

SHOP MANAGEMENT SOFTWARE SELECTION

SUMMARY

This BMA, in the form of a checklist, is based on a detailed study of the needs of four tooling and machining job shops serving the aerospace industry. The study was conducted by Solion Systems, Inc., Dayton, OH, under an Air Force contract aimed at transferring technology to the subcontractor base.

Although the four companies studied were primarily machining companies, most of the considerations in the checklist will apply equally to toolmaking companies and to other one-of-a-kind situations.

NTMA is not aware of any software system nor any practical combination of software systems that will meet all of the requirements and recommendations listed here. In continuing work under its Air Force subcontract, Solion Systems is attempting to develop such a comprehensive package, and some functional modules are already in place and being tested in the job shops that are involved as test sites in the Air Force's Machining Initiative for Aerospace Subcontractors (MIAS) program.

Your company may not necessarily need all of the items included in this listing. You may also have additional special requirements that are not covered here. The intent of this checklist is to help you "ask the right questions" when considering computerized systems for shop management and control. The checklist is also useful for controlling shop operations.

The material contained here is condensed from a report issued by the Air Force Materials Laboratory and is used with their permission.

PART I - ASSESSING YOUR NEEDS QUOTE MANAGEMENT

- Permits rapid quote response over the phone or in writing
- Retrieves information on previous quotes for the same or similar jobs
- Ability to provide information on actual cost of last run (versus quoted price), items in stock, and open orders
- Ability to obtain history on past jobs by customer, by type of job, etc.

ORDER PROCESSING

- Order entry directly through the computer
- Salesman's commissions
- Linkages to customer quote, sales tracking, and invoicing functions
- Ability to compare purchase order to quote (and identify any inconsistencies)
- Ability to check status of open orders
- Reports of order activity by customer, by date, by salesman, by part (or tool), etc.

INVOICE PROCESSING

- Generates all invoices (upon demand for partial orders or partial shipments)
- Links to purchase order and shipping functions
- Invoice routine triggered when product is shipped, or at other predetermined points

SHIPPING AND RECEIVING

- Tracks due dates, instructions for packing and shipping
- Generates packing slips
- Shipping triggers invoicing through link to invoicing function
- Receiving function enters goods into inventory and alerts responsible person. Triggers an alert to the responsible person for quality inspection upon receipt.

PROCESS PLANNING

- Ability to define detailed process plans
- Includes: order number, part (or tool) number, part or tool name, customer's name, drawing number, material

requirements, tooling and/or fixtures required, and machine-group assignments

- Define detailed step-by-step operation instructions with standard labor hours
- Cover set-ups, various machine (and bench) processes, outside contractors' processes, inspections and tests, and shipping
- Generates routing sheet or "traveler" form to accompany the job through the plant
- Ability to update or modify previous process plans for similar jobs
- Ability to record approval of process plans generated
- Ability to handle "split travelers," rework, and engineering changes
- Ability to include machine capabilities, standard times, tolerance standards, etc.

JOB COSTING

- Ability to track total costs of the job, including vendor costs of material and components, outside subcontract work, tooling, etc.; internal costs of labor, equipment, overhead, etc.
- Ability to track costs of scrap and rework
- Machine hour costs and labor allocation for multiple machine must be determined by management.

PURCHASING

- Include supplies and vendor information on vendor certifications, capabilities, etc.
- Cover suppliers of materials, services, equipment, consumable supplies, and so on
- Supplier file to include company name, address, services/products, pricing, performance history, history of past purchase activity.

INVENTORY

- Provide information about material, work-in-progress, finished goods, tools and fixtures, supplies, etc.
- Ability to handle information on customer-supplied material (and semi-finished parts, etc.)
- Ability to alert the responsible person that material for open orders has been received
- Ability to track work-in-progress for outside (subcontract) operations.

PRODUCTION SCHEDULING AND SHOP ORDER RELEASE

- Ability to meet demands for new and existing orders
- Provide flexibility to meet rapid priority changes
- Ability to select most effective loading for on-time completion
- Provision for manual adjustment to correct over-commitment or under-utilization
- Provide alternative process plans
- Ability to review upcoming requirements
- Ability to update with available shop-floor information

- Provide information to determine if outside subcontract off-loading is required
- Ability to support both automatic or manual release of planned and unexpected orders
- Link with shop floor control system to monitor work flow permitting assessment of impact to work-in-progress before implementing changes.

SALES TRACKING

- Track salesman's performance
- Track individual purchase orders
- Track quotes won and lost
- Track repeat business
- Track performance to promised delivery date
- Calculate salesman's commissions

QUALITY ASSURANCE

- Handles records of receiving inspection of materials, subcontracted work, purchased components, etc.
- Logs first-article and in-process inspection data
- Processes rejection tags (based on inspection results)
- Provides documentation of inspection results, mil-spec requirements, etc.
- Inspectors are still required to "sign off" on approved items.

NOTE: Although not addressed by the Air Force study, many job shops may benefit from separate software modules to support statistical process control, process capability data for machine tools, and so on.

REQUIREMENTS PLANNING

- Includes review of resources needed to do the job (machines, material, tooling, supplies, labor, etc.)
- Ability to show most effective use of resources for current and anticipated work
- Requires input from engineering and/or manufacturing managers
- Serves as an aid for management review
- Determines machine loads and shift schedules
- Ability to calculate manpower and machine requirements
- Determines overall shop capability
- Develops standard times as input to other functions including process planning, production scheduling, etc.

SHOP FLOOR CONTROL

- Captures data on material and parts flow, machine times, bench work, man hours, rework, set-up time, maintenance, etc.
- Provides procedure for tracking split orders or travelers
- Tracks priorities and responsibilities established under other functions
- Provides data for other cost and planning functions
- Ability to load work center from existing and expected work order data

- Provides information on each work center load including job number, part or tool identification, operation sequence, starting date, scheduled due date, batch quantity, and number of parts or details completed
- Permits "dispatching" work by priority or due date
- Permits selection of alternate routing if a work station is not available
- Provision for labor reporting including job number, operation, part or tool identification, work completed, and hours
- Ability to maintain standard hours from labor data reported

ACCOUNTING SUPPORT

- To include accounts payable, accounts receivable, payroll, and general ledger
- Should be able to interface with other functional modules
- Single data base is desirable

INTERFACE CHARACTERISTICS AND REQUIREMENTS

- Each module should be integrated with each other
- Data files needed by other modules must be accessible
- Data base must interface with modules from dissimilar suppliers
- Duplicate or redundant data should be eliminated or minimized
- Permit updates by interfacing between systems (namely, between the system developer and the installation site). This may be accomplished by floppy disks, modems, telecommunication links, magnetic tape, etc.

PERFORMANCE CHARACTERISTICS AND REQUIREMENTS

- Permit multiple users and concurrent access
- "User friendly" format using menus, forms, and prompts
- On-screen access to data base information
- Ability to generate hard-copy reports
- Ability to maintain a reasonable response time

HUMAN PERFORMANCE REQUIREMENTS

- Can the system be learned and understood by all workers?
- What training will be required?
- What procedures will be necessary to switch from any existing manual or "paper" system to an automated one?
- What changes in procedures from the existing system will be required?
- Can operator use be simplified to require only simple keystrokes?
- Can data entry be automated with bar code readers, light pens, or other techniques?

HARDWARE REQUIREMENTS

- The computer "platform" selected is likely to be a micro or mini computer.
- It should have sufficient capacity to permit reasonable execution time and adequate storage.
- The system should support multiple users/workstations and permit multiple access at the same time.
- The system should be capable of handling both parallel and serial-type printers and should provide for offline storage.

INFORMATION CHARACTERISTICS AND REQUIREMENTS

- Consideration should be given to collecting and entering needed information automatically wherever possible.
- Forms, reports and procedures should be examined carefully to ensure that field sizes (the number of spaces available for data entry) are sufficient and appropriate.

SOFTWARE QUALITY ASSURANCE

- Is the system maintainable?
- Can you test for reliability of functions and for data integration?
- Can menus be checked for proper flow through the system?
- Can on-screen forms be tested for proper function and performance?
- Will the software supplier test or assist in testing upon installation?

PART II - BUSINESS DECISIONS

Many NTMA members are looking at the growing array of new software systems available to help with scheduling, job tracking, costing and estimating, and other job shop functions. While many of these systems offer great advantages in productivity and improved control, caution should be exercised in selecting the system that's right for your particular application.

If you select a system that doesn't work out, you probably won't be able to recover by simply selling it and getting something else. The use of common business sense can help avoid turning a great success into a great rip-off. Here are some suggestions based upon actual experiences of NTMA members:

1. Don't sign a contract until you know what you're getting into! Are there provisions to give you a reasonable "escape route" if the system proves unsatisfactory? Most software programs aren't sold outright in the usual sense. Instead, the software developer licenses the use of the software. Generally, users are prohibited from copying or reselling the programs. Even if you can successfully sell a used software program, the developer is not likely to support its use by a second owner. Selling a program

in this fashion might also make you liable to a lawsuit by the developer. Find out under what circumstances will the supplier take it back and give you a refund.

2. Find out about modifications. If modifications are required to make the software fit your application, find out in great detail who is responsible for what. Will you be given free customization with your initial purchase? If so, to what extent? Do you have to pay for customization? If so, how much and on what basis? Will the developer customize your system for a flat fee or only for an hourly rate with no maximum?
3. Find out what comes with the basic package—and what doesn't. Does the developer provide you with the source code for the software? If so, you may be able to get a third party, perhaps one of your own people, to do any needed customizing. However, the software developer will probably not be responsible for any "outside" changes.
4. Find out about the relationship, if any, between the software developer and the hardware manufacturer. Most shop management software systems are "dedicated" to one or only a few different computers. In some cases the software source may be able to sell you a complete system, including hardware. If you are buying a package from a single source, find out who is responsible for supporting the hardware and software elements.

Also, be advised that software systems may not necessarily perform identically on different computer systems. Slower response times, lack of 100% integration, differences in screens and reports, and other inconsistencies may exist from one computer platform to another. Some of these kinds of trade-offs can be cost-effective, depending upon your particular needs. But insist on knowing exactly what you can expect to get out of your system before you sign a contract.

5. Insist on training and support and follow-through after the sale. A number of NTMA members have had problems with suppliers over the training issue. The situation usually goes like this: the shop owner can't get the system to work, and the supplier says that the user hasn't taken the time to learn it properly.

Don't let your own situation get that far without first getting a commitment from the supplier, in writing, on how much and what kind of training will be necessary. Find out how much and what kind of training the supplier will provide—and at what additional cost, if any.

Then, follow through by committing the time and people needed to do the training. Keep records of the training conducted. Send your people out of your plant for training if that's the only way they can break loose from their daily job routines.

6. Find out how the software differs from your current system. Some NTMA members have invested in expensive job-tracking and scheduling systems only to find that their manual systems did the job better and cheaper. Remember that the main advantage to computerized systems of these kinds is in information processing. If entering the data is more cumbersome with the computer, such advantages may be washed away.
7. Be skeptical of users' endorsements offered by the supplier. Ask your supplier if you can see a complete users' list (not just those that are happy with the product). Find out if there is an independent users' group (as opposed to a "sweetheart" users' group dominated by the software developer). Are there additional costs associated with user group participation? Can the group help you locally, or over the telephone, or must you travel to distant conferences?
8. Try a realistic demonstration. Many software suppliers will offer a demo disk or a live demonstration at their facility. Try applying the demo to more than one typical job from your company, if possible. See if you or your own people can operate the demo without direct help from the salesmen. Follow the demo through your entire job cycle, from order entry through shipment and billing.

The demo may be your only hands-on exposure to the product before signing a contract. Be sure that the key people in your company who will use the system all have a chance to scrutinize the demo and raise questions.
9. Check NTMA's Users Reports. NTMA has a growing collection of members' reports on various software packages as well as on machine tools and other capital equipment. You can get these reports by calling NTMA's Technical Department (1-800-248-NTMA). Review the reports, and then call some of the users themselves. Is their application similar to yours? A special machine builder with long job cycles, lots of bench work, and high subcontract content might have a completely different opinion of a given system than a prototyping machine shop that handles lots of short, machine-intensive jobs, for example.

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