

# INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

**Applications** Inventory and production control, payroll, labor distribution, accounts payable, budget and expense reporting, cost accounting, sales analyses and forecasting.

**Type of Industry** Welding Equipment Manufacturer

**Name of User** Miller Electric Manufacturing Co.  
Appleton, Wis.

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**Equipment Used** Control Data 180 data collectors (14)  
NCR Compu-tronic Card Systems (2)  
Friden Flexowriters  
IBM punched card equipment  
Bell System Data Speed equipment

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## Synopsis

Management recognized several years ago that the company's growth rate made it mandatory to explore techniques to acquire and process data on a larger scale, if current information were to be available to those who needed it for decision-making. As a first step, emphasis was given to obtaining and providing information required at the operating level, for production and inventory control; data gathered at that level also would be needed for management reports. Source data collection devices were installed on the shop floor to collect data, on punched tape, which is transmitted to Control Data's service center in Minneapolis for processing. Reports are prepared during the night and returned to Appleton the next day; at the same time, data is retained in magnetic tape files in Minneapolis for subsequent processing and preparation of biweekly and monthly reports.

Punched tape also is used to collect data as a byproduct of invoicing, accounts receivable and payable, and order processing. Some of these tapes also are transmitted to Minneapolis. Others are mailed to NCR's service center in Dayton for preparation of monthly sales analyses.

The data processing volume reached a point where the company has conducted feasibility studies relevant to acquiring its own computer. By establishing the basic data collection systems and applications, Miller Electric will be in a position to use its computer extensively without delays for system and application development.

Miller Electric Manufacturing Co. was founded in 1929, when the late Niels C. Miller designed and produced, in his basement, the first universally accepted AC welder. His widow is now president of a company that employs over 600 and sells products in every part of the world. The firm experienced a tremendous growth in recent years, more than doubling its sales volume. From one welder, its product line has grown to 150 models for diverse uses--in hobby shops as well as in the plants of the world's largest metal fabricators whose products include space capsules, missiles, ships, jet aircraft and pipelines.

### THE SYSTEM

Fourteen CDC 180 data collectors are installed at strategic locations in the manufacturing plant. Input to these devices includes: (1) an employe master card that identifies the individual according to employe number, shift number, department number and account number (2) a punched card that indicates the part the individual is working on (3) variable information entered by dials on the collection units to indicate progress made on the parts being built (4) the time of input, automatically recorded by clock module on the collection unit (5) collection station number, also entered automatically by preset dials.



PUNCH CLOCKS AND JOB CLOCKS HAVE BEEN REPLACED WITH CONTROL DATA 180 DATA COLLECTORS. WITH THESE UNITS, THE PAYROLL IS AUTOMATICALLY RUN FROM A COMPUTER. DATA ON ACTUAL TIME REQUIRED FOR ANY JOB NUMBER CAN ALSO BE COLLECTED.

At night, a watchman collects the tapes from the collection units and delivers them to a janitor who splices them together, using a Robins data splicer. The janitor loads the tape into a Data

Speed transmitter, then uses the Data-Phone data set in the voice mode to place a call to the CDC service center in Minneapolis. Once contact has been established, he switches the data set to the data mode and activates the transmitter.

In Minneapolis, the data is received in punched tape form, then fed into a computer for processing--the same night it is received. Resulting reports, printed out by the computer, are placed on an airplane and flown to Appleton, where they arrive by noon. The reports are used to (1) indicate who was absent so that reasons for absenteeism can be determined immediately (2) check on production status, to see if schedules are being met and if there are any trends which might indicate future bottlenecks resulting from work overload in any given area (3) verify input of inventory information (held on magnetic tape at CDC for subsequent production of weekly reports) (4) pinpoint areas in which employes are working overtime and those in which fewer than the normal workday hours are being reported (5) provide foremen who are responsible for two shifts with activity reports on the shift that worked while he was off-duty (6) check good and bad messages transmitted to Minneapolis. The latter is primarily used to pinpoint the sources of errors, so that these errors can be cleared up and accuracy upgraded before future applications, utilizing the data, are phased in. The company has found that normally it can reconstruct the messages even if they contain errors. When the system first went into operation, human errors were numerous but, with additional training, these plummeted. Some errors crept in during data collection; it was determined that these were due to electrical interference and they were eliminated by attaching voltage regulators to the CDC 180s.

CODE	PART NUMBER	JOB	LOT	SUFFIX	LOT QUANTITY	SERIAL NUMBER	PLC	PART-NUMBER	
								JOB-NUMBER	LOT-NUMBER
0	0	0	0	0	0	0	0		
1	2	3	4	5	6	7	8		
1	1	1	1	1	1	1	1		
2	2	2	2	2	2	2	2		
3	3	3	3	3	3	3	3		
4	4	4	4	4	4	4	4		
5	5	5	5	5	5	5	5		
6	6	6	6	6	6	6	6		
7	7	7	7	7	7	7	7		
8	8	8	8	8	8	8	8		
9	9	9	9	9	9	9	9		
1	2	3	4	5	6	7	8		
9	9	9	9	9	9	9	9		

PRODUCTION CARD

DEPARTMENT

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COMPLETED QUANTITY

GOOD REJECT

STARTING DATE DUE DATE

N.C.CO. 87-1-F 3-64 MILLER ELECTRIC MFG. CO.

GREEN-COLORED DIRECT LABOR PRODUCTION CARD IS USED TO RECORD FIXED DATA. OTHER COLOR CODED CARDS ARE USED FOR INDIRECT LABOR REPORTING, OVERTIME AUTHORIZATION, EARLY CLOCK IN, ETC.

Inventory Control

Inventory control information also is transmitted daily to Minneapolis. This data is held on magnetic tape for once-a-week processing. When parts orders are prepared, a master file of edge punched cards provides constant data on vendors for input to a Friden Flexowriter. The operator enters only variable information, such as quantity and date. In addition to hard copy purchase orders, the Flexowriter outputs punched tape and punched cards (one for each line item). The tape is transmitted to CDC to update the "on order" file; the cards are used after the item is received to prepare punched tape that is transmitted to CDC to update the inventory file.

When parts are disbursed from inventory, the edge punched cards are pulled from the file and used to create a paper tape. Data is transmitted to Minneapolis and the disbursement is recorded on magnetic tape files.

With the data from inventory transactions and that from the shop floor on production activity and attendance, it is possible for the company to derive a variety of statistical breakdowns as to

actual cost for each phase in production of its products. These include (1) part operation cost report which shows the cost, for example, of cutting and welding required on each part (2) a bill of materials explosion which shows the actual hours required for production and the amount of variance from pre-established (and prestored on magnetic tape) average hours (3) total labor and material costs (4) a summary of company expenses by area, by each department within each area, and by each account within each department. The information also provides the basis for projecting part requirements. For example, management can find out how many of each part will be required to build any number of welders during a given period.

DAILY MESSAGE AND LOST TIME REPORT				DAY 5
DEPT 203	EMP 0226	CLOCKED IN AT 09.33 (LATE)		
		DEPT 203	EMP 0226	TIME LOST IN HOURS IS: 01.83
		DEPT 203	EMP 0520	TIME LOST IN HOURS IS: 08.00
		DEPT 203	EMP 0594	TIME LOST IN HOURS IS: 08.00
		DEPT 203	EMP 0677	TIME LOST IN HOURS IS: 08.00
		DEPT 203	EMP 0682	TIME LOST IN HOURS IS: 08.00
DEPT 204	EMP 0028	RECLOCKED IN AT 12.51 GONE 00.51 HOURS		
		DEPT 204	EMP 0028	TIME LOST IN HOURS IS: 00.01
		DEPT 204	EMP 0166	TIME LOST IN HOURS IS: 08.00
		DEPT 204	EMP 0397	TIME LOST IN HOURS IS: 08.00
DEPT 204	EMP 0477	CLOCKED IN AT 16.23 (LATE)		
DEPT 204	EMP 0477	NO CLOCK OUT - 0 HOURS ACCUMULATED		
		DEPT 204	EMP 0477	TIME LOST IN HOURS IS:
DEPT 204	EMP 0495	CLOCKED IN AT 07.74 (LATE)		

DAILY MESSAGE AND LOST TIME REPORT, PRINTED OUT BY THE COMPUTER IN MINNEAPOLIS, INDICATES WHO WAS ABSENT OR LATE, SO THAT CAUSE MAY BE DETERMINED IMMEDIATELY.

MILLER ELECTRIC MFG. CO.										DAY 6
LABOR DISTRIBUTION PERFORMANCE REPORT										
ACCT	EMP NO	PART NO	OPER	PIECES	HOURS	HRS/100 PIECES		PERFORMANCE PERCENTAGE	ACCUMULATED TOTALS	
						REGULAR	ACTUAL		REG	SP
	0379				8.00 *				39.82 *	* *
667	0450				3.26					
526	0450	500342	55	12	1.24					
667	0450				.58					
526	0450	500342	55	3	1.77					
526	0450	525000	55	1	1.14					
627	0450				.01					
	0450				8.00 *				40.00 *	* *
526	0461	355500	10	7	2.32					
526	0461	500347	11	15	4.51					
526	0461	500347	10	3	1.16					
627	0461				.01					
	0461				8.00 *				39.81 *	* *
667	0472	500337	12	20	8.00					
	0472				8.00 *				39.82 *	* *
526	0493	502500	60	30	7.98					
627	0493				.02					
	0493				8.00 *				* 40.02 *	

LABOR DISTRIBUTION PERFORMANCE REPORT, PRINTED OUT BY THE COMPUTER AT THE CDC SERVICE CENTER, PINPOINTS AREAS REQUIRING OVERTIME OR AREAS REQUIRING FEWER THAN THE NORMAL WORKDAY HOURS.

### Payroll

The attendance reporting provides all the data required for payroll preparation, which is done biweekly in Minneapolis. In addition to checks, the computer is programmed to produce a summary of payroll costs by departments, reports for governmental agencies, fund contribution listings, and cumulative statistics on which bonuses and incentives are based. Periodically, up-to-date employe directories also are prepared from information used primarily for payroll purposes. In setting up the system, the company allowed a two-day buffer so that unforeseen circumstances, such as a snowed-in airport, would not delay payday. Payroll preparation used to occupy six people full time; now it is a part-time job for one person. Those who used to perform this task are now employed at other jobs in the company.

### Sales Analyses

Punched tape is produced during billing operations on two NCR Compu-Tronics to provide data for input to an NCR computer, at Dayton, which prepares sales analyses. This processing is done once a month. These analyses incorporate virtually every type of statistical breakdown possible; sales by commodity, by territory, by model, by domestic and export items, by sales districts. This report is used by virtually every department head within the company and it provides the data on which compensation for district sales managers is based.

### RESULTS AND FUTURE PLANS

The primary benefit from the system has been the ability to gather information and place it in the hands of those who need it, when they need it. Data transmission capability provides the speed essential to get the data into a computer fast; air express brings the print-outs back to the plant while it is still possible to take action on the basis of what happened the previous day. The system produces more information than previously was economically and practically obtainable. As a result (1) costs can be traced to the source (2) tight control can be maintained on inventory and shortages of critical items can be averted (3) work scheduling can be based on accurate information about current production status and the hours required for each fabrication and assembly operation (4) the "why" of absenteeism and overtime can be determined on a daily basis (5) lengthy calculations previously required to determine incentive and bonus payments have been eliminated because the statistics are accumulated in magnetic tape files.

All systems and applications have been designed with an eye to the future. Thus, paper tape collection devices at the source, and the use of punched cards to store constant information eliminate the need for extensive data conversion; wherever possible, information is "written once" and from that point on all "rewriting" is automatic, thus minimizing the chances for manual errors occurring.

By using outside service centers for processing, the cost for hardware and operating personnel has been forestalled until the company has sufficient information processing volume to warrant the investment. At the same time, all personnel involved in the systems are gaining experience and acquiring competence at a smooth, gradual pace that parallels the step-by-step phase-in of new applications, all of which are requisites of an effective management information system.