

INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications Management Information System
Type of Industry Manufacturer
Name of User American Bosch Division
American Bosch Arma Corporation
Springfield, Mass.

Equipment Used IBM System/360 Model 40 Computer System
IBM 1030 Data Collection System

Synopsis

American Bosch Division of the American Bosch Arma Corp. , a producer of diesel fuel injection systems, hydraulic products, liquified petroleum and natural gas carburetion equipment, is presently using an IBM System/360 Model 40 computer system in conjunction with an IBM 1030 data collection system.

The management information system at the American Bosch Division produces daily labor reports which allow foremen to review their operations. The initial phase of the system involves manufacturing and quality control. Some 28 IBM 1030 data collection terminals are installed on the manufacturing floor, each with the capability of reporting information by punched card, plastic badge or the keyboard.

Future plans at the American Bosch Division are to include all facets of its operations into the centralized computer. This will include sales, purchasing, personnel, controller, engineering and industrial engineering.

A third generation computer system installed recently by the American Bosch Division of the American Bosch Arma Corp. has improved the firm's profits by as much as \$100,000 annually from one area alone. The division, located in Springfield, Mass., is a major producer of diesel fuel injection systems, hydraulic products, liquified petroleum and natural gas carburetion equipment.

At American Bosch, the quality and quantity of information, and management's ability to control it, are being improved through a real time computer system. The system features a centralized computer to which data is reported directly from all functional areas. Instead of working on events that took place days or weeks ago, the computer now processes information collected at the points of origin.

For example, plant foremen get daily labor reports at the start of each shift, permitting them to review their own operations and making possible the reduction of variance by more than 16 percent. Instead of making decisions after the fact, management now has the ability to concentrate on exception items as they take place.

In general, top executives will have more accurate and more timely information with which to work. All of this is expected to produce substantial annual savings; on data collection -- to cite one area -- the annual savings have been in excess of \$100,000.

The project which will make these savings available is called ABOUND (American Bosch Operations Under New Dimensions). The primary new dimension at American Bosch Division is the IBM System/360 Model 40, a third generation computer with vastly improved storage and communications abilities. To take advantage of these abilities, the company is installing remote communications terminals at various points in the company, including manufacturing, quality control, sales purchasing, personnel, engineering, and industrial engineering. In this way information captured at the point of origin will be sped directly to the centralized 360, processed, and then made available to top management on both a routine and exception basis. Now, for example, production control knows several weeks earlier than before that a high percentage of scrap has occurred and that a new production order must be initiated. This is usually known soon enough to meet the original due date.

THE SYSTEM

The first major phase of ABOUND involves manufacturing and quality control. Some 28 IBM 1030 data collection terminals have been installed on the manufacturing floor at American Bosch -- each terminal with the capability of reporting punched card, plastic badge, and variable keyboard data. Through these terminals factory employes and foremen now report all production information to the computer, including inspection information, machine maintenance data, work in process, and other essential production details. Manual collection of data previously cost American Bosch \$100,000 a year and would probably cost \$150,000 with today's plant population. The terminals not only do the work faster, but cost only \$50,000 a year.

Although this information flow is used initially to update various records stored on the magnetic tapes and direct access magnetic discs of the system, the goal of ABOUND is management by exception. For this reason the computer is programed with the norms and standards of a wide variety of operations. Even though a routine report may not be scheduled for several days or weeks, any deviations noted in a particular manufacturing operation are flagged immediately. The result is an ability to respond far faster, and with far more information, than was possible under the previous system.

In the timekeeping function, for example, exception reporting is proving to be the key to labor analysis. As timekeeping is a major source for basic information, and inextricably related to all forms of production reporting, it was the first application to be put on the new system. The ability to replace old-fashioned time cards with plastic badges was a major improvement.



TIME RECORDING EQUIPMENT AT AMERICAN BOSCH IS CONNECTED DIRECTLY TO THE DATA PROCESSING CENTER. EMPLOYEES INSERT PLASTIC CARDS INTO THE IBM 1035 DATA COLLECTION TERMINAL, AND TIME IN AND OUT IS RECORDED ON A PUNCHED CARD AT THE DATA PROCESSING CENTER.

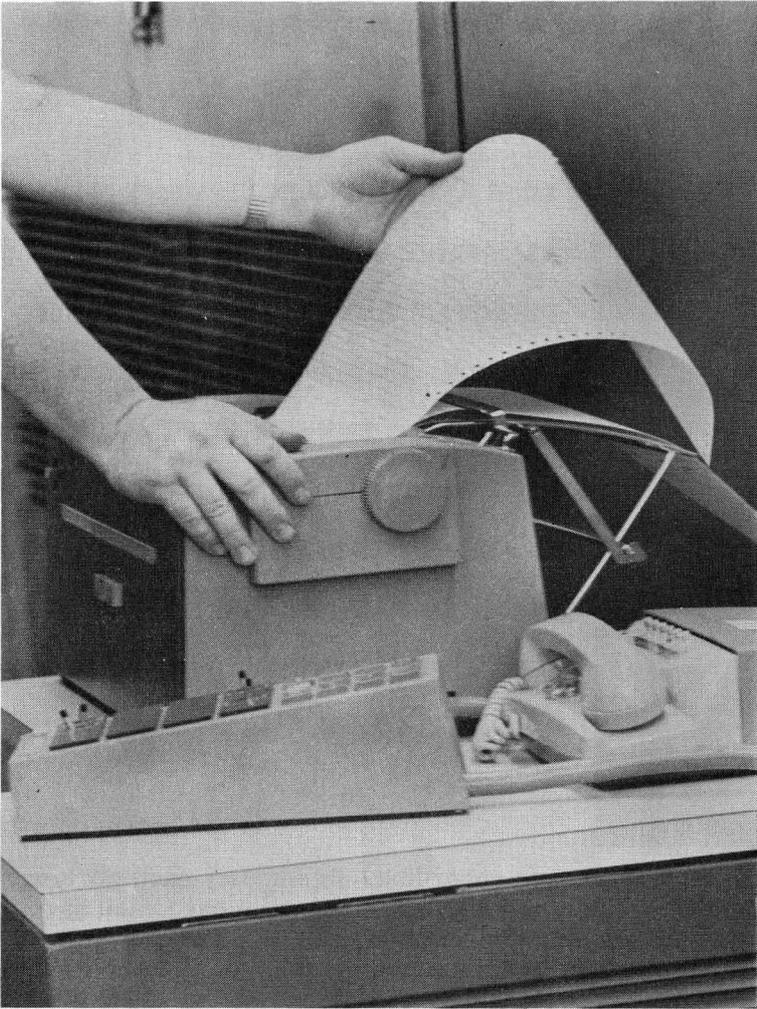
This approach also reduces the efforts involved in time recording. Previously each worker, on completing a job, had to take the work papers to a timekeeper's desk, fill out a card, and have it signed by his foreman. Now most of the information is entered automatically into the 1030 terminal from badges and prepunched cards. This means less effort and a timesaving of 10 to 15 minutes a day for the worker. It has also eliminated the card punching operation previously required, since the 1030 system creates machine-readable documents and will ultimately be linked directly to the computer.

Another result is tighter control of payroll reporting. With information flowing directly into the computer, payroll processing is now under control of a stored program -- and management has the ability to get subtotals or detail figures any time it wants them. It helps, for instance, when a department wants to determine if the budget will permit overtime for several individuals.

The system also provides a means for isolating areas and individuals where productivity does not conform to management objectives. Formerly this could be done only after the fact -- sometimes a week later. Now, deteriorating conditions are spotted almost as they happen, and management can take corrective action while it is early enough to do some good.

Finally, ABOUND pinpoints the problem areas each day and thus strengthens factory management. Line supervisors have been given 25 percent more time for supervision by elimination of the reports previously required of them. Top management gets a single, concise, and accurate report which shows at a glance what is happening, where and when.

The next department to be put on the new system was Time Study -- because of its affinity to timekeeping and because of the importance to management of the information generated here. With the existence of 100,000 rates -- perhaps 25,000 active at any one time and thousands of changes occurring monthly -- this is an area where dollars can be lost in wholesale amounts. This is because rates previously were not applied until posted manually into master rate files. Now new rates can



TRAVEL CARDS FOR SEVERAL ORDERS ARE CLEARED ON A REMOTE TERMINAL IN THE PRODUCTION CONTROL OFFICE. THE IBM 1050 TERMINALS PRINT OUT THE ORDER AND EACH OF THE OPERATIONS WHICH MUST BE PERFORMED ON THIS MASTER FORM WHICH WILL ACCOMPANY THE JOB UNTIL ITS COMPLETION.

be dialed directly into the system by a time study man using the data collection equipment. Thus, there is a new and timely source of statistics on time study.

With ABOUND, time study data of several types is fed into the operational file. With practically no extra effort the company is now able to get such factors as: standard time and standard rate; total hours on each rate and the number of pieces produced; total number of pieces at standard plus-or-minus from expected volume; total number of pieces where make-up is involved; total number of pieces on deviation and by major reason (machines, tools, material, etc.); and date and type of last activity.

The advantages reaped from the above input are immediate. For example, detailed analysis of current conditions can enable the time study group to handle a 20 percent larger plant without increasing its own size and real time reporting to Industrial Engineering for new plant layouts. Remote inquiry makes the same data available to Time Study.

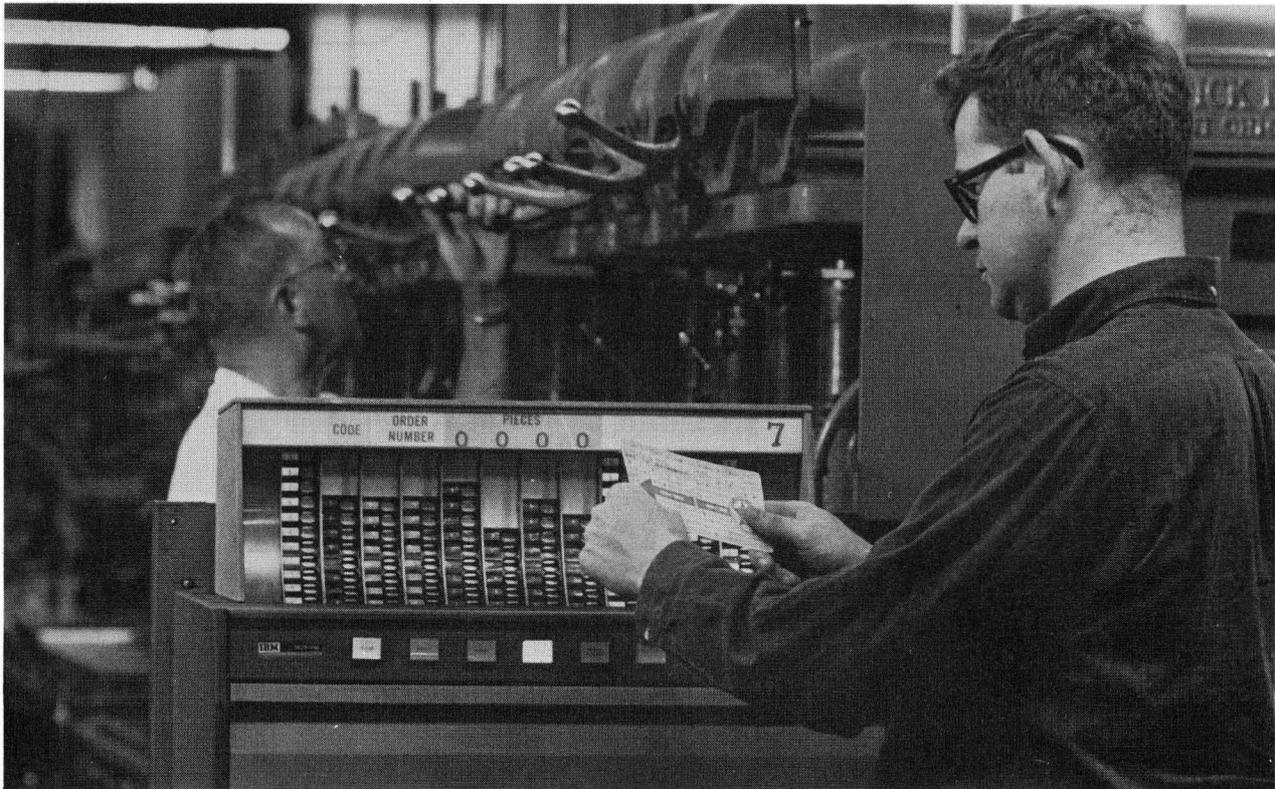
From Time Study, the third major area to go on the system was Inspection. The job of inspecting 3,000 to 4,000 operations per day of high volume production is difficult no matter how it's done. Under manual or semiautomated methods a great deal of paperwork is required from inspection people and this leaves far too much room for errors such as skipped operations. Thus, it was a natural function for inclusion on the computer system.

To simplify and automate the inspection procedure, the 360/1030 system was applied to several tasks: First, System/360 was used to maintain as part of the operations file a statistical area for inspection history including total number inspected by job order number, and total number rejected by major reason code. Second, three complete jobs, which can be used to indicate a simple trend (thus permitting management to take fast action), are retained in this file. Third, the data collection system is used to report the inspection data on a real time basis. Fourth, daily reports are produced by the system showing what was inspected, how much, rejects and the reasons. Finally, as a new schedule is released by production planning, the 360 produces an inspection report showing items on the schedule that have a poor inspection history, high reject rate, or show an upward trend in rejects.

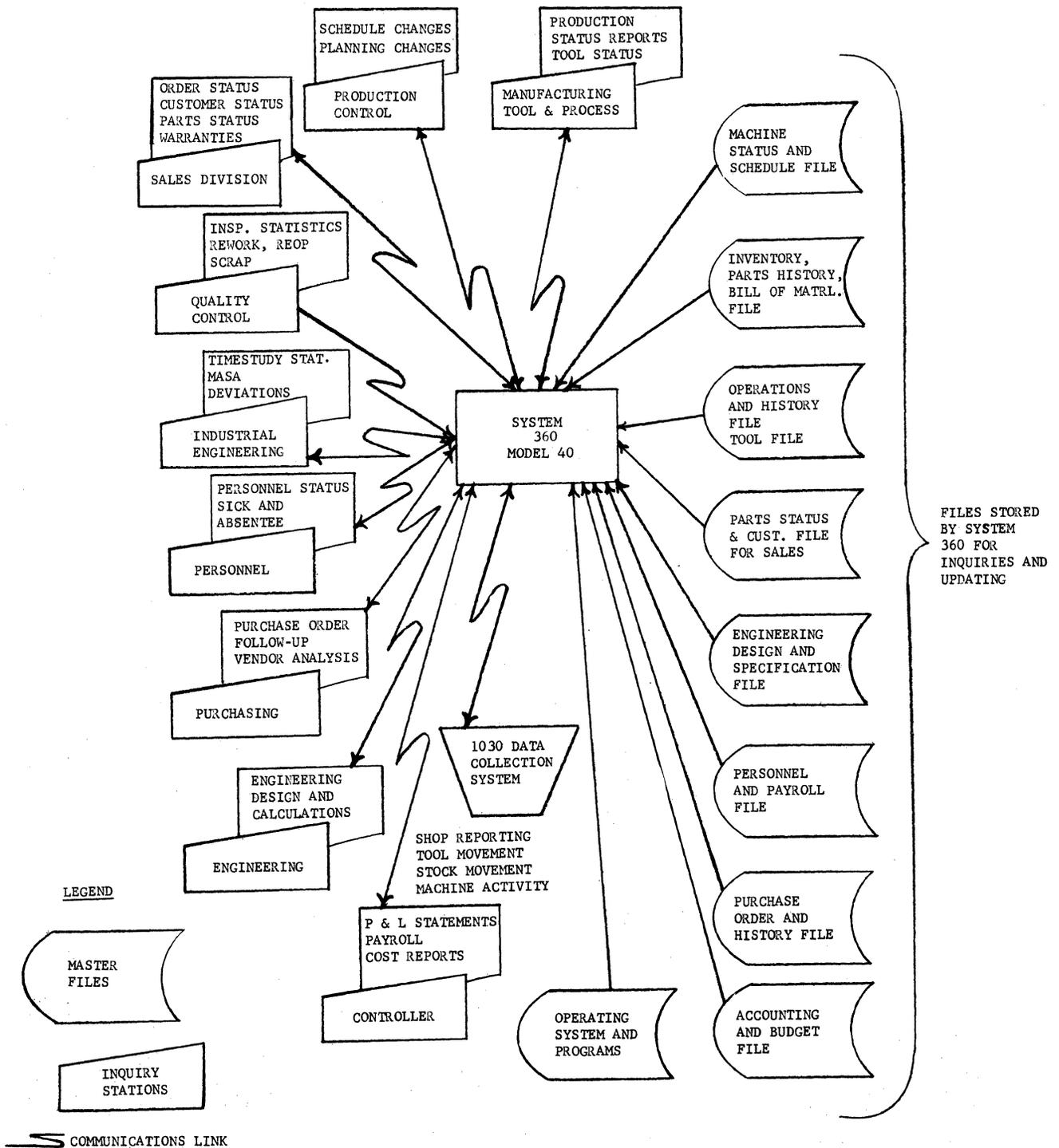
In short, through a new-found ability to pinpoint troublesome trends, the philosophy behind "Zero Defects" becomes more and more practical.

In production control the two main areas affected by ABOUND are production planning and dispatching. Production planning is responsible for the origination of all orders to produce product material, plus their scheduling. Dispatching is involved primarily with the efficient and timely flow of material through the shop.

Both functions, it must be stressed, have been performed at American Bosch for many years through a computer. The addition of System/360, however, refines these procedures by reducing error possibility. Previously, a certain amount of manual transfer was necessary to move raw data from one document to another -- and this was where untold errors occurred which were never revealed until physical inventory. Today, however, most of the data used by the 360 comes from punched cards or pre-existing tape or disc files. As a result, it is almost 100 percent valid.



OPERATOR INSERTS OWN BADGE AND PREPUNCHED CARD IN THE REMOTE TERMINAL. HE CAN INDICATE THE TYPE OF TRANSACTION, THE ORDER NUMBER AND THE NUMBER OF PIECES COMPLETED. THIS DATA IS TRANSMITTED TO THE DATA PROCESSING CENTER.



ABOUND SYSTEM AT AMERICAN BOSCH DIVISION.

What this means to production control is (1) the ability to control all jobs no matter where they are located in the plant; since the computer has information on all job status no older than the last transaction report; (2) the ability to establish priorities by considering the impact of a schedule change on other production orders in the plant; and (3) the ability to locate any job and its position in the shop by inquiring about the job through remote stations located on the plant floor as well as in management offices.

RESULTS AND FUTURE PLANS

Through the use of routine and exception reports, and procedures made possible by remote stations, managers can react faster as a result of better information and thus exercise tighter control of their operations. These improvements, in turn, mean that the American Bosch Division is able to produce a better quality product - for a fair price - and on time.

While manufacturing and quality control are the first recipients of the benefits of ABOUND, they are no means the only areas to gain as a result of the system. The ultimate objective is to tie all facets of American Bosch's operations into the centralized computer. And this includes sales, purchasing, personnel, controller, engineering and industrial engineering.



IBM 2311 DISC STORAGE UNITS, PART OF THE SYSTEM/360 MODEL 40, CAN STORE UP TO 14.5 MILLION CHARACTERS OF INFORMATION.

In sales, for example, Project ABOUND can be of great value in accumulating and measuring the effects of detail as influenced by the new ending variables involved in a dynamic sales situation. To this end, American Bosch Division is presently setting up within System/360 two main files - one file by part number and one file by customer number. The part number file, for instance, is already being used to process and release daily orders; and the information in it -- vital sales statistics -- is being made available to sales personnel via a remote inquiry station. The customer file, on the other hand, includes such information as items sold, number of orders by month, dollar value of sales by item, and open orders by item; and is used via remote inquiry station for customer inquiries, salesman inquiries, and so forth. Thus, both files provide the sales division with more accurate and timely information.

The same holds true in the other areas of operations at American Bosch. Whether the function is purchasing or engineering, the basic flow is the same; input to System/360 is achieved primarily through data collection terminals located at strategic points within the functional area. Once inside the computer, processing is accomplished via stored programs such as the Inventory Management Program and Control Technique (IMPACT) used to spot items falling below a predetermined minimum inventory point. Exception items are called to management's attention for immediate action. Access to other data within the computer is achieved through remote inquiry stations and, generally, management has the kind of information required for action and decision.

In essence, Project ABOUND at American Bosch follows a regular cycle, with each functional part of the system relating to other parts and with changes in one function reflected in others. It has the ultimate goal of keeping all levels of management completely informed as to the business activities which affect them.

Currently the computer produces both exception and detail reports. Management normally uses the exception reports to spot areas where its attention is required. Detail reports are used primarily for investigation and reference. As soon as remote inquiry service is fully operational, the detail reports will be discontinued, since the same information will be available through the terminals on a more current basis.

Thus, where mass detail tends to hide and confuse the true issue, Project ABOUND achieves effective reporting by concentrating on those items which are most significant to management.