

INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications Data Collection
Type of Industry Meter and Service Station Equipment Manufacturer
Name of User A. O. Smith
Meter and Service Station Equipment Div.
Erie, Pa.

Equipment Used Friden Collectadata Data Collection System

Synopsis

A. O. Smith, at Erie, Pa., is currently using 11 Friden 3002 Transmitters connected to a central console and two receiver consoles in its data collection network.

The network is used to facilitate fabricating and assembly line operations in addition to attendance reporting. The system produces two daily reports; one is a daily labor balance report, and the second is a performance and utilization report.

The system has enabled A. O. Smith to increase production, has minimized errors in job reporting and has established control over production activities.

When growth and greater complexities in its manufacturing processes outdated procedures at A. O. Smith of Erie, Pa., a Collectadata data collection network by Friden was ordered to automate job reporting from the factory floor.

The order came about as the result of investigating a number of data collection systems. It was recommended that a computer be ordered to replace the existing tabulating equipment, and the data collection network would complement the computer installation.

Prior to the data collection network, job reporting on the floor was strictly a manual operation. Each worker recorded his time and related data on job cards that accompanied a work order. The cards were sent to accounting where job information was keypunched, verified and rates extended. Cards were used to prepare tab reports on performance, costs and attendance.

However, the feasibility study pointed out basic disadvantages in the system. A statistical sampling showed a high degree of inaccuracy in the worker's reporting. Workers were required to transcribe a great deal of numeric data to the reporting form from the work orders as well as the data they generated.

Specifically, this data consisted of a job number, a part number, the quantity, the elapsed time, the machine number, the operation, the department, the shift, the date and employe number for productive work. Non-productive time was charged to relative accounts. Some workers tended to delay their reporting to their convenience. This resulted in inaccurate guesses at prior activities. There was always the potential that a worker could borrow against inefficient time reporting. This negated the purpose of performance reporting.

Supervision was handicapped by a three-way delivery in tab reporting time. Tabulating was faced with a keypunching load problem which held up its performance. Production management also encountered problems in planning, scheduling and controlling the jobs. A. O. Smith's automated data collection has helped to solve these problems.

The A. O. Smith meter and service station division employs about 700 persons who are engaged in producing pumps, meters and control valves, and automated systems. The automated systems provide a variety of modes for recording, storing and read-out of fuel transactions. This data is in a form which can be integrated into data processing systems by owners.

The meter and service station division is in Erie, Pa.

THE SYSTEM

A. O. Smith is currently using eleven 3002 transmitters connected to a central control console and two receiver consoles. A third receiver is used as a standard back-up unit.

With this data collection network, A. O. Smith is achieving meaningful results. The system is being developed to take full advantage of the network in relation to the computer installation.

Fabrication

Production control prepares a job routing order which calls for the fabrication of a number of parts or assemblies. The number and timing are based on forecasts and stock status reports.

The job routing order is held pending release by production control. Upon release, it is routed to tabulating where job cards are punched. These cards provide for reporting on a non-scheduled operation that might be needed to fabricate the part.

All cards are enclosed with the job routing order and are sent to a dispatcher who sends them to the appropriate starting operation (stock room, machine shop, starting foreman). As the job progresses, each worker selects the card applicable to his operation.

Upon completion of the operation, the worker inserts his badge and proper card in the transmitter, selects the proper transmission program and dials the proper variable entries for the transmission. Various types of cards are color-coded to matching colors on the transaction selector for easier identification.

NON-PRODUCTIVE CHARGE NO.

SET DIAL FOR NON-PRODUCTIVE

1. ENTER LABOR CODE (1)
2. ENTER DEPARTMENT NUMBER (2)
3. ENTER CHARGE NUMBER (3)
- NOT PPE-PUNCHED (4)
4. INSERT CARD
5. INSERT BADGE

NON ROUTED CARD

SET DIAL FOR NON-ROUTED

1. ENTER LABOR CODE (1)
2. ENTER OPERATION NUMBER (2)
3. ENTER DEPT. NUMBER (3)
4. ENTER QUANTITY (4)
5. INSERT CARD

PRODUCTIVE JOB CARD

SET DIAL FOR PRODUCTIVE

1. ENTER LABOR CODE (1)
2. ENTER OPER. COMPLETE CODE (1)
3. ENTER DEPT. PERFORMING IF NECESSARY (2)
4. ENTER QUANTITY (4)
5. INSERT CARD
6. INSERT BADGE
7. PRESS START BUTTON

A. O. SMITH - MSSE DIV. LABOR DISTRIBUTION

DATE	CLOCK NO.	JOB NO.	PART NO.	OPER. NO.	OPER. CHARGE NO.	MACH. NO.	REVISED HRS.	STD. HOURS	STD. COST	DIALS	REVISED HRS.	STD. COST	STD. HRS.
00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222
33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333
44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444
55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555
66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666
77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777
88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888
99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999

TAB CARDS, BADGES AND OPERATOR ENTRIES CREATE THE ORIGINAL INPUT TO THE DATA COLLECTION NETWORK.

Assembly Line Operation

Assembly line operations differ from fabrication in that job cards are standard for each step in the assembly. Master cards are prepared and remain at their respective locations in the plant area and need only be updated for rate or operation changes.

Specifically, data generated upon completion of the job is:

1. Date and time added to the message by the central console.
2. Employee's clock number read from his badge by the transmitter.
3. Transaction code, job number, part number, department, operation, machine number, revised standard hours, and standard cost is obtained from reading the job card in the transmitter.
4. Labor code, quantity produced, an operation completed code, dialed in the variable fields by the worker.

The entire message consists of 64 digits of information. However, the worker has only to enter a maximum of six digits of variable information.

Other Transactions

In fabricating an assembly or part, it is possible that work may be performed that was not provided for on the job routing order. In these cases a non-routed card is used. The part number and job number are encoded in the card. The operator will dial, in addition to his standard entries, operation number and department.

In those instances where a worker is not directly performing an operation he will account for his time using a non-productive tab card. These cards contain the number applicable to the account to be charged. Typical designations of non-productive charges are: wait for stock, wait for set up, tool breakdown, rework, union, etc.

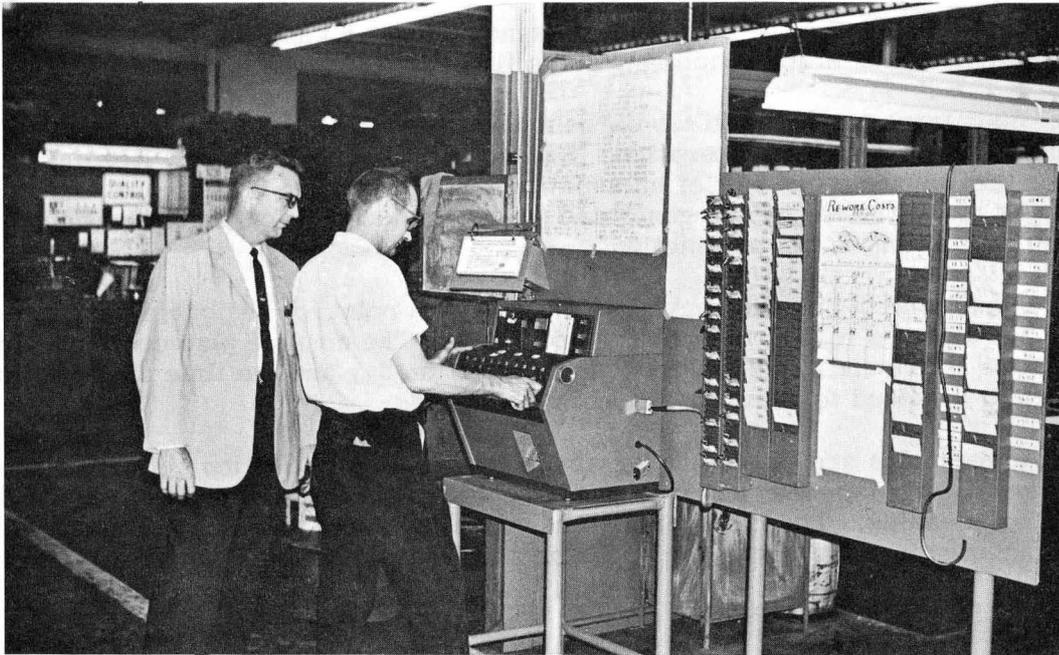


OPERATOR PREPARES TO LOAD A REEL OF PAPER TAPE IN THE RECEIVER CONSOLE. ADJOINING UNIT IS THE CENTRAL CONSOLE.

Provision is also made in the system for reporting multiple machine operations where a worker operates two or more machines simultaneously and group operations where two or more employees work on the same operation. In addition, reports are made on incompleting operations.

Attendance and Reports

In addition to job reporting, the network is used to record employee attendance time. When reporting to and leaving his normal shift, the employee inserts his badge into the transmitter's reader. He records attendance, using a clock in/out switch. Use of this switch identifies the message as attendance reporting as opposed to job reporting.



EMPLOYEE DIALS QUANTITY PRODUCED ON HIS OPERATION. THE JOB IS IDENTIFIED BY THE TAB CARD AND THE EMPLOYEE BADGE INSERTED IN THE HOLDERS OF THE TRANSMITTING UNIT.

Two daily reports are run. The first is a daily labor balance report. This accounts for the worker's attendance time, job performance time and non-productive time. Any difference between his clock hours and job time (productive and non-productive) is printed out. This tab report is ready for each shop foreman as he begins his next shift supervision.

The second is a performance and utilization report, showing the employee's percentage efficiency, comparing each operation's standard time against the worker's reported actual time.

Utilization compares each department's total employee earned hours against attendance hours to develop a percentage of utilization.

Attendance cards are summarized by employee to cut a total regular and overtime hours card. This is used as the basis for preparation of the payroll.

EQUIPMENT

The Collectadata data collection network, Model 30, is a communication method used to transmit common data from remote internal locations to a central receiving center. The most common application is the reporting of employe time and attendance and the sending of manufacturing processing data.

The network's purpose is to transmit data in an automated mode to eliminate time delays with their associated costs and to optimize accuracy.

The basic configuration is a series of transmitters that are connected to a receiver/control console.

Transmitters serve as the input units to send data via a cable to the receiver/control console. They are normally located in manufacturing and allied activity areas.

Model 3002 transmitters read tab cards and badges. The tab card normally contains status data pertinent to a specific job or operation. Badges identify the employe. Reading from the two inputs combines this data into one unit of information for transmission. The operator supplements the information with the variables he has generated (units produced, type of transaction, etc.) by selecting a program and dialing in his transaction.

The central control console serves as the terminal point for the cable transmission lines. Incoming lines are directed to their respective receivers. The console also contains two central time transmitters (one active and one standby) that register the day and the time of day. Upon request, these entries will be added to a transmission.

Receiver consoles are the output terminals for the data collection network. Transmission activates the receiver's tape punch. This punch records the message in paper tape using eight-channel binary decimal coding. The receiver also houses a logic and power supply. Checking devices monitor all transmissions and notify the operator should there be a malfunction in the receiver.

RESULTS AND FUTURE PLANS

After the installation of the Collectadata data collection network the management of A. O. Smith has found:

1. Through the use of rapid reporting facilities of the network foremen have been able to increase production performance averages above their original goals.
2. Accuracy in reporting is high. Simplicity of transmitter operation has eliminated error problems and the system has been accepted by worker-reporters.
3. By tight control over each productive department's activities, tighter scheduling of production is realized.
4. Reports are now ready on schedule, eliminating a three-day delay.
5. The network has been integrated with the present tab installation.

There has been a net saving in keypunching and verifying of productive and non-productive labor cards of 125 hours per month.

A. O. Smith's next step in utilization of the data collection network will be inventory reporting. Subsequent to this, scheduling, dispatching, tool and die usage control and receiving and shipping applications are planned.