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## OVERVIEW

Traditional MRPII systems logic assumes that all inventory is available to satisfy any customer requirement and does not allow for the separation or allocation of specific materials, parts, or work in-process for customer-specific use. The ability to maintain separate customer identification or customer lots within the general population of parts and orders has traditionally been used in Contract and Project manufacturing environments. However, in today's customer-oriented world, this identification approach is very useful in providing clear identification and availability of materials for specific customer demand — even in an Assemble-to-Order, Made-to-Stock, or Repetitive manufacturing environment.

Separation of inventories is not uncommon in Japan where a *Seiban* (meaning “a manufacturing number”) is often assigned to customer-related inventory, work orders, and purchase orders.

Fujitsu, a joint-venture partner in *GLOVIA INTERNATIONAL* with MDIS, has helped to develop a unique implementation of Seiban-enabled MRP called PRP that allows the separation of product or customer-specific activities from the general MRP population.

Benefits go beyond the quick and easy retrieval of job-specific supply orders. The primary benefit stems from having customer-order-line level visibility throughout the entire manufacturing process. Synchronized production scheduling, assembly, and delivery of products to customers as promised, along with customer-order-line profitability analysis are the primary benefits of Seiban. Tools, such as the *Seiban Workbench*, give instant access to all Seiban-related information and support impact analysis, “What-if” simulations, and convenient maintenance of Seiban assignment and manufacturing execution. Seiban also provides superior cost accounting through positive identification and tracking of all Seiban/job related purchases, materials, and routing activities.



MRP, Material Requirements Planning, is one of the core processing applications within MRPII and ERP systems. It is the MRP logic that ties together all of the activities of the manufacturing company and coordinates them towards the single goal of responding to and satisfying customer demand. Even with today's Advanced Planning Systems (APS) replacing MRP in ERP systems in a growing number of instances, most of the basic MRP context remains.

In particular, we refer to the basic mechanics of the demand & supply netting calculation. In MRP, and with most of the APS calculation engines as well, it is a given that "parts are parts" and that they should be made available to and used by the most critical production activity. In the simpler MRP environment, "most critical" simply means the earliest need. MRP netting logic identifies gross requirements (needs) and arranges them in date order. It then assumes that the earliest requirements will consume any available inventory and that new supplies will become available to satisfy subsequent needs. In general, this is not a bad way to go.

In most cases, the earliest need is the most critical and should therefore get a higher priority toward the consumption of available inventory. All else being equal, the later requirement allows more time to secure additional stocks so it is only logical to use the available inventory to satisfy the earliest needs. With Advanced Planning Systems, the logic is not so clear-cut but the net effect is much the same: the most needy requirement is identified and assigned priority for consumption of available inventory. In both cases (ordinary MRP and the new APS) any available inventory is thus distributed during the planning process and can be redistributed by subsequent planning runs any time the plan and the requirements change. In other words, inventory designated for "Job X" during the first planning run can be redirected to "Job Y" during a later re-planning process.

All inventory and supply orders are considered to be "open" resources, available to all customer requirements. These resources can also be easily re-assigned to a different requirement whenever needs change.<sup>1</sup>



<sup>1</sup> "All" inventory may be a bit of an overstatement. The *GLOVIA* system allows certain inventory to be designated as 'reject' or 'suspect' and excluded from MRP availability (non-nettable). In addition, specific inventory locations can be designated as 'non-nettable'. These are unusual and useful capabilities, not found in many other ERP systems, but not really germane to the topic at hand.

In most environments, this makes sense. Assuming that priorities are assigned fairly and equitably, this system will generate the best result; timely completion and delivery insofar as it can be accomplished within limited resources.

It may be desirable, however, or even required in some circumstances by customer-centric manufacturers, to isolate certain inventories for designated use and not to mix those resources with the general population of parts or open

stock. In such circumstances, traditional MRP logic fails. The basic netting logic outlined above is an inherent characteristic of the technique and cannot be selectively disabled. There is no way, in most MRP systems, to isolate inventory to specific purposes. This forces the use of awkward and often ineffective procedural "work-arounds" that add considerable effort and usually prove unsatisfactory in the final analysis.

## THE CHALLENGE: GOING AGAINST THE DESIGN OF MRP

Because this concept is so ingrained in the basic design of MRP, it is difficult to imagine how an MRP software developer could incorporate separation of Supply (i.e. inventories, production orders, purchase orders, etc.) into an existing software package. MRP is designed to "*net in date sequence*" and any change to that dictum would involve a complete rewriting of the logic.

Similarly, to incorporate a selective netting capability would require a rethinking of much of the process. Selective netting is something that has been considered, sometimes attempted, and seldom executed within the MRP community.

Discarding the discussion of "open" inventory for a moment, why would a company want or need to specifically pre-designate how and where inventory will be used? One simple answer is that the customer might require it. This happens quite often today as manufacturers "build-to-order" in being more responsive and competitive. Customers often agree to contracts with suppliers that require the customer to prepay for materials and inventory in support of their needs. If the customer has paid for the inventory, it is their right to demand that it be used only for their own products and jobs. This eliminates the possibility that the supply orders could be consumed by an unanticipated

demand of another customer, leaving the real owner with a shortage and a late delivery of the original customer's own product.

In addition, there are other key benefits available if separation of supply orders is accomplished. First on the list is enhanced visibility. If all stocks and activities are tied together through a common designator, retrieval of Seiban/job-specific information is instantaneous and infallible. The ability to collect true 'actual' costs is greatly refined. Coordination and synchronization of all activities related to a Seiban/Job is greatly enhanced. More discussion of benefits is included at the end of this document.

"Supply Orders" in this discussion includes purchased items on order but not yet received, production work-in-process, sub-assemblies and assemblies temporarily stocked in anticipation of future use, and even planned purchase and production activities. If you want to separate the "Supply Orders" for a specific customer or job, why not separate all of the inventory; stock, on-order, in-process, and planned? Only in this way can you insure that "allocated" material and resources are truly secured for their intended use. But how would one go about making this separation and tracking the intended use of all supply orders?

The foregoing discussion outlines a need that has been widely recognized by world-class Japanese manufacturers who typically do not utilize MRP. To identify material, parts, and activities to the ultimate use is a relatively common consideration. In the spirit of keeping things simple, the simple solution is to attach an identifying number to all parts, materials, purchase orders, and manufacturing orders (all supply orders) that identify them as belonging to a particular customer, job, project, or product line. In Japan, this identifying number is called Seiban from the Japanese word *Sei* meaning “manufacturing” (or production) and *Ban* meaning “number” - a manufacturing number.

Seiban is not limited to a single instance of a product (a single customer order or contract), although that might indeed be the case. For an electronics manufacturer, for example, there may be parts that are common between the radio, television, and stereo product lines but there might also be a need to segregate TV production activities, parts, and costs from the rest. With a Seiban planning and tracking capability it is possible to easily identify those plans and activities that are for televisions and separate them from those that are for other usages of those same parts.

The Seiban is attached to purchase orders, parts in inventory, and manufacturing orders providing a convenient reference that allows quick and easy access to all information about that family of parts and activities. Our

electronics manufacturer, for example, might designate a range of Seiban numbers to be reserved for the TV product line and have the system automatically assign the next available number within the sequence to a new production order for TVs. All lower level purchase orders and manufacturing orders in support of that TV production, and all resulting inventories, will carry the same Seiban.

Applying the same process to MRP is a bit more complicated. When the MRP plan is generated, all requirements and planned orders must also carry the Seiban identification tying them to the top-level requirement. Further, this identification is durable (hard-pegged); the planned activities thus Seiban-stamped cannot be considered available to satisfy any other requirement.

The result is like having separate MRPs within the overall MRP process. In actual practice, there are, indeed, separate MRPs for each designated Seiban requirement performed right along with the “regular” MRP for non-Seiban requirements. *GLOVIA* simplifies and enables this process to take place through its interactive *Seiban Workbench* and *PRP* application.

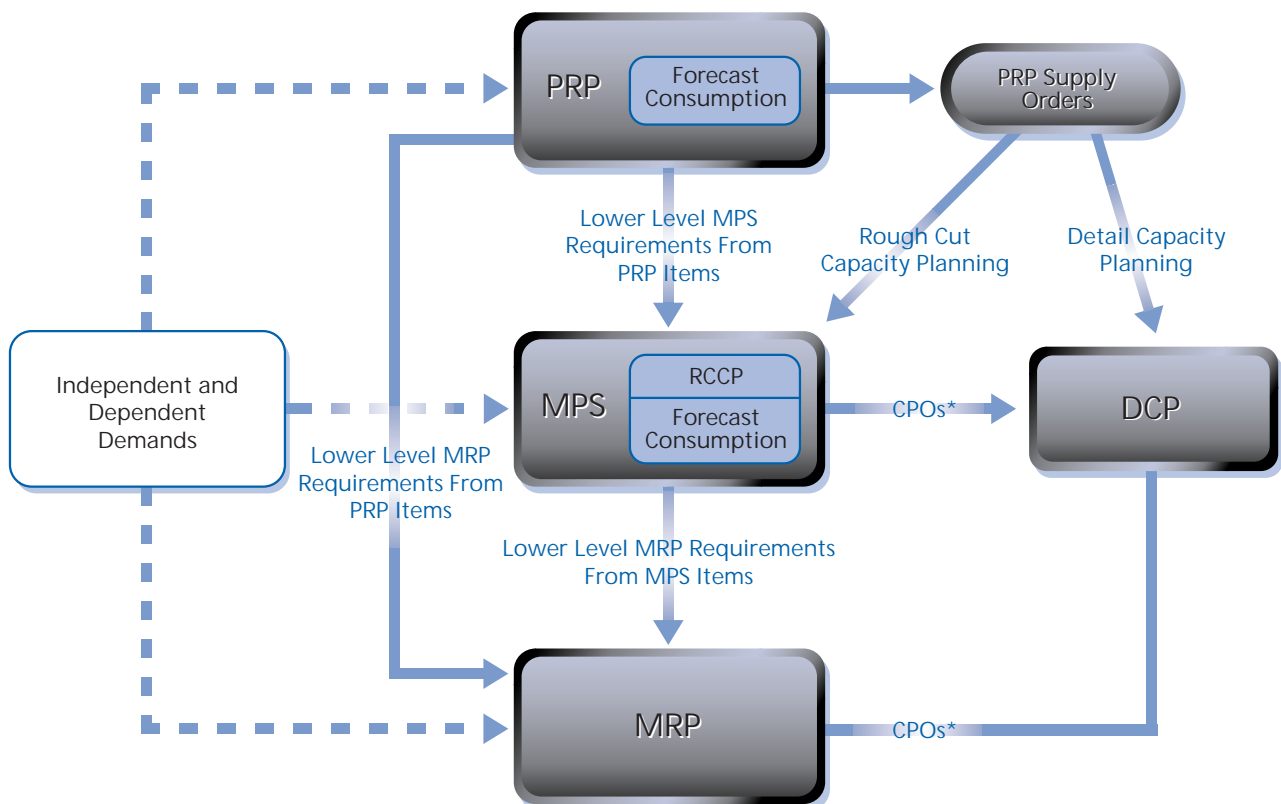


The GLOVIA ERP system incorporates the Seiban principle within a larger resource planning application that can coexist, and is fully integrated with, traditional MPS and MRP approaches. This tool, called PRP, is designed to track Seibans, jobs, projects or contracts, gathering all related costs into a defined manner and making status, progress, and projected customer delivery information readily available.

The GLOVIA SEIBAN tool utilizes its unique identification system to link together all aspects of a customer's order, job, project or contract and simplify retrieval and analysis chores through multi-level pegging of a customer's demand

with all of its associated supply sources. PRP will then plan and re-plan material items and "service items" for all forms of customer demand - be it a sales order, contract, or project. Service items are used to sell services and to track activities associated with services such as consulting, education, and installation activities.<sup>2</sup>

Since all items associated with a customer's demand are fully integrated, full identification with the supply sources is assured. As a result, it is easy to assess the impact of changes at any level of the overall effort and manage changes throughout the process.



\* NOTE: CPOs are computer planned orders

Figure 1: HOW PRP INTERACTS WITH THE OTHER PLANNING APPLICATIONS

<sup>2</sup> Service items, unlike material items, are sub-contracted or delivered. They are not manufactured. A service item contains a Routing and may contain a Bill of Materials (BOM) of associated material items. The routing for a service item describes the steps necessary to deliver a service. The BOM for a service item contains the material items that are required to deliver the service.

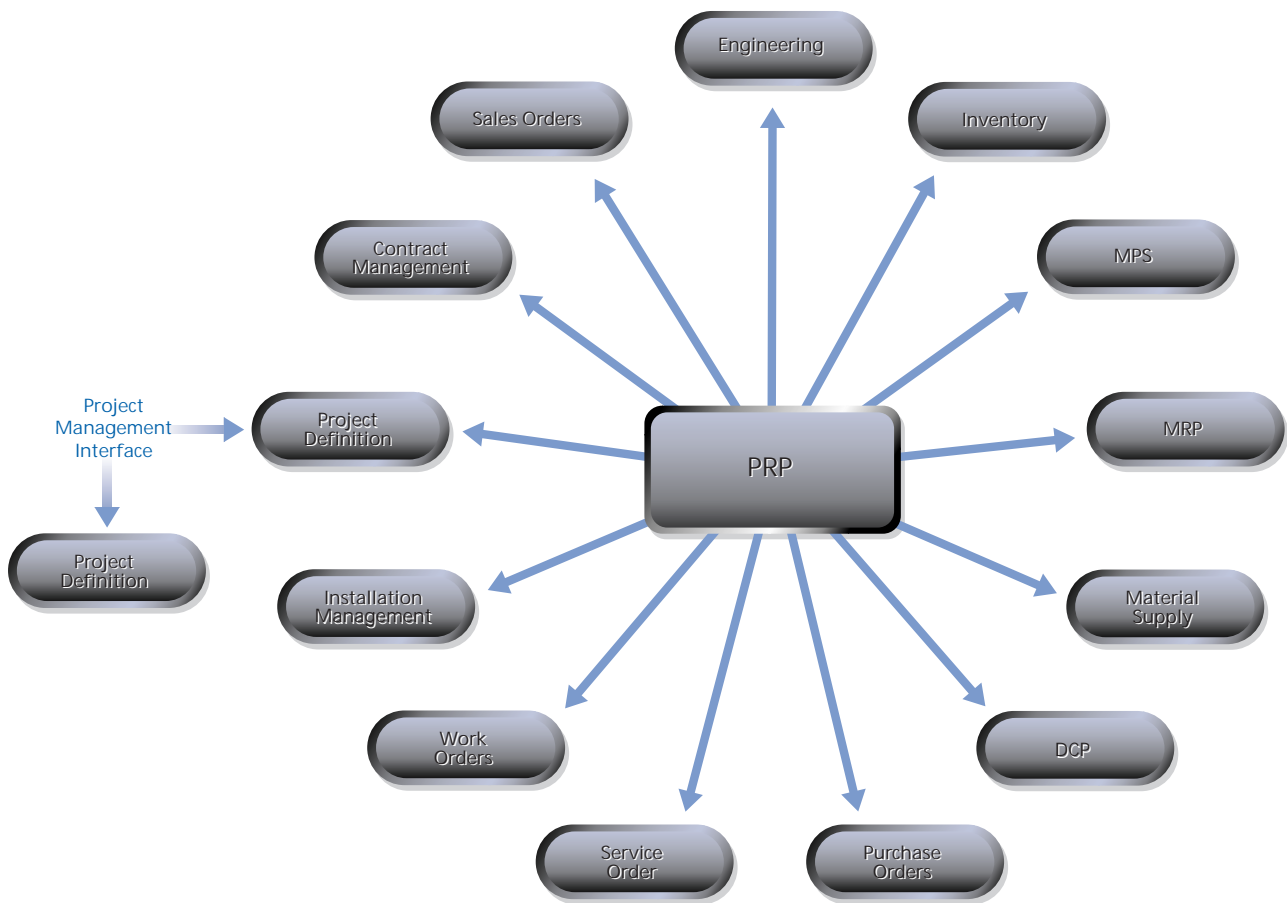


Figure 2: PRP IS FULLY INTEGRATED WITH THE REST OF THE GLOVIA SYSTEM

The Seiban enabled PRP tool, along with Master Production Scheduling (MPS) and MRP, plan demand in a dynamic manner; PRP sends requirements to both MPS and MRP as appropriate to the items. MPS, in turn, sends requirements to MRP for dependent items within demands passed by PRP. PRP performs forecast consumption for PRP items. MPS performs forecast consumption for MPS items. Rough-Cut Capacity Planning (RCCP) and Detail Capacity Planning (DCP) apply to supply orders from PRP as well as to MPS/MRP plans.

PRP's trigger at the item level enabling multi-level pegging (both hard & soft pegging) to the

customer's order, contract or project; thus, allowing the user to instantly know where each item or service associated with fulfilling a customer's request belongs. PRP also provides the ability to perform capacity resource planning for a customer's demand. Although these features are helpful in fulfilling a customer's order, the overall goal is to fulfill your customer's order profitably. With *GLOVIA SEIBAN* you can deploy *target costing* - a direct identification of actual production and purchase costs - which allows you to measure the profitability of a customer's demand.

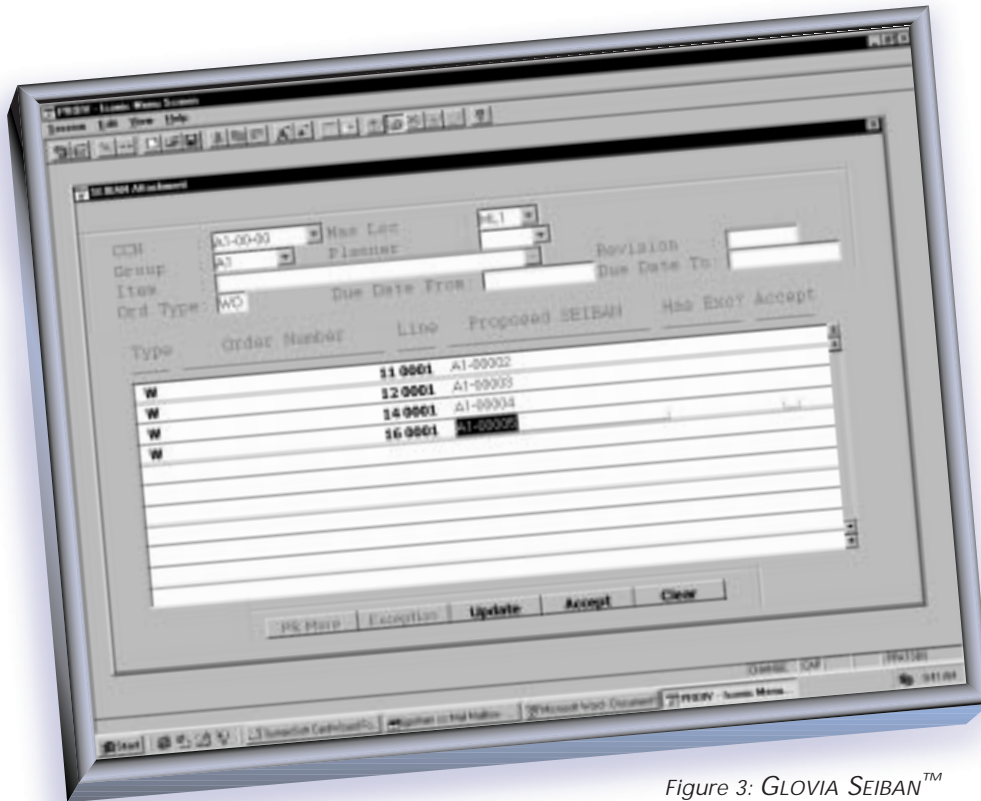


Figure 3: GLOVIA SEIBAN™

The GLOVIA SEIBAN system attaches a manufacturing number to all activities and supply orders associated with a Seiban-designated item. When a requirement is entered for a Seiban item, the user may enter a Seiban number or may allow the system to automatically assign the number from a designated range of Seiban numbers for that item. The user-assigned Seiban could be the customer identification, customer order or order-line

number, customer PO number, project or contract number, or any other number.

When a supply order is generated, either manually or through GLOVIA's planning systems, the supply order inherits the Seiban, which acts as a second key (field) for the order. Similarly, purchased parts and outsourced services also inherit the Seiban upon release as do inventory commitments and planned orders.

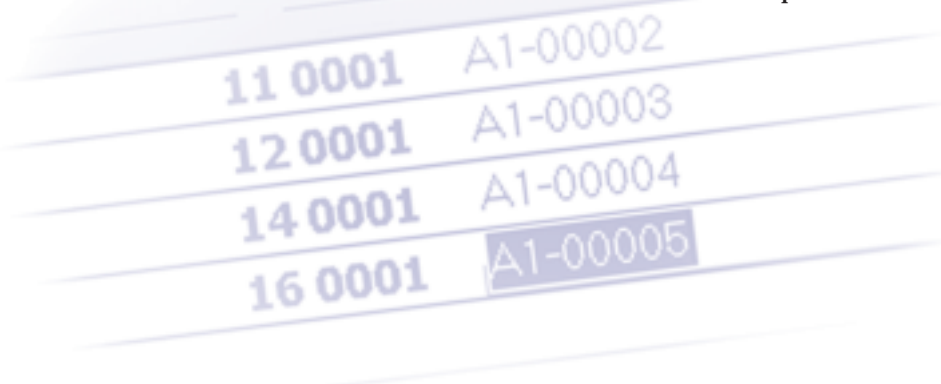




Figure 4: GLOVIA SEIBAN™ WORKBENCH

The *GLOVIA Seiban Workbench* facilitates all management and maintenance of Seiban-related parts, orders, and activities. It provides a set of tools to:

- Establish initial dates based on order, contract, or project dates
- Generate projected supply orders
- Reconcile dates
- Plan and replan
- Process the exception messages generated (during planning and replanning) for specific demand requirements and supply orders
- Perform Impact Analysis
- Link to the online capacity check of Detail Capacity Planning (DCP)
- Link to the *GLOVIA's Buyer Workbench*
- Link to *GLOVIA's Item Inventory On-hand Inquiry*
- Link to *GLOVIA's MRP/MPS Planning Inquiry*

Since all orders and activities are tied together through the Seiban number, retrieval of all Seiban-related information is fast, complete, and easy. Furthermore, the effect of a change or potential change to any Seiban activity can be quickly determined and "what if?" scenarios can be tested easily within the customer order, contract, project or batch that the Seiban unites.

Remember that Seiban can be applied to any kind of product or order. It is useful beyond the contract environment to trace activities and costs for any product line, batch of products, production "run", or any other individual item or grouping.

The *GLOVIA SEIBAN* application provides many other benefits beyond quick retrieval of related information:

- The ability to plan and replan material items and service items and to manage these items through the use of Seiban identification numbers.
- The ability to perform impact analysis to see the effect of a change or potential change - because all other activities (both up and down the bill-of-material chain) are tightly linked to all others.
- The ability to change the schedule for any item within the Seiban group and have the system (optionally) adjust the schedules for all other items, activities, and schedules by the same amount, keeping them in synchronization. This also applies to changes in the customer requirement or Master Schedule.
- Full integration with the Master Production Schedule (MPS) and Material Requirements Planning (MRP) meaning that Seiban planning and management work independently of, but in full coordination with the planning and management of non-Seiban items.
- The ability to track all costs associated with the Seiban and value-added activities including direct-purchased materials, work orders, services, and indirect costs.
- Improved inventory management through the ability to peg replenishments to requirements.
- Reduced inventory requirements because acquisition and replenishment can be tied directly to specific needs.
- The ability to perform multi-level planning. For material and service items, PRP explodes the associated BOM and plans the PRP items. Lower level MPS and MRP items are sent to the appropriate application (Master Production Schedule or Materials Resource Planning) for planning.
- The ability to perform detail capacity resource planning for an order.



APS - Advanced Planning and Scheduling, modern application of heuristics, rules-based logic, optimization, and other techniques to the manufacturing system “planning” process.

CPOs - Computer Planned Orders. Planned orders generated by the master production schedule, as material requirements planning, or GLOVIA’s PRP.

DCP - Detail Capacity Planning.

ERP - Enterprise Resource Planning, today’s definition of an integrated manufacturing management software suite.

Hard Pegging - The durable attachment of a lower level inventory quantity or activity to a requirement.

MPS - Master Production Schedule, the high-level plan for production (typically applies to end products or “critical” items).

MRP - Material Requirements Planning, traditional approach to manufacturing planning consisting of gross requirements determination, netting of available inventory, order planning (lot sizing), and setting of required start date for material acquisition.

MRP II - Manufacturing Resource Planning, integrated manufacturing management application suite with MRP at its core. This term is being replaced by ERP.

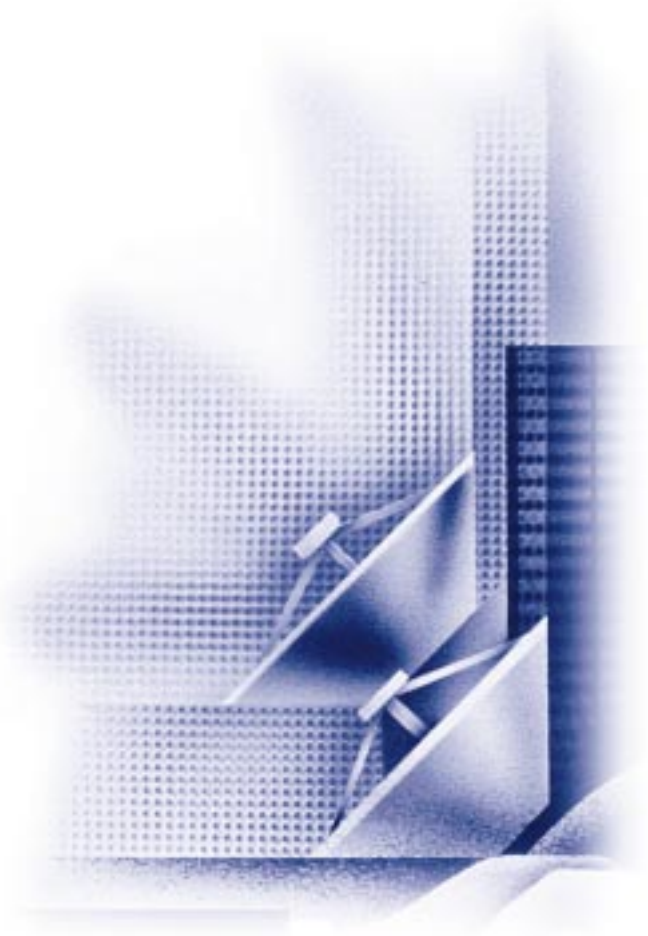
Netting - the process of comparing a requirement to the inventory available to fulfill that requirement.

Pegging - the ability to trace requirements through an MRP plan. Also the process of identifying requirements that generated a lower-level activity.

PRP - Project Resource Planning (*GLOVIA* product).

RCCP - Rough-Cut Capacity Planning.

Seiban - Japanese term meaning, literally, Manufacturing Number.



## Worldwide and Americas Headquarters

*GLOVIA INTERNATIONAL LLC*  
1940 E. Mariposa Ave.  
El Segundo, CA 90245-3457  
(800) 223-3799  
(310) 563-7000  
Fax: (310) 563-7300  
Email: [marketing@glovia.com](mailto:marketing@glovia.com)  
Internet: [www.glovia.com](http://www.glovia.com)

## European Headquarters

*GLOVIA INTERNATIONAL LTD*  
Boundary Way  
Hemel Hempstead  
Hertfordshire HP2 7HU  
United Kingdom  
+44 (0) 1442 232424  
Fax: +44 (0) 1442 274927

*United Kingdom*  
*GLOVIA INTERNATIONAL LTD*  
Sandford House  
41 Homer Road  
Solihull  
West Midlands B91 3QJ  
+44 (0) 1442 274040  
+44 (0) 121 711 4646  
Fax: +44 (0) 121 711 4015

*Netherlands - Benelux*  
*GLOVIA INTERNATIONAL B.V.*  
Gebouw "De Spoortoren"  
Fellenoord 350  
5611 ZJ Eindhoven  
The Netherlands  
(31) 40 2655355  
Fax: (31) 40 2451444

## Asia Pacific Headquarters

*GLOVIA INTERNATIONAL ASIA PACIFIC PTE LTD*  
391A Orchard Road  
#12-01 Ngee Ann City Tower A  
Singapore 238873  
(65) 737-7908  
Fax: (65) 737-1356



*Written for GLOVIA INTERNATIONAL by*  
David A. Turbide, CFPIM, CMfgE, CIRM  
President, Production Solutions, Inc.  
669 Hale Street, Beverly, MA 01915  
[Dave@mfg-erp.com](mailto:Dave@mfg-erp.com)