

THE SEVEN DEADLY SINS

James R. Pawlik, CPIM, *Mentor Sciences International*

Historians tell us that almost every lecture given during the middle ages had as its principle subject, "the seven deadly sins or virtues". Today, despite heavy investments in computer hardware, software, and consulting services, many manufacturing control systems operate as if they were designed during the dark ages.

It seems appropriate to identify seven common pitfalls that collectively or individually can limit the utility of a materials management system, and to describe techniques that can be useful in eliminating or avoiding them.

Removing these obstacles may not create a "Camelot" environment for materials personnel, but will yield a basis for the management decisions required to cope with the uncertainties and variabilities of markets, lead times, and cost that will be experienced during the eighties.

The "Seven Deadly Sins" as described by Dante were as follows:

1. Lust
2. Gluttony
3. Avarice
4. Sloth
5. Anger
6. Envy
7. Pride

Experienced practitioners, who have installed or have tried to install materials control systems, will recognize the seven following pitfalls as modern day equivalents of Dante's deadly virtues. In our installation efforts, if we ignore the following considerations, we will most certainly be accused of committing them by users of the system.

1. Set Realistic Goals and Objectives and Estimate the Resources Required to Achieve them. (LUST)

The capital outlay for an on line, interactive, integrated manufacturing control system is significant. Depending on company size, the investment in hardware and software can range from about two hundred thousand dollars minimum to several million for a large, complex system. Adding to this the man years consumed in design, installation, and training, it becomes obvious that careful attention should be paid to identifying expected benefits.

To obtain appropriations, justification analysis is required. Conservative estimates of improvements in tangible measures should be made for alternate approaches. Some examples of key ratios, percentages, and other measures are:

Average Inventory Investment
Inventory Turnover
Frequency of Stockout
Operating Efficiencies
Customer Service Levels
Direct & Indirect Labour Costs
Materials Costs

Bogies should be estimated for improvement in key measures, and target curves that display improvement versus time should be constructed.

Intangible benefits should also be determined, and the qualitative values described as clearly as is possible.

A system should only be purchased and installed if it meets the same cost versus benefits criteria that a piece of production machinery must meet. By properly justifying the system and identifying reasonable improvement, unrealistic expectations (and resulting LUST) can be avoided. The threat of changing horses in mid stream is also minimized.

2. Develop Statements of Requirements and Select the Right Software. (GLUTTONY)

The old Latin phrase "caveat emptor" has rarely been more appropriately forewarning than when applied to computer software, hardware, and peripherals. A survey of manufacturing software products taken less than one year ago revealed that fewer than 50 percent of the vendors have actually installed an operating MRP system.

To develop a statement of requirements for your company, the information needs must be totally identified. Vendors can be extremely helpful if given accurate base data. Many have created algorithms useful to determine main memory and disk storage requirements. Both the number of terminals and expected response time can usually be accurately estimated for on line interactive systems. Both base and design year data (based on an extrapolation of base year data or management defined growth factors) should be determined as completely as possible. The steps to follow in determining requirements and selecting equipment and software are as follows:

- 1) Develop a profile or fact sheet on your company, its products, and services. (See Figure 1).
- 2) Identify hardware and software vendors and obtain information. Use your fact sheet to solicit literature and systems descriptions.

3) Select vendors and determine systems requirements and costs. If the vendor determines requirements for you make sure that he understands your data and can explain his methods.

4) Obtain and review formal quotations from two or more vendors, try to arrange field trips to visit existing sites with complete installations in similar industries. Prepare a reference list of questions. (See Figure 2). If possible try to visit the main office of the vendor. Determine the location and method of rendering field service.

5) Determine customization requirements and firm prices for modifications. Find out maintenance availabilities and the cost and frequencies of enhancements.

6) Select supplier(s) and develop an implementation and installation schedule indicating dates and specific responsibilities.

By carefully analyzing needs, you can find the best system and avoid the cost and delay associated with large scale custom modification (i.e. GLUTTONY).

3. Involve Management and Operations Personnel. (AVARICE)

Developing and maintaining user interest is perhaps the most important key to a successful systems installation. By involvement, we mean active participation during the specification stage, and acceptance and satisfaction during the implementation phase.

The thought process, information, and existing source(s) must be understood prior to any attempt to introduce or explain a new system. Computers and in particular video terminals tend to arouse phobias in the uninitiated. Uncertainty and anxieties can be overcome by a genuine interest in the information requirements of manufacturing personnel. Discovering or incorporating a function that is uniquely helpful is a real asset when converting "your system" into "their system".

By conveying the conception that computers are tools that do very well and fast jobs that man does slowly, and therefore provide time to think about operations and freedom from mundane tasks, the prospects of an open-minded attitude are increased. Cooperation becomes almost a certainty and a large hurdle on the path is cleared. (i.e. AVARICE).

4. Develop a Realistic Implementation Plan. (SLOTH)

We have established a requirement for realistic objectives and a reasonable

return. An implementation plan is a key to timely realization of these objectives.

The classic approach in which selected modules of a system usually starting with inventory and order entry modules are brought up one or two at a time over an installation horizon of one to two years is rapidly becoming passe for many good reasons:

- a) The improvements and cost benefits of using MRP are not at all realized for nine months to two years.
- b) Management begins to become disturbed about continually sinking funds into a system that promises to yield results in two to three operating quarters despite a justifiable return on the original appropriation.
- c) Operating personnel quickly lose enthusiasm for a system that does not produce tangible results.
- d) Installation synergy wanes, and the people that worked to build inventory records that are 98.375 percent accurate become lethargic about maintaining them at that level of accuracy for no immediate reason.

R.G. Brown of Materials Management Systems Inc. recommends what he calls "vertical implementation". Using this approach, the entire system is brought up as soon as possible for about one half a dozen items. Additional items are added after the original six or so are understood and are under control.

Vertical implementation using an ABC analysis is by far the best approach. Starting with the recommended six, additional items are added until all end class A end items and their components and subassemblies are under control. "B" items and finally "C" items are added to complete the installation. If an "ABC" analysis is not available due to lack of data then sampling or good estimates can be used.

It is a comfortable situation to be able to report that after less than three months on the system, eighty percent of the inventory is under control, and more than 90 percent of the originally projected saving in carrying costs, ordering costs, idle time and lost sales will be achieved on an annual basis!

The prior recommendation that a software system have all modules and functions operational at time of purchase becomes of paramount importance if this installation method is selected.

Vertical implementation requires that key representatives from all operating departments receive training in the use of the new system. Input data for the items initially introduced must be accurate and current at installation time.

Today, a reputable software supplier can load a package on your hardware, and be ready for data entry or file

conversion in a matter of hours! A thorough implementation plan can make the actual installation process equally swift and efficient.

Listed below are some key recommendations for the development and control of such a plan:

1. *Be conservative about lead time estimates for both equipment and tasks.* Suppliers of computers and other hardware have been known to be fickle about meeting delivery dates, and just when you will actually receive equipment is often a function of business and market conditions for your vendors. Plan on revising your schedule frequently to adjust for early and late completion dates. Forward schedule the first time around, then use backward scheduling to revise due dates for project items. Remember that copies of the schedule are often the only communication that key managers have about the project for many months prior to their involvement. Try to keep it current and realistic.
2. Use critical path analysis, Program Evaluation and Review Techniques (PERT), an Indian Seer (?) or whatever works to establish project nodes, start and completion dates, but exhibit the schedule in clear Gantt format. Indicate clearly department(s) and person(s) responsible for completing project items.
3. Issue revised schedules frequently. Use issue control letters to indicate revisions, and footnotes to indicate reasons for changes. Avoid distribution of long verbose status reports.
4. Include vendor responsibilities on your schedule, and either place them directly on your distribution list, or assign the responsibility of verifying critical delivery dates to someone in purchasing.

A "state of the art", closed loop manufacturing control system can be installed and fully operational in less than one year for a typical discrete manufacturer. Careful planning, monitoring, and timely adjustments are required of a sound implementation plan. Cooperation can be maintained and (SLOTH) the development of a lack of interest can be avoided.

5. Write Standard Operating Procedures. (ANGER)

Departmental operating personnel are not systems experts, and have no a priori understanding of how to interface with and utilize the new system. Therefore the better the documentation, the better are the chances of satisfaction and immediate results from use of the system.

Systems and in particular canned software packages must be integrated into the day to day operations of users. Headings on input documents must match prompts for input data, procedures for correcting errors and omissions, and back up procedures for use in the event of extended downtime must be clearly understood.

Software vendors are developing improved user manuals and their systems now include user orientated interactive prompts. These tools make the task of developing procedures easier, and their documentation should be considered a useful core to build a thorough set of standard operating procedures around. The analyst should obtain a thorough understanding of existing methods and their counterparts in the new system prior to beginning the documentation process. Actual writing of the procedures should take place while observing operations. This will guarantee accuracy, and allow the training and documentation phases to be combined. Department personnel can use a draft of the operating instructions, and questions can be answered, omissions uncovered, and clarifications made prior to formal distribution of manuals. Minor customizations can also be made during this period such as changing file names, field sizes, and introducing constants for data that does not vary to minimize entry time and effort. A familiar term appearing on a screen prompt replacing a foreign one can be a "real security blanket" to the uninitiated first time user.

After completing detailed documentation for each module and function of the system, the analyst should employ a little value analysis. It should be easy to identify commonly used input codes and answers to common questions. This information can be organized onto a six by ten inch card. Most input terminals allow ample room to attach customized input and inquiry instructions next to the viewing tube for a quick reference by the user. You do not know of a better method to assist new users in working with the system. You will be amazed at how fast users assimilate the information on these cards given the secure feeling of knowing that they are there for immediate reference.

It has often been said that there are two categories of decisions which can be made in any business. These are genuine and routine decisions. Routine decisions being those for which policies have been established and little analysis is required. Genuine decisions being nonroutine and requiring considerable thinking. Effective management may then be defined as the process of minimizing the number of genuine decisions that must be made or maximizing those that are routine. Well written standard operating procedures are therefore a hallmark of a well managed manufacturing system.

By providing a key to effectively use systems functions and information, frustrations are eliminated (ANGER) and tempers kept calm.

6. Train Users (ENVY)

Training users means something more than teaching personnel how and what to enter into the system. True edification and interface instruction teaches the user why they input information, and what can be accomplished with the resulting answers and calculations provided by the system. Everyone who has ever tried to install a system must have been confronted by the hard nosed cross armed company veteran with the "show me" attitude. It is pathetic that despite the ballyhoo and hoopla about "MRP" systems, many systems fail miserably because users feared them. How many of us have heard comments like: "I have been planning requirements around here for the last twenty years, and understand this business – so let me see your machines do a better job." This user is more than likely to let the system recommend an absurd requirement and do nothing about it. He unconsciously wants to prove that he knows more than the machine. Why? Well, maybe he experienced the typical "how to enter that" and "when to enter this" type of training that has little time for how to interpret results. The process of getting the practitioner to realize that the "machine" is not there to replace his experience, but to augment its value by minimizing the arithmetic chores he must perform and daily expediting and identifying problem areas and inventory balances with the potential to become problem areas.

Case studies and actual decision making simulation exercises are an important part of an effective training program. Familiarity with the theory and operation of the system is important. When an experienced practitioner gets to the point that he can recognize an absurd requirement has been generated by a bill of materials, quantity error or an unreasonably long lead time, and can take appropriate corrective action, he is ready to really use the system. More importantly, when he realizes that making corrections yield requirement quantities that he is in agreement with, he then trusts the logic of the system. This combination of understanding and experience is far too rare in American Industry.

Situation training sessions and the need to develop formal strategies and decision rules for production planning and inventory control remain key areas for the use of outside consultants to yield fertile and profitable results. Far too often companies invest thousands in sophisticated, "Net Change" MRP systems, but try to drive them with so marketing forecasts getting disastrous results and not understanding why. The

need for true training in manufacturing control systems often extends far above the practitioner level into the board room where the decisions to acquire expensive and sophisticated computer systems are really made.

The theory of a sound manufacturing control system is neither vague nor abstract, and is eminently logical. By making sure that users understand, and are comfortable with the system mistrust (ENVY) is avoided, and maximum utilization is obtained.

7. Institute a Maintenance Program to Solve Problems and Enhance the System. (PRIDE)

Installation of a manufacturing control system requires much more than merely putting the system up on a computer and training users. Almost from the minute the system is switched on, things begin to deteriorate, change, or go wrong. Your company is a dynamic entity with requirements that are constantly changing, and new priorities arising daily.

An effective maintenance program is an essential requirement of a successful manufacturing control system. Production rates and machinery benefit from a preventative maintenance plan that prevents expensive catastrophic failures. Under such a plan parts are inspected, lubricated, and replaced at routine intervals based on the number of parts run or the number of hours in use.

Routine tasks that maintain the effectiveness of your manufacturing control system should also be defined and described in a system manager's manual. It is the system manager's responsibility to see that these maintenance procedures are completed as prescribed in the manual.

Audit trail recorded should be maintained on key transaction files, and examined for correct entries by authorized personnel.

If the system is on line and interactive the password file and security codes should be audited on a monthly basis and changed periodically.

If flags have been set fixing fields at constant values, the flag condition and values of the constant should be checked at predefined intervals.

Problems should be examined promptly and a docket kept identifying the problems, proposed solution, date reported, and estimated solution date. The system manager should review past due problems, and see that they are rescheduled.

The opportunity to suggest changes, request special or new reports, and enhancements should be provided to operating personnel. Status of such requests should be maintained in a separate log. The submitter should be

informed of the expected installation date if the suggestion is accepted. If not, a brief explanation should be provided.

Enhancements offered by software vendors can be installed with the approval of users when found to be of benefit. Care must be taken not to destroy custom software by writing over it when installing enhancements.

Like a fine watch or automobile fine manufacturing systems need maintenance to operate efficiently. By maintaining a flexible attitude to the need for change, and listening to user needs, you can keep your system functioning as a useful tool and avoid animosity (ENVY).

Selected References for Further Reading:

Albert, Kenneth J. *Handbook of Business Problem Solving*, McGraw-Hill Book Co., New York, (1980) pp 6-1 6-75.

Brown, Robert Goodell *Advanced Service Parts Inventory Control*, Materials Management Systems, Inc., Norwich, VT (1982).

GANE, Chris-Sarson, Trish *Structured Systems Analysis*, Prentice-Hall, Inc., Englewood Cliffs, NJ, (1979).

Valentine, Raymond F. *Value Analysis For Better Systems and Procedures*, Prentice-Hall, Inc., Englewood Cliffs, NJ, (1970)

Wolf, Arthur E. *Computerized Plant Information Systems*, Prentice-Hall, Inc., Englewood Cliffs, NJ, (1974).

Autobiography-James R. Pawlik CPIM

Mr. Pawlik has more than fifteen years of experience in the analysis, design, and implementation of solutions to complex problems in manufacturing and physical distribution. A management consultant for the past seven years, he has been associated with ACME firms. Prior to his consulting career, he has held senior staff level positions in Industrial Engineering with three manufacturing firms.

His education includes a Bachelor of Science degree from Roosevelt University, graduate study as a National Science Foundation Fellow at the Illinois Institute of Technology, and graduate courses in business at Northern Illinois University.

Mr. Pawlik has published papers on applied management science, and is a frequent lecturer at national conventions and local meeting of professional societies. He is a Senior Member of the American Institute of Industrial Engineers, and maintains active membership in the Operations Research Society of America and the American Production and Inventory Control Society.

WEAR THE TIE

Each member should wear the tie as a symbol of pride in our profession. Our BPICS ties in maroon and dark blue cost £4.00 when ordered from our Society's National Office.