appear to be on standards for short-run products.

System would have worked if everyone had put in a positive effort toward making it work.

Bonus - (crew) Why should we bust butt for this so he can draw a bonus?!