Ohio Instrument Case (Conclusion)

John Heptonstall
Here is the solution to the problem posed on Page 46—

THE OHIO INSTRUMENT CASE
(Conclusion)

by John Heptonstall
Education for Management

THE SITUATION that has arisen in the Waterville Plant is by no means uncommon. Therefore, although the comments made in this analysis are addressed primarily to the case situation, many of them have very general implications.

Mr. Douglas, foreman of No. 3 store, and his assistant, Mr. Smulkowski, are not at all enthusiastic about the proposed computer system. Is this the natural reaction of men who see themselves threatened by the "expert" who proposes to replace their long-established way of doing things with something they mistrust, and are their criticisms valid? Here we can give a short and unequivocal answer. Yes, their criticisms are valid. Mr. Mancini has performed a very inadequate analysis. Indeed, he has fallen into a very common trap. An analyst looking at any clerical or data processing operation with a view to converting it to EDP has to ask himself: Is it physically feasible to do this on a computer? Is it within the computer's power to perform this task? Usually the answer is that if the clerk doing the job is simply applying a set of operating instructions—that is, if the decision rules have been made for him by management, and he is simply applying them—then the job can be computerized without much difficulty. If, however, the clerk is required to use judgment, then the job cannot be computerized as it stands, and a new system that eliminates this need for judgment will have to be worked out before the job can be computerized, if indeed it can be computerized at all.

The key to this situation, however, is this: The existence of a set of operating instructions does not necessarily mean that those instructions are being used. In many cases the clerks will have found that the instructions given to them are not universally applicable, and will have developed exception routines of their own. In some cases they may have abandoned the formal instructions entirely and developed their own set of procedures—and these procedures are probably more efficient than the formal operating procedures. Yet management probably does not even realize that the formal system is not being used.

An analyst who discovers that a set of operating instructions exists and therefore concludes that the job requires no human judgment is making a serious mistake, then. But so is an analyst who does realize that clerks have developed their own procedures but concludes that their reasons for doing so were eccentricity, stupidity, or sheer cussedness. A good analyst who detects any departure from formal decision rules should immediately try to find out why this is happening, because there is often a very good reason.

Well, we do show that informal procedures have developed in No. 3 stores and that the stores clerks are using their intelligence. Does this mean that computerization of the inventory control and re-ordering procedures is not feasible and that we should drop the idea? Not necessarily. It does mean, though, that more thought and research is required and that Mr. Mancini's recommendations were very premature.

There is little doubt that the basic file updating operation—recording all issues and receipts and recalculating the balance on hand after each transaction—can be performed by the computer. One possible approach, then, is to comput-
erize this by shifting maintenance function but to leave the re-ordering responsibility in the hands of people.

The computer could still be given re-order points for each item and be programed to print out a list of items that have fallen to their points after each updating run. It would also be possible to program the computer to print a list of all other items purchased from the same supplier, although this would probably require fairly time-consuming search routines or an extensive address index to be stored in memory. The list of items at a below-re-order level would then be reviewed by a stock clerk, who would originate purchase orders and decide what other items from the same suppliers should be ordered to make up a shipment. "Half-and-half" systems such as this are used by many companies, sometimes as interim measures to be re-examined later with a view to fully automating them. They make it possible to enjoy some of the clerical cost reduction benefits of computerization by eliminating routine file maintenance functions while at the same time avoiding any loss in operating efficiency.

**Fully computerised system**

Alternatively, it may be possible to devise a fully computerized system. This will mean first producing new decision rules that avoid the shortcomings of the old ones, then writing a program to implement these new decision rules. It may be that the old re-order points and order quantities have not been revised for some years and that production volume has increased considerably in that time. In this case most inventory items are probably being ordered too frequently and in inadequate quantities, and, by recalculating these parameters, management may be able to reduce ordering costs to the extent that the automated system’s failure to review other items from the same supplier can be tolerated. A more sophisticated approach, however, would be to program the computer to reproduce the clerk’s present method of operation as closely as possible. In other words, whenever one item reached its reorder level the computer would examine all other items from the same supplier. Because the computer cannot think and cannot therefore make decisions it would have to be given a secondary decision rule, such as “order any items from the same supplier if they have fallen to within 26 per cent of their reorder levels.” The computerized inventory file would be somewhat expanded: The reorder for each item would have to include one or more supplier code numbers by means of which the processor could locate other items obtained from a given supplier. Such a procedure will only be practicable if the inventory file is maintained on a random access device such as a disk pack: The time needed to search back over a tape file when a re-order was signalled towards the end of an updating run would increase running time prohibitively.

It is not possible to say that any one of the above approaches provides the “right” solution to the reordering problem in this company. We have to compare the costs and benefits of each and need much additional data to be able to do so. On the basis of experience in similar situations, however, we would say that a system that combines automation of the purely data processing function with a degree of human judgment is likely to prove optimal.

The other matter raised in the case, the judgment used by the clerks in servicing demands for out-of-stock items, is basically similar. One possible approach would be to store in the record for each item in inventory a list of near-substitutes and to enter a subroutine to print out this list whenever it is out of stock. This would be far short of a full solution, though, and might be disastrous: Not all of the “substitutes” will be safe substitutes in all possible applications. Again, the best solution is most probably to use the computer to perform the record keeping but to retain a small number of skilled human beings to handle the exceptions.

**Man-machine ideal**

This latter situation provides a good example of the way in which a man aided by the power of a computer can function more efficiently than either man or computer alone. The ideal solution here, cost and volume permitting, would be a real time computer system with a teletype/display terminal in the stores. When the store clerk received a request for a part he would immediately use the terminal to obtain the current stock on hand—in exactly the same way that the girl at the airline reservation counter uses her terminal to check that seats are available on your chosen flight. If adequate stock was available he would issue it, and transmit the information that the issue had been made back to the computer, which would promptly recalculate the balance left on hand. If the stock on hand was not adequate, the clerk would use his terminal to inquire what purchase orders were outstanding and when delivery was expected. He would also use the terminal to check the levels of any parts that he knew to be substitutes to see if any of these were available in adequate quantity.

Operations of the type described in this last paragraph are potentially far more promising and important than most of the approaches we have been discussing. Instead of asking whether we can program a computer, working automatically, to simulate human judgment, we shall become increasingly concerned with questions of how we can improve the efficiency of a man and machine working as a team by imposing the case of communication between man and computer. This is the ultimate solution to the kind of problem described in this case.