

INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications	Production Control
Type of Industry	Data Processing Equipment Manufacturer
Name of User	Univac Division of Sperry Rand Corp. Ilion, New York

Equipment Used	Telecontrol 2100 System Univac 1004 Computer System
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Synopsis

At the Ilion plant of the Univac Division of Sperry Rand Corporation, a Telecontrol 2100 system is employed in directing the production of 319 machine tools and their operators. The Telecontrol 2100 is integrated with an in-plant Univac 1004 computer to provide scheduling and control of manufacturing orders through all operations. The complex further provides for labor reporting of all direct labor activity. It also provides tool priorities and directions to the tool room attendant.

A number of daily, weekly and monthly reports are generated, providing management with complete shop work load data, open orders status, inventories and many other items pertinent to an efficient managerial function.

At the Iion, New York, plant of the Univac Division of Sperry Rand Corporation a Telecontrol 2100 system in conjunction with a Univac 1004 computer supports the controlling of an in process inventory consisting of approximately 3,000 manufacturing orders. Parts from these orders are used in the production of Univac's 1004 and 1050 systems. In the near future, parts will also be produced for Univac's 9200 and 9300 series of computers.

Each manufacturing order requires from 10-12 processing operations, with 1,000 operations being performed daily. Some 30,000 operations, monthly, are controlled by the system. These operations may consist of milling, drilling, grinding, polishing, punching, lathing, etc. Some 319 machines and operators are directed by the system.

In addition to the Telecontrol 2100 system and the Univac 1004 computer, the system also uses a keypunch/verifier, a sorter, two (2) Kardveyor files, and a Cardomatic. Integral parts of the control system are a public address system and a call director which are used for communications between the manufacturing floor and the control room.

The control system produces a number of reports ranging from order status to current shop load. From these reports, production control can determine open orders, the location of these orders, expected delivery dates and the most opportune time to introduce engineering changes.

These reports alert manufacturing management to required work loads in specific departments, work centers and labor classifications as related to capacities and schedules. Further, warning of potential capacity bottlenecks, these reports permit timely and accurate management decisions.

Labor reporting procedures and attendant reports, channeled to the Accounting Department, provide timely monitoring of cost variation between standard and actual costs.

In essence, the system follows the manufacturing cycle of each order, from its receipt to final shipment.

THE SYSTEM

The system begins with the receipt of an order. For each order a routing sheet and a deck of white punched cards are prepared. Each card designates an operation to be performed and contains the order number, the item identification number, the operation start date, order due date, the required department and work center and other pertinent data. Similar information is contained on the routing sheet.

A duplicate set of yellow planned operation cards are produced. Both the routing sheet and the yellow punched cards are filed in a Kardveyor file (hereafter referred to as file number one) by part and order number. The white deck is filed in a second Kardveyor file, number two (2), in load format by department, by work center, by start date. With these two sets of files, one can determine the status of each of the orders, the stage of production, shop loads, etc.

The operations to be performed are listed on the routing sheet. An example of operations to be performed may be as follows: operation 10-shear; operation 20-cutoff; operation 30 - mill and deburr; etc. For each of these operations, two (2) planned operation cards are prepared; one for Kardveyor file number one, the other for Kardveyor file number two.

As work on an order is to begin, the first yellow planned operation card is taken from file number one and matched with its mate in file number two. The white planned operation card from file number two is placed into a "departmental in station" file; the yellow card is discarded. Remaining in file number one are the routing sheet and the balance of the yellow planned operation cards. In order to determine the status of an order, all one has to do is to compare the routing sheet with the remaining yellow planned operation cards. The cards left in file number one indicate the operations yet to be performed. The card which has been removed indicates the operation which is in a run, or ready to run, position. A white card in file number one indicates a completed operation.

UNIVAC
DIVISION OF SPERRY RAND CORPORATION

ROUTING SHEET

ITEM IDENTIFICATION NO.		REV. LVL.	ACCT. NO.	ORDER NO.	DATE DUE	QUANTITY ON ORDER	DATE ISSUED	SHIP TO ACCT.	CODE	STORE RM. ACCT.		
5026876 00		A	2423	S07636		20	717					
ITEM IDENTIFICATION NO.		REV. LVL.	ACCT. NO.	PROCESS DATE	SUPERSEDED DATE	EIR NUMBER	CARD COUNT	ITEM DESCRIPTION	PAGE NO.			
5026876 00		A	2423					BUMPER	1			
LINE NO.	OPERATION NO.	DEPT. NO.	WORK CENTER HEAD CODE	PROC. LABOR GRADE	TP	MC	SET UP TIME	SET UP LG	STANDARD TIME PER HUNDRED	I/D	OPERATION DESCRIPTION	
	0		908							3		15
	1	3120								3	* 50611570214 12.0 C	4
	10	3131	S02A	27			500	27	100	3	SHEAR	4
	20	1131	P20B	27			700	27	150	3	CUTOFF	2
	30	1111	M02B	28			2 000	28	4 000	3	MILL & DEBURR	12
	40	3111	M13B	28			2 000	28	1 500	3	MILL & DEBURR	2
	50	3231	P10A	27			700	27	300	3	FORM PER PRINT	4
	60	3232	D40B	25			300	28	3 500	3	DRILL	12
	70	2435	D03B	25			300	28	900	3	CSK FOR TAP & TAP	2
	80	2224	K01	43					100	3	CLEAN	8
	90	2522	B01A	41					4 000	3	POLISH	8
	100	2425								3	INSPECT	4
	110	2524	K03	66					1 750	3	FINISH KS 135	8
	120	2425								3	INSPECT	4
	130	2024	Z21	43					200	3	PACKAGE	8
	140	20	R-P							3	MOVE TO CUSTODIAN	4

ROUTING SHEET, ON WHICH THE OPERATIONS TO BE PERFORMED ARE LISTED.

CARD		ITEM IDENTIFICATION NUMBER										CYCLE HRS.	SPL	OPER NO.	DEPT. NO.	PR. LG.	ORDER NO.	LOAD HRS.	START DATE	WORK CTR.																								
1	1	3 9 8 5 0 2 6 8 7 6 0 0										0 0 4	1	1 4 0	2 0	S 0 7 6 3 6	0 0 0	7 2 7	R 7 P																									
3	3											3	3	3	3	3	3	3	3	3	3																							
5	5											5							5	5	5	5																						
7	7											7						7		7	7	7																						
PLANNED OPERATION CARD																																												
1	1	4	5	6	7	11	13	14	15	16	17	18	20	21	23	24	25	27	28	29	30	31	32	34	36	37	38	39	41	42	43	44	45											
T.	M.I.C.	M.	SET-UP	SET-UP HOURS											7 2 8		3 2 4 2 3																											
C.	REV.	C.	L.G.												ORDER	CURRENT STD. HRS.	I/D	PROC. ACC'T.	BUDGETED STD. HOURS	PLANNED QUANTITY																								
3	3	3	3												DUE DATE																													
5	5	5	5																																									
7	7	7	7																																									
9	9	9	9																																									
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90

PLANNED OPERATION CARD DESIGNATES OPERATION TO BE PERFORMED. CARD CONTAINS ORDER NUMBER, ITEM IDENTIFICATION NUMBER, OPERATION START DATE, ORDER DUE DATE, REQUIRED DEPARTMENT AND WORK CENTER AND OTHER PERTINENT DATA.

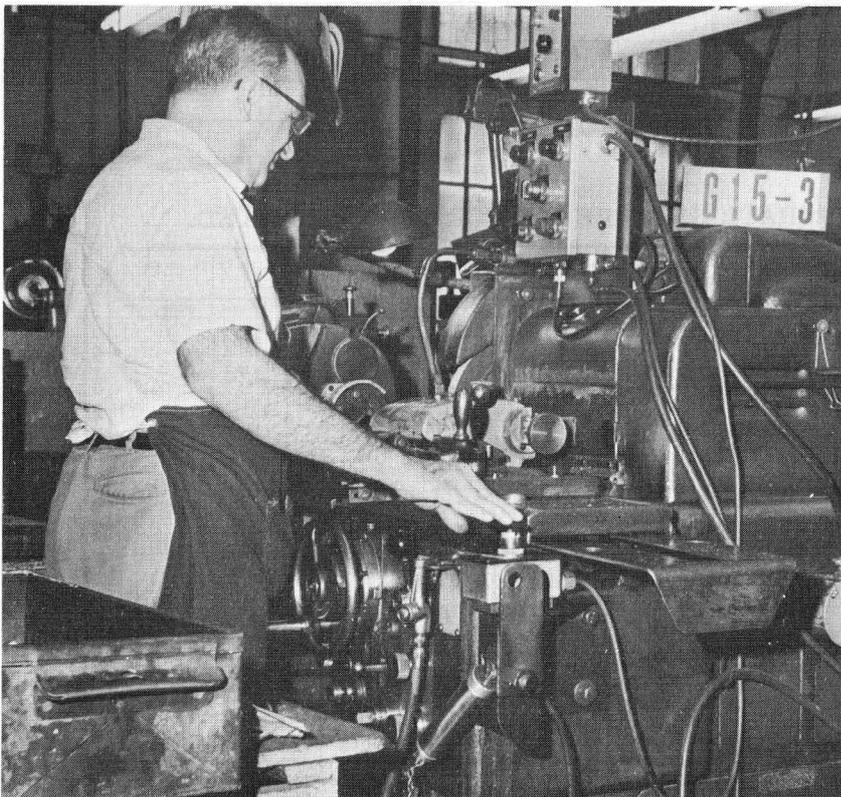
As an operation is completed - a man and a machine become available - a white planned operation card referencing department, work center, labor classification and planned start date is taken from the related "In Station" file and placed on the Telecontrol panel. Each panel on the Telecontrol board designates a particular machine within a work center. Associated with each panel are signal lights and time and production centers.

When a man is assigned to a machine by use of the Telecontrol communication system, a "man plug," designating the machine operator, is inserted into the panel associated with that machine. The controller presets the job balance counter to the specified order quantity; the panel already contains the machine number and the operator's name.

At the machine, a control box, equipped with red and green signal lights, an alarm switch, a reset button, a jack for a portable telephone and a downtime lock, is activated by the insertion of the "man plug" in the control room panel, lighting the green signal lights, both on the control box and the panel. The departmental foreman inserts a key in the control box downtime lock, placing the machine in a non-productive category. This also activates a non-productive time counter in the control room panel and lights the red signal lights, both on the control box and on the panel. Non-productive time is recorded until the first piece is produced according to specifications and approved.

After the set-up has been completed, the reset button on the control box at the machine is depressed by the operator causing the red lights on the control box and on the Telecontrol panel to go out. This inactivates the non-productive time counter; activates a productive time counter; indicates to the controller that non-productive time is no longer being recorded and production time has started. The green light remains on giving a visual indication that the machine is operating in a production mode.

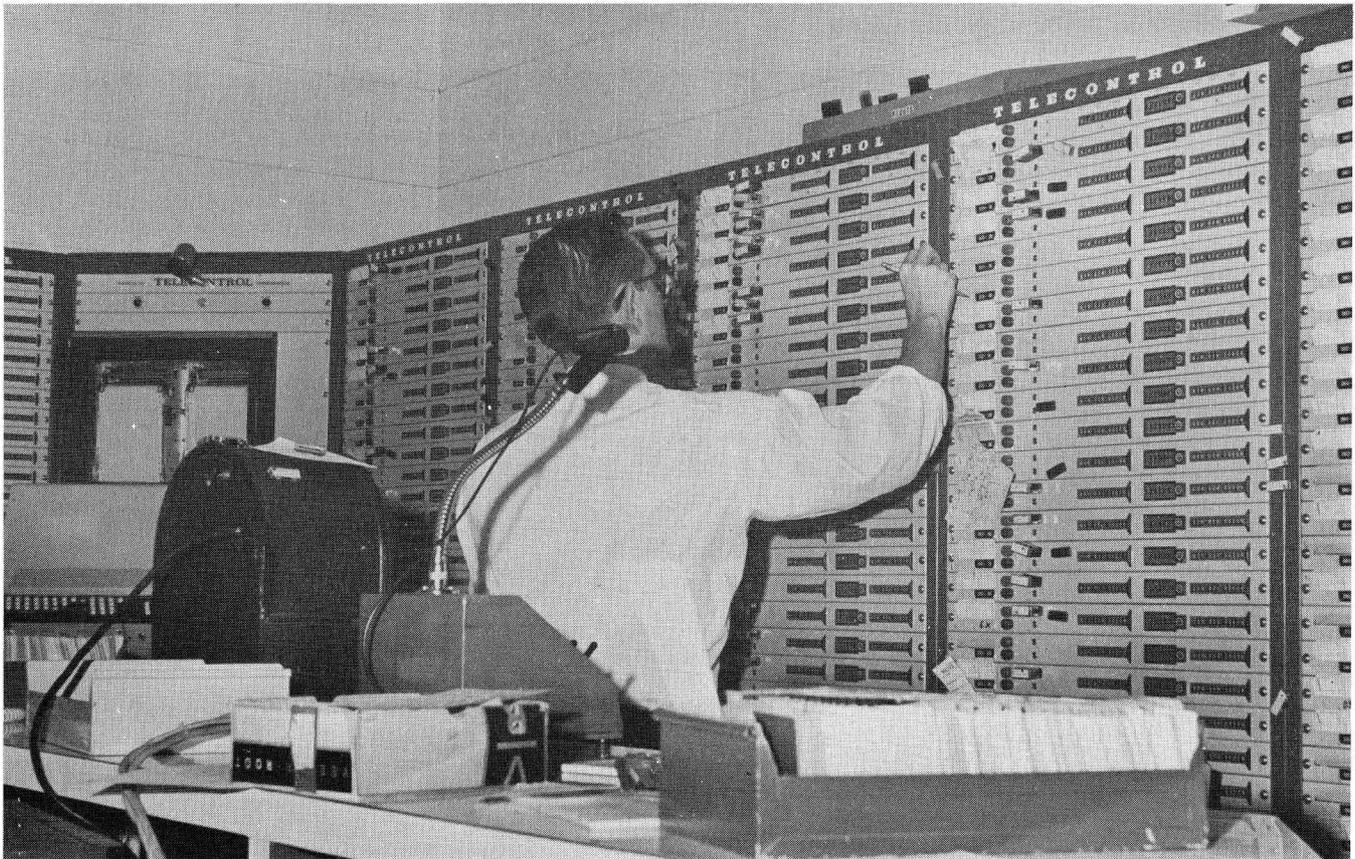
The reset button also activates a piece counter which tallies the number of items produced. As each item is produced the operator pushes a button at the work station which causes the balance counter to decrease by one and the piece counter to increase by one.



MACHINE OPERATOR RECORDS COMPLETION OF A PIECE BY PUSHING BUTTON WHICH ACTIVATES A PIECE COUNTER ON THE TELECONTROL PANEL IN THE CONTROL ROOM.

When the required number of items has been produced (the balance counter reaches zero), visual alarms are activated at the machine and audible and visual alarms are activated in the control room. The controller, using the public address system, then directs the foreman to the machine. On arrival, the foreman using the Telecontrol communication system, confirms job completion and accepts a new assignment for the man and machine from the controller.

In the control room the white planned operation card for the completed operation is transferred to the departmental "Out Station" file, awaiting truck service. The controller, using the public address system, directs a trucker to the required out station. After completing movement of the order, the trucker reports the move via a call director extension; the white planned operation card is then transferred to the number one file. The presence of the white card in this file indicates that this particular operation has been completed. The next yellow planned operation card is then removed and matched to a white card from file number two as before. Again, the yellow card is discarded, the duplicate white card from file number two is placed into the "In Station" file prior to being placed on the Telecontrol panel, and the cycle is repeated.



PRODUCTION CONTROLLER TAKES READINGS FROM COUNTERS ON TELECONTROL PANEL.

If during the production of a part, the machine breaks down, the alarm switch on the control box is turned to indicate (by means of a flashing red light in the control room) that the machine is out of order. This switch is also used whenever the machine operator requires assistance. Thus, the controller is able to direct a supervisor to this work station to investigate the problem.

After assessing the situation, the supervisor then reports to the controller over his portable telephone link to the Telecontrol communication system and repairs or other maintenance service are initiated.

At the completion of each job, the controller manually posts variables, i. e., elapsed time, number of pieces processed and the operator's clock number to a prepunched labor ticket. This data is then keypunched by the 1004 operators for processing into production and labor reports.

When the machine operator receives a new job order, he picks up a package of required tools already prepared by the tool crib from advance notification by the controller.

The Telecontrol system with the Univac 1004 is installed adjacent to the production control office. It is manned by four (4) controllers during the first shift and one during the second. Four clerks and two 1004 operators complete the staff on the first shift; one clerk during the second shift.

RESULTS

The production control system at the Univac plant in Ilion provides management with some fifty reports from which timely, accurate data is obtained. Information on current work loads in hours is made available for the total shop, for individual departments, for individual work centers and for individual labor classifications.



OVERALL VIEW OF THE PRODUCTION CONTROL ROOM. KARDVEYOR FILES CONTAIN PLANNED OPERATION CARDS.

The system also provides management with data concerning manpower and machine tool capacities, the immediate location and status of each of the 3,000 manufacturing orders, immediate recognition of production bottlenecks and advance knowledge of tool package requirements.

In regard to scheduling, schedules are produced giving the start date of each operation predicated on the required stock delivery date of the completed order. In addition, priorities for each operation of each order are established.

In short, by the use of the Univac 1004 and the Telecontrol 2100 systems, a higher level of control has been established over the manufacturing operations at Ilion.