

# MRP and the DOD Solution

by Gregory L. Fordham, CPA, CIA, and Joel C. Polakoff, CPIM, CPM

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MRP is an acronym that is often associated with both material requirements planning and manufacturing resource planning. Although these terms are frequently interchangeable, they do designate differing degrees of manufacturing management systems.

MRP has been used loosely by many in government contracting to describe any form of computerized manufacturing management and scheduling system. The subject of MRP burst onto Washington's center stage with all the force of scandal. There was talk of a secret handshake deal between the Department of Defense inspector general (DOD IG) and the Defense Contract Audit Agency (DCM) that would have both offices join forces and "stick it" to contractors. There were reviews of 25 contractor MRP systems –all of which revealed serious deficiencies. There were estimates that the government is being overcharged between \$4 billion and \$50 billion as a result of MRP systems. There was even a federal grand jury investigation and a series of congressional hearings.

Although it looks as if cooler heads will prevail, the outcome of the MRP controversy currently rests with the acceptance of a DOD proposed rule on MRP systems. The proposed rule accompanies this article. Should the proposed rule fail to win acceptance, Congress will most certainly resume its efforts to legislate a solution, specifically H.R 3140.

Thus the question is should the proposed rule be accepted and incorporated into either the Defense Federal Acquisition Regulation Supplement (DFARS) or the Federal Acquisition Regulation (FAR)? The

answer is no. It should not be incorporated into either set of regulations, for three reasons.

First, many problems have been uncovered and associated with MRP systems, but few are unique to them. The proposed rule addresses these problems as they relate to MRP only, not as they relate to other environments.

Second, the degree to which the proposed rule establishes system requirements and performance specifications is unparalleled in the remainder of the regulations. The incorporation of regulations that set standards for MRP without regulations setting similar standards for all other business systems would only cause greater confusion and controversy.

Third, the regulations already contain many provisions that can be used to accomplish the same results as those sought by the proposed rule. If MRP concepts are to deliver the same benefits to defense contracting that they have brought to other commercial applications, however, some provisions of the regulations need to be reconsidered. Each of these reasons is discussed below.

### What Are the Problems with MRP?

Last year there was much discussion about the deficiencies found in MRP systems and whether MRP concepts could be implemented in the defense contracting industry. As a result of its reviews, the DCAA published a listing of the 10 most common system deficiencies (see Appendix 1). In addition, the DCAA revealed several system weaknesses that contributed to the deficiencies (see Appendix 2). Reviewing these lists, one can categorize the problems into several areas: improper accounting methods, defective pricing, faulty production scheduling, faulty systems design, and poor system implementation. To say the least, none of these is unique to MRP.

With regard to improper accounting methods the DCAA has found several deficiencies in MRP systems, most of which involve the inconsistency of a contractor's accounting methods. For example, part of the MRP logic is to treat the inventory as a common resource pool. As priorities change, the system allocates the resources of that pool to where they are needed most,

attempting to match need dates of orders to due dates of expected materials. Because of the extensive cost and accounting principles in government contracting, contractors often have one cost flow assumption for their government operations and a different cost flow assumption for their commercial operations. When the MRP system allocates inventories, it frequently does so across the boundaries of the contractor's government and commercial operations. Consequently, inconsistencies have occurred in the costing of the inventory items.

Other deficiencies were uncovered in contractor accounting and costing systems. Some were strictly a misapplication of principles such as the cost accounting standards (CAS). In any case, these kinds of problems are neither new to government auditors nor unique to MRP.

Many defective pricing issues accompany MRP, one of these results from the MRP netting process. Because the MRP system allocates inventory based on system priorities, there can be no guarantee that the items purchased for a particular contract will ultimately be used on that contract. MRP thrives by minimizing in-house inventories to meet total requirements. Without this the MRP explosion process would be ineffective. The contractor's failure to disclose this information and its effect on contract pricing is a potential defective pricing issue; however, defective pricing is not a new problem nor is it unique to MRP.

Faulty production scheduling received much attention during the hearings. Of concern to committee members was the practice of contractors to "front load" their contracts with the purchases of all the materials needed to perform the contract and its options. Once purchased, the inventory became part of the resource pool. As priorities changed, the materials were reallocated to other contracts, including commercial contracts. In essence, the contractors were supposedly earning higher profits on their commercial work because all of the inventory carrying and finance costs were being paid by the government. Although a MRP system might make this practice more efficient for contractors, it is not a new practice nor is it unique to MRP. The impropriety of such practices by a contractor are more obvious with a MRP system, however, because they are contrary to the system's goals.

The consequences of faulty systems design also received much attention during the controversy. The most prominent areas for discussion surround how the borrow/payback should be handled, who has materials ownership,

and whether the audit trail is adequate. In essence, if the contractor has excess materials on government contracts but has shortages on commercial contracts, can the contractor borrow from the government and "pay back" the materials at a later date? How should this be documented in the accounting records? Again, these are not new problems. Furthermore, the many sections of existing regulations dedicated to this area give evidence that it is not unique to MRP.

Poor systems implementation is a direct result of poor systems design and general disregard for the advice of various experts when implementing a MRP system. The specific problems in this area are high system error rates, poor documentation, and lack of system understanding by contractor personnel. Although each of these areas is important to the success of the MRP formal system, none of these problems should be thought of as new or unique to MRP. The existence of high error rates in the formal system of many business applications is not unusual. A high error rate in the formal system, however, does not necessarily mean the informal system is equally unreliable and that the total system is without benefit. High error rates in a computerized application often indicate poor data input controls. Poor input controls are not new to data processing nor are they unique to MRP.

Poor documentation is another common complaint in every type of computerized system. The lack of system understanding by company personnel is a common problem. It often seems there is an inverse relationship between system size and complexity and the level of system understanding on the part of company personnel.

These problems are neither new nor unique to MRP. Instituting regulations that address these problems in a specific environment, such as MRP, while not addressing the underlying causes is like worrying about a fly speck when one has the entire ceiling to paint. Furthermore, there are no regulations for contractor job cost systems, inventory systems, estimating systems, etc. Accounting and administrative controls are just as important for those systems. If similar regulations are not needed for them, why should a regulation be needed for MRP systems?

Setting the Standards for MRP

A great deal of thought has gone in to the need for MRP system standard, Currently, there are no standards governing the use of MRP systems in government contracting. If such standard existed, many believe it might be easier to monitor the problems that have be associated with MRP systems and thus protect the government's interest. Although such a concept has many merits, instituting specific standards for MRP will only cause greater confusion and controversy.

These problems will occur for several reasons. First, there are no standard for other systems provided in regulation. Second, the proposed rule emphasizes the formal system. Third, MR is not one system but a collection of many systems. Fourth, the proposed rule lacks a definition of MRP.

Although the federal procurement system is guided by many regulation the preeminent portions of these are contained in the FAR, which is contained in Title 48 Code of Federal Regulations (CFR), Chapter 1, and comprises more than 1,200 pages of material. In all of this, only one contractor system is described in any detail –the contractor's system for managing government property– discussed in the 12 pages of FAR Subpart 45.5. Perhaps the only reason the government has set any standards for property systems is that as stated in FAR Section 45.505, "the contractor's property control records shall constitute the Government's official property records..."

All other contractor systems, such as, job costing, inventory, general ledger, accounts receivable, accounts payable, order entry, contract administration and estimating are neglected. This is as, it should be. The regulations have clearly established a method and desired outcome for federal procurements. It thus becomes the contractor's responsibility to develop methods and systems that, satisfy regulation objectives and company goals. Not only does the proposed rule detract from the status quo through micro management, it infringes on the contractor's fundamental right to operate its business in the best manner for itself and the government A micro management approach will only increase the amount of controversy surrounding MRP systems.

The proposed rule establishes various standards for a MRP system; however, they are directed toward the formal system only. The formal system is the way things should work; the informal system is the way they do work. The items in the proposed rule that require accuracy rates of 95

and 98 percent have been taken from some popular literature that uses these same rates to evaluate the significance of the formal system in an organization's manufacturing management operations. In other words, they have nothing to do with the accuracy of the overall system.

In this respect the proposed rule goes too far. The purpose of regulations should not be to dictate to contractors how to accomplish contract objectives. Furthermore, placing too much emphasis on the formal system could result in problems for the government. Primarily, auditors could become more likely to rely only on the information captured by the formal system and ignore the effects of the informal system. This in itself is not in the best interest of the government or the contractor. The existence of an informal and formal system, especially in manufacturing management, is well documented. Increasingly, emphasizing the formal system while ignoring the contributions of the informal system will only create additional problems.

MRP is not a single system, but a collection of systems. In the aerospace and defense industry MRP includes engineering, work order processing, material and capacity requirements planning, job costing, order entry, inventory control, purchasing, accounts receivable, accounts payable, payroll, general ledger, estimating, bidding, and cost and schedule performance measurement. Item 5 of the proposed rule requires the contractor to have a 95 percent accuracy level for inventory records. Why should a contractor with a MRP system be required to maintain a certain level of inventory accuracy, and the contractor without a MRP system not have the same requirement?

Inventory accuracy is a common problem. Auditors have long been able to perform audits of systems with error rates in the past. Why do they need an accuracy standard for MRP? What benefit will the government derive from having such a standard? Is the effect of the informal system ignored? What happens if the contractor's formal system fails the standard? Is the contractor notified? Is the progress payment rate reduced? Are costs disallowed? If so, by what formula? If the contractor's system fails any of the standards, will the contractor be exposed to the penalties of having made false statements on invoices or proposals? The proposed rule would only promote additional controversy. These are but a few of the obvious questions that will arise should the proposed rule be accepted.

A final problem with the proposed rule is that it lacks a definition of MRP. One needs only to read various texts and technical journals to understand that MRP has various meanings to various manufacturing environments. Some recognize two types of MRP; others speak of three or four. Still others describe various types and classes of MRP systems such as process, discrete, and repetitive. MRP can range from something as simple as an order launching system to a sophisticated, fully integrated business management system that completely drives a company's manufacturing, finance, and marketing processes.

In the case of the proposed rule, at what level will the 95 percent inventory accuracy rate be required? Will it be required for anyone having computerized inventory records? Will an inventory system be considered the same as a MRP system? If a definition is developed for MRP systems, what will stop contractors from modifying their systems so that they can avoid a set of standards that are otherwise unparalleled in the regulations?

In all, the proposed rule would only create further controversy, and would not solve the problems at issue. It is silent as to its application. Standing alone in the forest of procurement regulations, it oversimplifies the problems of a bigger picture. Each of these elements is a reason not to implement the proposed rule and a discussion of why it will inevitably cause more problems than it will solve.

### The Applicable Regulations

MRP has an established history in the commercial sector. It has also developed a respectable track record for reducing manufacturing costs and customer deliveries. The potential of cost reduction has the government interested in MRP concepts. If government contractors can obtain the same benefits from MRP that their commercial operations have produced, MRP is expected to yield a 25 to 35 percent cost savings with a 90 percent reduction in overtime hours.

MRP systems have been able to deliver these kind of results because they optimize on-hand inventories by adopting an approach totally different from the classical reorder point techniques frequently taught in school and widely implemented for years. MRP ignores the classical order point, order up to methods, and concentrates on establishing priorities and capacity for dependent and independent demand items. Under this

methodology MRP systems are able to efficiently schedule what is needed when it is needed.

Because MRP techniques are totally different and require a different management style than what a company may be use to using, companies often have problems implementing MRP systems and maximizing the benefits brought by the formal system. In fact, it is a constant battle to stop the informal system from taking over. Likewise, there are problems with the current contracting regulations that will prevent the government from maximizing the benefits of MRP concepts. Problems exist in four areas: proper time phasing, the borrow/payback, commingling of inventory, and title.

### Proper Time Phasing

The DCM has already identified the problems associated with improper time phasing, which is not only bad for the government, it is contrary to the goals of MRP. Examples of improper time phasing have been found in contracts having progress payments. Contractors have "front loaded" their contracts with materials purchases, their MRP systems skewed to improperly determine priorities and capacity. This practice by contractors subverts the goals of MRP and as a result inventories are not optimized. The proposed rule tries to address the need for proper time phasing with item 2. Some suggestions for solving the problem would eliminate progress payments. But the need for proper time phasing is not limited to cases with progress payments or even fixed price contracts; it is needed for manufacturing management in all types of contracts whether the contractor does or does not have a MRP system.

Costs are a driving force in many areas of federal procurement policy. In many cases, such as progress payments, incurred costs are the basis for a company's periodic billings. The question then is what power does the government have to protect itself from the costs associated with improper time phasing? As it turns out, the government has substantial protection. Federal regulations are explicit as to costs and cost allowability -see FAR Subsection 31.201-3 and the requirement of reasonableness for cost allowability.

If a contractor has improperly time phased the purchases of materials for a contract, with or without the aid of a MRP system, how can those costs be

considered reasonable? If the contractor has improperly time phased the purchase of materials then he would not be able to support his actions as those of a prudent businessman acting in the best interest of the government (FAR Subsection 31.201-3(c)).

For a more explicit approach the government could also enhance the various payment clauses. For example, the progress payments clause, FAR Subsection 52.323-16(a)(3)(i), could be enhanced to say that examples of costs that are not reasonable or allocable are costs of materials and materials purchases that are improperly time phased.

The government has other approaches in addition to the reasonableness concept. In FAR Subsection 52.232-16(c)(3) the contracting officer (CO) can adjust the amount of progress payments, the liquidation rate, or both if he finds that "inventory allocated to this contract substantially exceeds reasonable requirements." This passage could be enhanced to say that it means, but is not limited to, properly time phased materials purchases. Likewise, the other payment clauses could be similarly enhanced to allow the CO to reduce or withhold payments because of improperly time phased materials purchases.

This approach is simple and straightforward, and promotes the government's objectives in all cases of materials purchases. It would not be limited to fixed-price contracts, progress payments, or MRP systems. The proposed rule's contribution to the regulations is not needed. The government already has adequate protection against irresponsible contractor actions; however, if the government believes more protection is needed, it should enhance the regulations as suggested above, but a rule that addresses the problems of improper time phasing as they relate only to MRP should not be accepted.

#### Borrow/Payback

There has been much discussion of the borrow/payback method. Specifically, the borrowing contract must absorb any changes in price between the cost of the borrowed materials and the cost of the payback materials. This procedure is not used in commercial MRP systems. To implement it in government contracting, many existing MRP systems will require additional programming and computer resources.

Despite that everyone seems to accept the borrow/payback principle, what is its basis and rationale? Is it reasonableness or allocability? Is it the requirements of FAR Subsection 31.205- 26(d)? Is this principle applicable in all cases, or is it merely another attempt by the government to encroach on a company's responsibility to utilize and schedule its resources as it sees best?

Imagine a scenario where a contractor purchases materials for a specific contract. Soon after, an error in the contract specifications delays the contract's performance. The contract is rescheduled pending resolution of the problem; consequently, the materials are reallocated to other contract efforts. When the delayed contract is restarted and inventory is allocated to it. Should the materials be cost at their new replacement value or at their original value? Are the price differences the consequence of a delay? Are they properly chargeable to the contract under the Changes clause? Is it proper for the contractor to reallocate the inventory and try to mitigate its damages?

Production management is a dynamic environment The MRP system recognizes this and focuses on establishing priorities and capacity. In MRP, inventory is a resource pool. The concept that a particular materials purchase is dedicated for a specific contract is unrealistic in a MRP environment. Instead, the materials are purchased to meet the priorities and capacity constraints established in the system. In essence, the materials purchased benefit the organization, not the contract

The costing method that has been developed to handle the borrow/payback is a hybrid process developed to reduce the chance of cost manipulation and the shifting of overruns among contracts. In reality, it only complicates the system and provides the government with no real benefit The method should be abolished and materials should be costed at the price they are finally allocated for processing and not at the price they are originally allocated by the system.

### Commingling of Inventory

During its reviews the DCM analyzed MRP systems at production plants with fixed-price contracts and progress payments, but not in other types of contract situations. Throughout this process the DCM has thrust in the face of contractors the provisions of FAR Section 45.507, which requires

that "government-owned property shall be kept physically separate from contractor-owned property." Seemingly overlooked is FAR Section 45.502(c)(2), which states "Property to which the Government has acquired a lien or title solely as a result of advance, progress, or partial payments is not subject to the requirements of this subpart"

Thus, in all of the locations where the DCM has reviewed MRP systems, contractors are not subject to any of the provisions of FAR Subpart 45.5 that prohibit the commingling of inventory.

Despite the DCM's apparent blunder, the concern over commingled materials has much significance for the success of MRP. MRP attempts to lower inventory carrying costs by minimizing the inventory on hand; a benefit that will be seriously reduced if the materials for all contracts must have separate storage facilities. Although separate storage is not required for contracts with progress payments, separate storage will still be required for other types of contracts. Consequently, a change in regulations to permit the commingling of materials is necessary if the full benefits of MRP are to be realized.

This controversy is not unlike a regulation change that occurred in the grant program. Years ago that program required grantees to maintain separate bank accounts for each grant. This is no longer required; grantees may now commingle funds from differing grants in the same bank account, but the grantee must be able to account for all funds individually. This is how contract inventories should be managed. As long as a contractor can account separately for the materials, it is in the government's and the contractor's interest to use the same storage facilities for like items. The provisions of FAR Subsection 45.505-3(f)(2)(ii) should be eliminated from the regulations.

#### Materials Ownership (Title)

The MRP logic views inventory as company owned; however, regulations vest title with the government. This is a major problem and one that threatens the success of MRP more than any of the others. The difficulty is twofold. First, the government's claim to title reduces the ability of the MRP system to optimize inventory across the board. Second, the regulations impair a contractor's ability to allocate the inventory on a timely basis.

The vestiture of title and the timing of title transfer is described in detail in each of the various payments clauses (FAR Subsections 52.232-16, 52.245-2, and 52.245-5). Essentially, the government claims title to the inventory the earlier of when the contractor is reimbursed for the inventory, the inventory is issued for contract performance, or the inventory is processed or used in contract performance. In the case of progress payments, the clause claims vestiture of title but there is some doubt as to whether the government has title or merely a lien on the materials.

Whether the government has a lien or has title is probably irrelevant to the MRP controversy. The fact that it does have one or the other prevents the MRP system from treating all inventories as company owned and thus restricts the system's ability to allocate inventory resources purely on the basis of priorities. Simply stated, the government's claim to title prevents the MRP system from treating the inventory as a single resource pool. It must instead view the inventory as two pools, a government pool available only for government contracts and a company pool available for either government or commercial contracts.

Despite the significance of the government's claim to title, there has been little discussion of its effect, the debate centering on any of the other topics instead. The closest any discussion comes to addressing the title issue is when it addresses FAR Subsections 32.503-15(d) and 52.232-16(d)(5), which require the contractor to obtain permission from the administrative contracting officer (ACO) before transferring, for other uses, government materials on fixed-price contracts with progress payments. The same concepts are covered for other types of contracts in their respective payments clauses (FAR Subsection 52.245-2(d) for fixed-price contracts and 52.245-5(d) for cost-reimbursable, time and material, or labor hour contracts).

If contractors are to get ACO approval before letting the system allocate materials, little benefit will be gained from the MRP system. The DOD was quick to recognize this problem, and is allowing contractors to transfer materials between contracts without getting previous ACO approval as long as the contractor reports the results within one month.

This new DOD policy is unclear in its application. Primarily, does the privilege extend to transfers between government and commercial contracts? If so, the policy is contrary to the government's claim of title. Is

the DOD setting the stage for another DivAD fiasco? If the privilege is limited to government contracts only, the government needs to revise the current policy so that this limitation is made clear. Next, it should modify the notification requirements as they exist in the above cited FAR Subsections so that they are in agreement with the new policy. In either case, regulations must be modified, but in the latter instance, the benefits of MRP will be eliminated.

Each of these problems, government claim to title and materials transfer procedures, is a significant threat to the success of MRP. If the government decides to hold fast to its title claim and its advance transfer approval procedures, the benefits of a MRP system are eliminated. Millions of dollars of contractor investment and a competitive advantage would be wiped out

Before MRP can be accepted in government contracting, government officials will have to weigh the importance of protecting the taxpayer's investment in materials versus the benefits to taxpayers that can be obtained by the adoption of proven MRP concepts. Deleting from the regulations the government's claim to title for materials will result in the government's getting the most benefits from MRP. Keeping the title requirements but allowing contractors to unilaterally transfer materials between government contracts will preserve some MRP benefits. Any provision that restricts both will undoubtedly doom MRP for the defense contracting industry.

MRP is a method for efficiently managing and scheduling manufacturing processes by recognizing the differing behavioral characteristics of independent and dependent demand items. Consequently, MRP subordinates the classical order point methods of manufacturing management to the more important tasks of establishing priorities and capacities. The system then views the material inventories as an organizational resource that can be used to accomplish the production objectives.

MRP is a newcomer to the defense contracting industry. The critical considerations for its success do not revolve around audit trails or accuracy rates, but are more global. The regulations should establish objectives and policies and leave the details to contractors. Specifically, when drafting regulations about MRP, policy makers should answer four basic questions: Does the government want the cost saving benefits that

MRP methods can deliver? Where do the concepts of MRP conflict with government contracting objectives? If conflicts do exist, should the regulations be changed so that MRP benefits can be realized? (Do the benefits outweigh the costs?) Finally, if regulations should be changed, where and how should they be changed so as to avoid a major overhaul of the procurement system?

The proposed rule is not needed, nor is H.R 3140. Each of these options attests to the absurdity of micro management. Neither addresses any of the concepts of MRP or their application in government contracting; the latter proposes to establish standards for a system that has no definition.

Any serious attempt to settle the MRP debate must address the regulations that govern the four issues identified above: proper time phased requirements, borrow/payback costing, commingling of inventory, and materials ownership. The ensuing discussion should be open to all.

## Appendix 1

### 10 Most Common MRP Deficiencies

1. Costing to contacts based on the requirements, in lieu of actual contract usage (costing the paper transactions only). This the government is billed for "reserved" items which may or may not be used on the contract.
2. Treating contract inventory as company-owned inventory, and therefore costing among contracts using the company-owned inventory valuation in lieu of actual cost incurred.
3. Recurring usage of "informal"/other contract inventory to satisfy contract requirements (whole cost/no cost transfers) without proper disclosure to the government.
4. Pricing of manufactured parts using open "actual history" work orders which can have excess costs built in until the work order is closed.
5. Inclusion of an allocated portion of company-owned inventory costs in public voucher/progress payment requests.
6. Transferring material without the previous approval of the designated contracting administrative official, which can result in the list of contractually conveyed government title of material.
7. Fabricated part transfers generates by the MRP systems are not costed at the same value as the original charges.
8. Pricing of proposed BOMs without adequate consideration of available inventory.
9. Failure to fully disclose impact of the MRP netting process (also referred to as dynamic rescheduling) at the time of negotiation, which can result in violation of 10 U.S.C. 2306a.

10. Failure to adequately disclose that spare orders which are proposed, based on future purchases, are being completed with minimal material purchases supplemented, in whole or in part, by material transfers from an "informal:/other contract inventory with the procurement costs being charged to production contracts.

## Appendix 2

### Common Systems Weaknesses

- Poor integration of older software
- Inadequate implementation of access control software
- Inadequate error checks
- Poor audit trail
- Poor documentation
- Lack of certain activity reports essential to system auditing
- Contractor personnel unfamiliar with the "big picture"

Source: Testimony of James White, DCCA, on June 11, 1987, before the House Armed Services Readiness Subcommittee.