INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications	Inventory Control, Order Processing, Sales Analysis
Type of Industry	Pipe and Pipe Fitting Supply Wholesaler
Name of User	Midland Pipe and Supply Co. Cicero, Ill.

Equipment Used	IBM 1130 Computer System

Synopsis

Midland Pipe & Supply Co., Cicero, Ill., chose to develop its operations with inventory control as a starting point. Though the IBM 1130 is a "scientific" computer, the system's advantage of disc operation was chosen as suitable for an inventory profit analysis and accounts operation. Midland's system routes orders for pipe through computer processing to the factory floor. Because the company produces certain special pipe for its customers in limited quantity, there is a percentage of short shipments. This situation requires a second computer pass to register the number of feet or amount of pipe actually shipped. The Midland system is being expanded with order picking, profit analysis and accounts receivable being implemented. Purchasing will be the last function automated.

Midland Pipe and Supply Co., with annual sales of over $5 million, regularly stocks some 14,000 industrial pipes, valves and fittings in over 80 different product classifications. It sells to about 1,500 industrial firms and contractors and offers a variety of fabrication services.

Background to EDP

Before the decision to rent the 1130, Midland was using a Kardex system -- trays of cards in filing cabinets -- for recording inventory. The procedure did not include pricing, as the volume of accounts left no time for it. Inventory control was accomplished, intermittently, by going through the cards. Billing was done on an SCM 7816 billing machine.

The company decided that its own management would be in charge of computer operations. A management representative learned programing, Fortran, and the 1130 monitor system which allows a user to assemble, compile and execute individual or group programs. Vice president Larry Walsh began writing programs about five months before the computer system arrived. There are about 100 separate programs presently in use by the company.

Inventory control was chosen for the first application for very specific reasons: "Inventory is the life blood of our business," explains Walsh. "It is the area in which critical control problems most frequently occur and is by far the biggest investment cost factor. We were eager to reap automated inventory control advantages as quickly as possible."

Preparing the company for inventory control computerization was involved and time-consuming. First, a master file record for each of the 14,000 product items in stock was established. Each product had to be numbered and coded in a way that would be useful to routine order processing and for management control.

A seven-digit code system was devised, with the first three digits identifying the product classification and the last four digits identifying the specific item. A brief description of the item was associated with the code on the file record kept on the inventory disc, along with item size (or sizes) and weight per unit and per 100 units, on-hand and on-order quantity, sales for the month and for year-to-date. Trend and sales forecast information are maintained on the record.
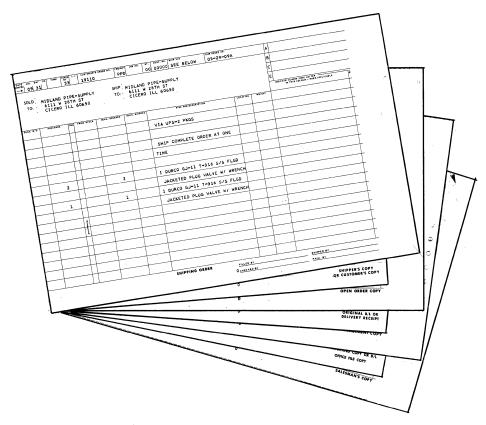
THE SYSTEM

When an order comes in by mail or phone, the customer punched card is pulled from a file. Line item cards describing stock items are also pulled and the quantity ordered is punched in each. A third, "miscellaneous," information card with special sizes, etc., is also prepared. "A fourth card could be prepared," Walsh explains, "if the company ordering the material specified another 'ship to' address."
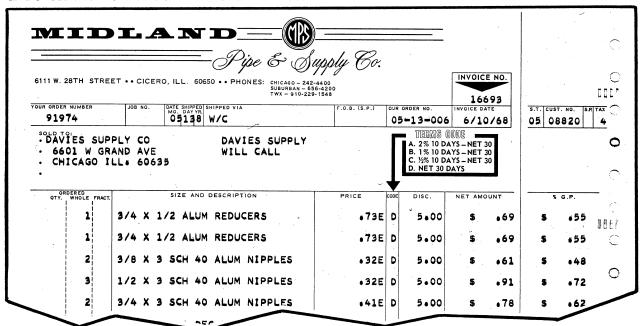
These cards serve to access the inventory disc, reducing the amount of inventory for subsequent orders and generates a multi-part form (one of which is a pick order for the warehouse). After the cards are computer processed, they are returned to the file. Besides generating the form, the computer has deducted the materials amount specified on the cards from the amount of total inventory.

The warehouse clerk writes on his portion (the delivery receipt) of the multipart form the footage actually sent (in short shipment situations where not enough pipe is available to fill the entire order). Otherwise the items shipped are simply confirmed.

After the order has been shipped (one part of the multipart form serves as a shipping label), data from the warehouse clerk's copy is punched into cards. The pipe footage actually shipped is punched into stock item cards. These cards provide the second pass to the computer--they adjust inventory on the inventory disc (by adding the amount originally deducted and subtracting the amount actually shipped.) The computer then updates the sales file and updates the accounts receivable file on the accounts receivable disc. The computer, working with a discount code and a discount structure table, prints the customer invoice.

THE MULTIPART FORM--PICKING ORDER, BILL OF LADING, SHIPPING ORDER AND
OFFICE CONTROL COPY, ETC.-- IS GENERATED BY THE FIRST PASS OF CARDS.
SECTIONS STAY WITH THE GOODS TO THEIR DESTINATION: OTHER SECTIONS RETURN
TO THE OFFICE WITH FIGURES FOR AMOUNTS ACTUALLY SHIPPED TO BE PUNCHED
INTO CARDS FOR SECOND MACHINE PASS.

THE COMPUTER UTILIZES THE DISCOUNT CODE AND THE DISCOUNT STRUCTURE
TABLE TO PRINT OUT A CUSTOMER INVOICE

PRODUCT	SIZE + DESCRIPTION	WEIGHT	PRICE	NCOST	SK QTY	MOQ	LOCA-	M/QTY	SA/PD	O/ORD	FORC	ICOST	SA/YR
1020000	FORGED STEEL FLANGES	0	.00	50.00	0	0	-00	2000	3000	3500	4000	.00	0
1021112	1/2 150 FS WN FLG RF STD BORE	1	4.64	52.50	6	10	8-22	5	4	0	2-	55.00	30
1021115	3/4 150 FS WN FLG RF STD BORE	2	4.64	52.50	0	10	8-22	5	0	10	5--	55.00	22
1021118	1 150 FS WN FLG RF STD BORE	3	4.64	52.50	20	0	8-22	5	2	0	1	55.00	4
1021121	1 1/4 150 FS WN FLG RF STD BOR	3	4.92	52.50	10	0	8-24	4	3	0	4	55.00	16
1021124	1 1/2 150 FS WN FLG RF STD BOR	4	4.92	52.50	17	0	8-24	22	2	20	0	55.00	8
1021126	2 150 WN FLANGE RF SCH 80 BORE	0	.00	.00	0	0	8-25	5	0	0	0	.00	0
1021127	2 150 FS WN FLG RF STD BORE	6	4.92	52.50	161	0	8-27	70	15	0	10	55.00	105
1021130	2 1/2 150 FS WN FLG RF STD BOR	8	5.94	52.50	58	0	8-26	10	1	0	0	55.00	6
1021133	3 150 FS WN FLG RF STD BORE	10	6.90	52.50	373	0	8-29	52	14	0	5	55.00	101
1021136	3 1/2 150 FS WN FLG RF STD BOR	12	8.92	52.50	2-	0	8-30	2	0	0	0	55.00	2
1021139	4 150 FS WN FLG RF STD BORE	15	8.92	52.50	244	0	8-34	45	5	0	6	55.00	73
1021142	5 150 FS WN FLG RF STD BORE	19	14.46	52.50	13	0	7-15	7	0	0	0	55.00	4
1021145	6 150 FS WN FLG RF STD BORE	24	14.46	52.50	174	0	9-18	21	3	0	2	55.00	12
1021147	8 150 WN FLANGE RF XH BORE	39	.00	.00	0	0	9-22	0	0	0	0	.00	0
1021148	8 150 RF WN FLG RF STD BORE	39	23.70	52.50	84	0	9-29	12	1	0	2+	55.00	4
1021151	10 150 FS WN FLG RF STD BORE	52	37.38	52.50	50	0	9-32	8	0	0	0	55.00	1
1021154	12 150 FS WN FLG RF STD BORE	80	59.20	52.50	21	0	9-34	1	2	0	3++	55.00	8
1021157	14 150 FS WN FLG RF STD BORE	110	88.90	52.50	0	0	112-44	2	0	0	0	55.00	0
1021160	16 150 FS WN FLG RF STD BORE	140	115.14	52.50	1	0	112-44	2	0	0	0	55.00	0
1021163	18 150 FS WN FLG RF STD BORE	150	195.68	52.50	0	0	112-44	0	0	0	0	55.00	0
1021166	20 150 FS WN FLG RF STD BORE	180	238.76	52.50	0	0	112-44	1	0	0	0	55.00	0
1021172	24 150 FS WN FLG RF STD BORE	260	325.60	52.50	0	0	112-45	1	0	0	0	55.00	0

THE INVENTORY REPORT CONTAINS PRODUCT NUMBER, SIZE, DESCRIPTION AND WEIGHT. IT LISTS ITEM PRICE AND NORMAL (OR N) COST, PLACED ON THE REPORT IN THE FORM OF PERCENTAGE-OF-PRICE. CURRENT STOCK QUANTITY IS LISTED AND A SPACE HAS BEEN SAVED FOR LOCATION IN WAREHOUSE. M-QUANTITY REPRESENTS MINIMUM WANTS ON-HAND. THEN, QUARTERLY SALES, AMOUNT ON ORDER, AN EOQ SPACE WHEN DETERMINED AND I-COST OR INVENTORY COST. FINAL FIGURES ARE YEARLY SALES TOTALS.

An inventory report is available whenever needed. Until the time that the purchasing function is automated, the inventory report is essential for making purchasing decisions.

Each product's inventory information was squeezed into a 26-word record so that all 14,000 items could be easily accommodated on the master inventory disc, with room to expand to 15,000 items.

CUSTOMER					TYPE	MO TO DATE	SALES YR TO DATE	LAST YR		MO - DATE	GROSS PROFIT YR - DATE	LAST YR
			CR/LMT	.00								
			CURRNT	.00	DIRECT	.00	.00	.00	D-	.00	.00	.00
			30-59	.00	STOCK	149.38	149.38	10,594.16	S-	119.34	119.34	1,904.25
			60-89	.00	LABOR	2.75	2.75	1,513.30	F-	.00	.00	.00
06460	05	PC 00	90 &	.00	TOTAL	$152.13	$152.13	$12,107.46	T-	$119.34	$119.34	$1,904.25
			TOTAL	$ .00	AVE D	.00	.00	.00	AD	.00	.00	.00
					AVE S	4.14	49.79	321.03	AS	3.31	39.78	57.70

CUSTOMER					TYPE	MO TO DATE	SALES YR TO DATE	LAST YR		MO - DATE	GROSS PROFIT YR - DATE	LAST YR
			CR/LMT	.00								
			CURRNT	.00	DIRECT	10.35	10.35	.00	D-	2.75	2.75	.00
			30-59	.00	STOCK	.00	.00	222.08	S-	.00	.00	50.83
			60-89	.00	LABOR	.00	.00	12.00	F-	.00	.00	.00
07100	05	PC 00	90 &	.00	TOTAL	$ 10.35	$ 10.35	$234.08	T-	$ 2.75	$ 2.75	$ 50.83
			TOTAL	$ .00	AVE D	10.35	10.35	.00	AD	2.75	2.75	.00
					AVE S	.00	.00	37.01	AS	.00	.00	8.47

CUSTOMER					TYPE	MO TO DATE	SALES YR TO DATE	LAST YR		MO - DATE	GROSS PROFIT YR - DATE	LAST YR
			CR/LMT	.00								
			CURRNT	.00	DIRECT	.00	.00	.00	D-	.00	.00	.00
			30-59	.00	STOCK	70.20	70.20	5,405.89	S-	48.36	48.36	880.15
			60-89	.00	LABOR	.00	.00	1,264.06	F-	.00	.00	.0-
07120	05	PC 00	90 &	.00	TOTAL	$ 70.20	$ 70.20	$6,669.95	T-	$ 48.36	$ 48.36	$8--
					AVE D	.00	.00			.00	.00	

THE ACCOUNTS RECEIVABLE REPORT IS A LISTING OF CUSTOMER'S CREDIT STATUS. THE FIRST COLUMN AFTER THE CUSTOMER NAME CONTAINS THE CREDIT LIMIT ALLOWED: BELOW THE CREDIT LIMIT IS AMOUNT CURRENT, 30, 60, OR 90 DAY. SALES ARE LISTED MONTH TO DATE, YEAR TO DATE AND LAST YEAR. THIS AMOUNT IS BROKEN DOWN INTO DIRECT SHIPMENTS, OUT OF STOCK AND A LABOR CATEGORY WHICH COVERS PIPE THAT MIDLAND TOOLS AT THE FACTORY. AN AVERAGE OF DIRECT AND STOCK SHIPMENTS FOR EACH OF THE PERIODS IS ALSO LISTED SO SALES VOLUME CAN BE COMPARED WITH ORDER FREQUENCY.

The customer file-accounts receivable disc contains name, address, ship-to and credit information for each of the 1,500 customer accounts. It also contains the customer's discount code. A table of two dozen different price structures is stored within the computer. The computer uses the customer's specified discount code, which is keyed to the discount table, to develop accurate order pricing; the computer picks up each item's list price and discounts it during the billing run. Discounts vary, not only from customer to customer but from item to item within single customer orders.

An important consideration for the inventory control system was automatic pricing. This was accomplished by pricing by product: associating a list price with each item to furnish a basis for computer calculation of individual customer discounts. The list price and the normal cost of each item is carried on the computer inventory disc and is expressed as a percentage of the selling price, making it easier to change selling price while holding a constant cost figure.

Three months after the computer arrived, the complete inventory was under computer control. The system, as originally used, integrated order writing, inventory record updating, control reporting and customer invoicing. By the time the new system was fully operational, programs were being developed to incorporate order points and order quantities.

Stock and Inventory Controls

Because the company lacked historical sales data, the initial stock control parameter on the master record was a minimum quantity figure which was arbitrarily established. Wherever the item fell below this minimum, the computer would automatically print out a check sign. Space was reserved on the inventory record for an Economic Order Quantity (EOQ) figure which is presently being implemented. Because the company was unable to keep accurate records on all items in the past, Midland is trying different types of inventory control procedures to see which is most accurate on which items. Some items need to be checked accurately every three weeks; others require a rough estimate several times a year. Until then, a space has been left in the inventory program and report to indicate that the EOQ will eventually be used. If another approach is found to be more accurate, then that other ordering figure will be used.

The Sales Forecast

A sales forecast by item was developed. The forecast projects item demand, using exponential smoothing techniques for each upcoming four week period. To supplement the forecast, a sales trend model was developed which reflects the variation up or down in actual sales for the period previously recorded versus the forecasted sales. The new month's forecast is based, first, on actual sales for the current period and second, the forecasted sales for the current month and the previous month, and third, the trend between actual and forecasted demand. This calculation established the replenishment order quantity for the item based on on-hand and on-order quantity totals and forecast totals. The sales forecast is updated each month. The pre-system minimum quantity figure is still used, but this merely indicates order point in the new, more sophisticated inventory management routine.

The up-graded management system using the automated stock replenishment technique based on forecast and trend is still being refined, although Midland management feels that the system provides a fully integrated operational and management reporting setup.

Purchasing

One reason for controlling inventory is the need for accurate records to be used by the purchasing department. One of the purchasing problems is determining how much to buy to take advantage of price breaks such as freight allowances and price changes. With a tight inventory control system, a buyer can request an instant printout of all items at order point or all items within five percent of order point. Purchasing, as a separate function, has not yet been computerized. It will be accomplished via punched card generated purchase orders.

Now, items at reorder point are signaled on the inventory report and ordered through manual methods. But the new and accurate percentage information eliminates "seat-of-the-pants" ordering or purchasing items because they are known to be fast-moving. Even fast movers gather in inventory and become costly items to handle.

The All-Company Computer

Midland management is promoting a productive attitude toward the computer by both supervisors and office employes. Instead of tucking the 1130 away in an isolated area, the system is on the general office floor. It is accessible to functional personnel and its programs are designed for easy use. For example, a billing clerk does the billing, a member of the inside sales staff runs sales analyses and buyers run off their own inventory reports.

The company has also entered into a cooperative venture with nearby Hinsdale High School, which trains its students in computer use on the school's 1130. Midland offers summer jobs to high school students to continue their computer training in a business situation. The project has proved profitable to the firm; one of the student programers has graduated to become a full time staff member.

Future Plans

Another company benefit are special customer mailings made possible by the computer. Labels to lists of selected customers can be printed very quickly. More future plans include job and cost estimates, plotted graphs of financial reports and other data. Vice president Walsh says, "The only limitation of the computer is the imagination of the people running it."

The company estimates that before computerization, the stock item outages were approximately 20 percent of the total sales. Now, this figure has been reduced to from 5 to 10 percent.