Is a Packaged Program the Answer?
A Compromise to MM3000

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OVERVIEW

Many software vendors selling expensive inflexible packaged manufacturing systems lack the incentive for a pre-sale investigation to ensure success. As a result, the successful installation of manufacturing packages nationwide has been less than 10 percent. This paper will present a compromise as it relates to a real experience. It should be of interest to software vendors, manufacturing users, as well as the system designers and programmers.

Key Tronic Corporation supplies 38 percent of the world's custom terminal keyboards. The company was founded in 1969 by Mr. Lew Zirkle in Spokane, Washington. The company is privately held and has expanded to 1,200 exployees located in five locations around the city. Sales are increasing at 30 percent per year with three times the present business forecasted by 1985. During the past nine months we have been working hard to establish a better information system to handle the high volume of orders for both now and in the future. One of the main reasons for our position in the marketplace is our rapid turnaround from customer drawing to a quality finished product. Some of our customers include IBM, Wang, Xerox, Exxon, Tandy, Memorex, as well as many others. Our typical order through manufacturing cycle looks like Figure 1.

Manufacturing is very vertically integrated — meaning that practically everything on the keyboard is made from raw material. The keytops and switches are made from raw plastic pellets, printed circuit boards are cut from large sheets of laminate and etched in our own tanks, and most parts are inserted with the aid of automated equipment. All piece parts must be ready to go together at final assembly according to a predetermined schedule. Herein lies the complex data handling problem. There are over 100,000 parts and 350,000 structure relationships that must be coordinated with the 16 week backlog of piece part and keyboard orders.

The use of computer systems to aid in the tracking of information for the company has evolved through a number of minicomputers and stand-alone word processing systems. Until a few years ago a central computer system tracked mainly accounting and some 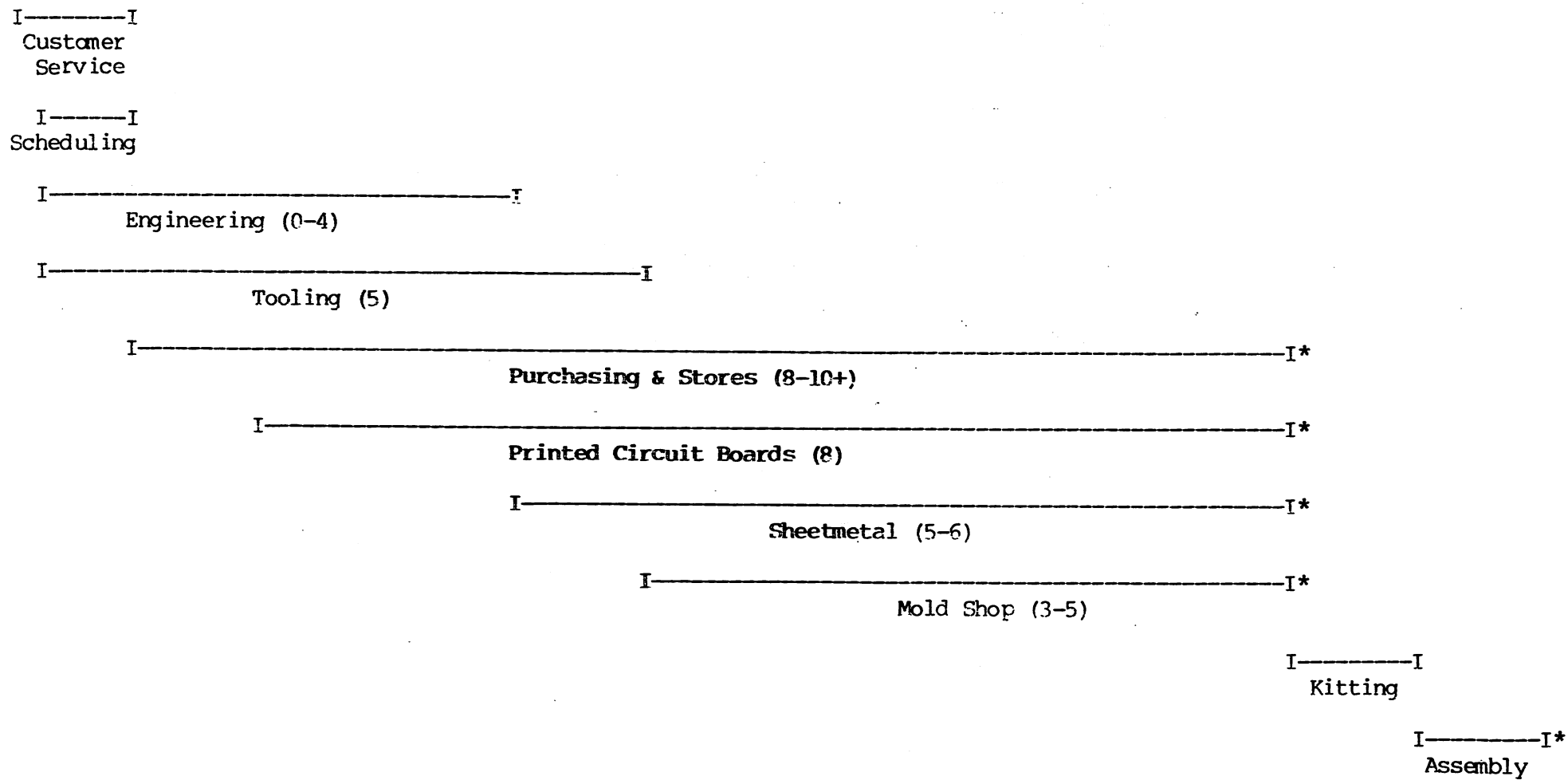of the 2,500 electronic parts requirements. Small systems such as a Burroughs, two IBM/32's, and an IBM/34 were used. For three years we searched for a packaged manufacturing system to meet our growing needs. In November of 1980, a Hewlett-Packard 3000/III computer was installed with the Materials Management/ 3000 software developed by HP. We will trace the initial failures, eventual successes, and present status of this installation. The final step was to scrap the programs from MM/3000 and write our own to the database that had been created.

In conclusion we will discuss how vendors might better sell packages, especially in the light of past failures. We will discuss preliminary system study, programming needs, educational needs (outside of HP), and follow-on consulting. This will be a constructive presentation and should help future HP3000 manufacturing systems to be brought up successfully.

DETAIL

We tried to start out right. One of the first things the MRP gurus tell you is the need for education from top management on down. The only training class that is offered with this package is System Administration. The S.E.'s will tell you that this course is for one person in the company, the one who will manage the database, programs, and train the users. We sent the Director of Engineering, Manager of M.I.S., an Mfg. Project Leader, a Systems Manager and a Programmer. As time went by only the Director is still involved with the program. Our present MM/3000 system manager has never taken the class. Looking back the money would have been better spent sending the line supervisors to a generalized course such as Oliver Wight's five day MRP class or some of the local American Production & Inventory Control Society (APICS) training classes.

The next misjudgement made was in the estimate of the database size and the amount of hardware, especially disk space that would be needed. Coupled with the fact that no one was yet using MM/3000 and the designers never planned to have it access such a large database, we had a great deal of difficulty trying to make a successful MRP run. The present database takes one and one-half 120 megabyte disc drives. As an example of miscalculation, it took us five days to load the

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I---------I
  Customer
   Service

  I------I
Scheduling

   I-------------------------------I
          Engineering (0-4)

 I--------------------------------------I
               Tooling (5)

    I--------------------------------------------------------------------I*
                    Purchasing & Stores (8-10+)

         I---------------------------------------------------------------I*
                    Printed Circuit Boards (8)

            I------------------------------------------------------------I*
                         Sheetmetal (5-6)

               I---------------------------------------------------------I*
                            Mold Shop (3-5)

                                                        I---------I
                                                          Kitting

                                                           I--------I*
                                                            Assembly
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12 WEEK MANUFACTURING CYCLE
KEYBOARD MANUFACTURING

NOTE: *Quality Control   **Figure 1**

database running twenty-four hours a day. As soon as the MRP generation starts, it needs 1,000,000 bytes of free space. It is efficient in the sense that it cleans up files as it goes. We often had more free space after a run than before. The system also keeps track of the size of temporary files from run to run. A typical run takes 14 hours even if we have only ten master scheduled items.

As time rolled on it became apparent that factory help was needed. For nearly three months we were seldom successful at making the system run properly. We had little help from PICS because nobody had a lot of experience since MM/3000 was new. After a while we had direct access to the writers of MM/3000. It should be noted here that the vertical rather than horizontal integration of the HP local and regional offices made it difficult to get all the right people together to resolve the problems. Some of the surprises we found were that you can only have 64,000 parts per key. It took two days to break this down to smaller sets, after we crashed. The system did not have the capability to copy one bill of material to another. We finally wrote our own routine to do it after HP had tried for eight months. MM/3000 and in MPE IV eat up 80-90% of the CST's. Even the addition of MPE IV does not show any improvement. As far as we have been told the HP3000/64 computer upgrade won't help initially here either as it will have the same number of CST's in the initial operating system.

With all these start up problems we still feel we are on the road to success. As the president of the company put it, however, had it not been for the recession that moderated our annual growth to only 30%, we would never have been able to keep up with the business. Now we should begin to look at datelines to see what events were set in motion to help build a useful information database.

4/1/81: With the help of a local HP/3000 with a card reader the keypunched card structure database was put on tape. During the same period packages were bought for the accounting department. Database conversions were made from IBM eight inch floppies. This included the G/L, A/R, A/P, Payroll, and fixed asset systems.

4/20/81: Layed out a three year MIS plan and hired a manager to make it go.

5/1/81: The Key Tronic MRP system for electronic parts was rewritten and completed on the HP/3000 (MRP/KTC). We didn't want to change this until we were satisfied that MRP/MM3000 could handle it. One week after he first converted it, the programmer left us and went to work for HP.

5/1/81: Turned the IBM system off.

5/15/81: Sold and shipped the IBM/34.

6/15/81: Started our first month-end accounting close.

7/1/81: Started our first year-end accounting close. During the past two months it became obvious that with 32 users the response time was going to heck in a hand basket. HP has some performance charts that show you what happens.

8/1/81: Installed our second HP3000 system and split out accounting and manufacturing.

9/15/81: Hired a senior programmer to help write a better MRP system (MRP/NEW). He did reduce the 14 hour run to less than an hour plus he fixed some problems HP had not been able to solve.

11/5/81: Installed an HP3000/33 for development work.

Since then we have continued to rewrite the software. Here are some of the items we are redoing.

● Because of the length of time it takes to get a report out we made our own MRP explosion module.

● Our company was more familiar with a "bucketed" MRP report rather than a "bucketless," so we made it bucketed.

● The structure and parts file editors locked entire data sets rather than items. This made the data entry operators very frustrated because they were forced to re-enter a data item over and over. Therefore, we went to a two step approach. The first was to use the MM/3000 batch data entry capability. We then rewrote all the editors since we did not have source code. Used PROTOS and the VIEW screens that had been established. Also used a "Father-Son" approach to programs so that the "Son" program worked with the database and the "Father" worked with the user.

● By efficiently writing our own code and taking the MM/3000 programs off, we reduced the CST's being used and, therefore, opened up the machine to more users. In two years there will be 60 to 70 terminals on three HP3000's.

CONCLUSION

No matter what manufacturing system is used, packaged or self-written, it takes up to two years to get MRP working. A packaged system may help prepare the database but it often is too generalized to meet specific company needs. The best thing for a vendor to do is to sell a skeleton system that will let the user easily build his own custom package. It would be better to spend $5,000 for the skeleton and $20,000 for six months of consulting to educate and write the finished software. HP charged us $25,000 for the package and an additional $11,000 for consulting.

In my experience with IBM, DEC and HP there usually are similar areas that sales people fall short when proposing their equipment.

1. The initial hardwre cannot handle the database.

2. The software is too generalized and cannot be customized.

3. The combination of hardware and software does not meet the response time expectations of the user.

Hewlett-Packard hardware was our choice because it could be expanded as the company grows without rewriting software. IBM and DEC usually fall short here. The software is now our own so it can be customized. Response time got pretty bad, but it looks like our adding CPUs and rewriting more efficient software will get us over this last problem. We also feel that the HP3000/64 will be our next computer upgrade, especially if a better operating system (but upward compatible to MPE IV) is developed.

All in all it has been a struggle, but we feel we are seeing the light at the end of the tunnel. For a company whose people had seen very little real time database use of a computer we have come a long way since May 1, 1981. We have been called by a number of companies for assistance and find there are many out there with similar problems. We look forward to working with the HP/IUG Manufacturing Interest Group in the future and hope that many of you will do the same.