

Agility and Manufacturing White Paper

TABLE OF CONTENTS

Manufacturing	1
Executive Summary	1
Becoming an Agile Manufacturer	2
The Customer Has Changed.....	2
Managing Change	2
Mastering Change.....	3
Agile Manufacturing Software.....	4
How Is Agile Manufacturing Different from MRP?	4
How Does Microsoft Navision for Manufacturing Deliver Agility?	4
How Does Microsoft Navision for Manufacturing Deliver Agility?	5
Microsoft Navision for Manufacturing: Features.....	6
Conclusion.....	8
Appendix.....	9
About Microsoft Business Solutions	9
Address:.....	9

MANUFACTURING

This white paper describes the general principles of agile manufacturing and how these principles relate to manufacturing functionality within Microsoft® Business Solutions–Navision®.

The first section describes in general terms the challenges that manufacturers are currently facing.

The second section goes into more detail regarding the challenges arising from a changing marketplace and explains how agile manufacturing can help companies manage and master that change.

The third section discusses the software needed to support agile manufacturing and, in particular, how Microsoft Navision for Manufacturing meets the needs of today’s manufacturers.

EXECUTIVE SUMMARY

All businesses today operate in a marketplace characterized by change. For manufacturers, the challenge is to become agile in order to ensure a flexible response to changing market conditions. Managing planned change, for example, through business process reengineering (BPR), is difficult in itself. However, managing unplanned change demands the ability to react faster and use new technology to match market conditions and customer demands in a way that maintains or creates competitive advantage.

As manufacturing strategies have evolved, the focus has shifted away from being big and stable with complete control, to being small, nimble and more responsive to the market. This evolution reflects the introduction of new technology, new trends and, in particular, new customer behavior. New markets are up for grabs because being big and stable is no longer a competitive formula. Agility is the small manufacturer’s chance to seize the market by responding faster to customer demands. Today’s manufacturing world leaders are characterized by their ability to deliver the products that customers want with minimum time-to-market and maximum capability to revamp products to meet market expectations.

This paper will discuss how systems that support agile manufacturing can go a long way in helping to ensure that agile manufacturers are able, not only to manage,

but also to master change. In particular, it focuses on how Microsoft Navision for Manufacturing fits into this new pattern in the business of manufacturing.

AGILE MANUFACTURING

To become an agile manufacturer, a company must recognize change in the marketplace and then manage and master that change. This section describes the market conditions that are pushing manufacturers toward adopting an agile manufacturing approach.

The Customer Has Changed

Today's customers focus on unique products and expect one-to-one marketing. As a result, they are less willing to accept mass-marketed goods and are rejecting one-size-fits-all products. This means that manufacturers must adapt and adopt the make-to-order mentality displayed by Japanese manufacturers in the 1980s in order to become customer-focused and supply customized products and services designed to match a particular customer profile.

The Customer Relationship Has Changed

Customers expect personalization in their supply-chain relationships and best practices from their supply-chain partners. Manufacturers that can offer a more personalized relationship to their customers and confirm their use of world-class practices will survive. Those that cannot will lose their competitive edge and, eventually, lose customers and even whole markets. Even brand awareness, traditionally the linchpin of customer loyalty, is becoming less important than the ability to execute and meet customer needs.

Partnering Is the Name of the Game

Just-in-time (JIT) manufacturing practices have made it essential for manufacturers and their business partners, both customers and suppliers, to work more closely together. Customers need to participate in the product planning or system integration process, and suppliers need to take more responsibility for quality control or even manage inventory on behalf of the manufacturers. Refocusing on core competencies means that manufacturers are more likely to outsource to supply chain partners and become part of virtual teams that are focused on delivering a specific service or product.

E-business Is Changing Market Dynamics

The Internet has opened up a worldwide market to every manufacturer, and it has enabled customers to source

products and services from any supplier, anywhere. Internet trading hubs and online marketplaces have created a significant amount of price transparency and are forcing more suppliers to meet the market in terms of their pricing and delivery. The Internet is increasing the visibility of supply chains and enabling virtual collaboration across supply chains, which are dramatically speeding up supply chain execution.

The Global Market Has Become a Reality

Today's companies can move into new marketplaces more easily than ever before because there are now fewer political and tariff borders. Trading blocks have emerged, such as NAFTA (North American Free Trade Agreement) and the EU, that facilitate international trade. Meanwhile, Asia and China represent massive emerging markets for absorbing manufacturing capacity and the Internet makes buying and selling across the globe relatively easy.

Product Know-how Is Key

Products that require a low level of know-how to manufacture cannot survive in high-wage countries, and standardized products that require little know-how will move to low-wage countries. Delivering products that require higher levels of know-how to produce is key to the survival of manufacturers in the developed countries. Creating these kinds of products demands better knowledge management in terms of the production process, market demands and customer needs.

Technology Is Cheaper, Faster and Better

As the pace of technological innovation continues to accelerate, technology is becoming cheaper, faster and better. Manufacturers of all types and levels have access to technology that can help them to respond faster and operate from smaller plants, using more flexible production methods. Complex manufacturing resource planning (MRP II) software has had its day. Today's manufacturing software is more flexible and easier to set up and use than traditional material requirements planning (MRP) applications and better able to support agile manufacturing.

Managing Change

The characteristics of an agile manufacturer include the following four ways of managing change:

- Recognition

- Focus on the customer
- Leveraging resources
- Cooperating to compete

The first step in managing change is to recognize that it is happening and proactively engage in change management. Companies can reexamine their markets and customers by looking for opportunities and risks. They can develop a planned change schedule as well as conducting a what-if exercise to prepare for unplanned change. They can also conduct a company-wide knowledge audit to determine what they are aware of and use the knowledge that is in their business systems, processes and employees.

Instead of allowing change to control your business, focusing on improving the customer's experience can be another way to control it. Customers want solutions that comprise both products and services and they require product flexibility and variability to meet their demands, as well as a quick response to any questions that relate to pricing and support.

An agile enterprise can also be recognized by its ability to successfully exploit its resources. It does not have idle capacity or poorly used resources. Part of change management is to identify underutilized, unused or non-existent resources and take better advantage of them or bring them on board. Agile manufacturers make resources work in teams and share knowledge to optimize the flow and cooperation within the enterprise.

Finally, agile manufacturers change the way that they interact with their business partners so that they can compete more effectively through cooperation. Today's successful enterprise knows that it does not dictate market demands: it listens to its customers. It finds its core competence and makes partnerships when it is necessary to provide the customer with a solution. Supply chain cooperation is only one aspect of becoming more cooperative—knowledge sharing is another. A competitive company is a company looking for partners to benefit its own products and services.

Mastering Change

For manufacturers, mastering change involves a strategic realignment that is supported by the implementation of a number of tactical initiatives. The strategic realignment is to focus manufacturing systems and resources on supporting the business goal, rather

than the traditional goal of controlling the plant or the manufacturing process. If the business goal is to respond faster to customer demands or to increase the breadth or depth of solutions provided, then the manufacturing systems and the resources they manage must be focused on this strategic objective.

The first tactical initiative is to do everything possible to reduce inventory levels. This is achieved in three ways:

- Eliminate waste
- Cut down transport time
- Reduce setup time

Eliminating waste improves the efficiency of supplying goods and services. Reducing transport times shortens both lead times and the timeframe needed for demand planning so that anticipated demand is not based on long-term assumptions. Reducing setup allows the production of smaller batches. As inventory represents both a risk and an investment, it is vital to keep inventory levels as low as possible without harming customer service.

Once inventory levels have been minimized, the manufacturer should focus on maximizing the throughput of the plant. Manufacturers should base production and distribution on current constraints and bottlenecks in the company (or in the supply chain) in order to maximize the throughput in the company.

While optimal throughput depends on many things (such as the physical layout of the plant and its production lines or work centers), it also depends on efficient supply chain collaboration. Efficient supply chain collaboration requires making the interaction between supply chain participants easier and faster, making supply chain processes more visible to the participants and encouraging an exchange of knowledge in the chain. Manufacturers need to ensure that they work with business partners that are good at providing products and (certain) services.

Where supply chain resources cannot be used to deliver a product or service, the manufacturer must ensure that individual employees and teams are properly empowered to fulfill their roles in the manufacturing process. This requires effective knowledge management: getting the most out of employees by empowering them to act and by increasing their skills,

and by giving them the ability to find and use knowledge easily in their work.

Establishing cross-functional teams cuts down on middle management, and collaboration between employees in different areas of the plant motivates those employees to focus on improving the workflow. The company's business goals and its manufacturing processes will become transparent to the individuals and teams that are responsible for delivering and executing them.

AGILE MANUFACTURING SOFTWARE

Software that supports agile manufacturing is different from the manufacturing planning and control systems (for example, MRP) of the past. It is less about control and more about flexibility – less about complex and deep functionality and more about programs that are easier to set up and use. Agile manufacturing focuses less on the process of manufacturing and more on the need to respond to customer demands.

How Is Agile Manufacturing Different from MRP?

Traditional software has often been geared toward giving the company strict control of all processes. The term *manufacturing planning and control* was coined to describe this business approach. Each area of the plant was measured separately. However, in retrospect, one can question how much value this control added to businesses.

Today, small and mid-size manufacturers are moving beyond the MRP II paradigm. While MRP II is still used, customers have recognized the need to adjust faster to market demands and to optimize business processes.

To quote manufacturing expert Brian Maskell, author of *Software and the Agile Manufacturer*, "When MRP II and other systems taking the operations-research approach were being widely introduced into Western manufacturing industries, it was considered that adding features and functions improved a system. The best systems were the ones with the most 'bells and whistles.' In recent years this view has changed. Simpler systems, which do not burden the user with all kinds of subtle new features are easier to use and thus more effective. Well-designed simple systems are more useful than a system with all manners of detailed complexities."

There is ample material documenting the failure of traditional manufacturing systems. For example, it is estimated that only 58% of all MRP II installations are successful¹, and only 8% have achieved a positive improvement in performance from their ERP implementation².

The biggest asset for a manufacturing solution today is simplicity and flexibility. Instead of being a system that forces the manufacturer into workflows that don't match their business, they need to stay agile.

How Does Microsoft Navision for Manufacturing Deliver Agility?

The following table shows how Microsoft Navision for Manufacturing conforms to the characteristics of an agile manufacturer, as defined by industry expert, Brian Maskell.

¹ Cheveny, Robert P., and Lawrence W. Scott. "Survey on MRP Implementation." *Journal of Production and Inventory Management* 3 (1989).

² PA Consulting Group. "Unlocking the value in ERP survey." January 2000.

How Does Microsoft Navision for Manufacturing Deliver Agility?

The following table shows how Microsoft Navision for Manufacturing conforms to the characteristics of an agile manufacturer, as defined by industry expert, Brian Maskell.

	Characteristics of an agile manufacturer, according to Brian Maskell	Characteristics of Microsoft Navision for Manufacturing
Integration	Systems must be integrated so that information is entered only once and is always up-to-date, accurate and accessible to users.	Users always have fast access to the latest information – anywhere in the program – because it is an integrated solution. Separation into optional granules allows for customer-specific solutions.
Simplicity	Programs, screens, and reports must be designed in such a way as to make them simple and easy to use. Simplification is a key aspect of agility, and software systems should reflect this.	The graphical user interface (GUI) is intuitive, consistent and follows the Microsoft GUI guidelines. The solution was developed with a focus on visibility. Tracking lets you look at plans across departments. The Navigate feature enables you to look at postings for auditing and customer service purposes, and SIFT technology makes it easy to drill down into more detail. Microsoft Business Solutions Manufacturing Foundation–Navision offers deep and rapid visibility into work-in-process and support for order-by-order, enabling small businesses to manage production orders, bills of material, manual planning processes, and exceptions–without adding complexity to business operations. Production schedules in Gantt charts bring together the data and functions for capacity planning and scheduling in one graphical interface for a quicker overview. The manual order planning tool functions as an MRP system that allows you to make decisions order by order without using complicated planning parameters. As part of Manual Planning, the Order Planning window displays all new demand alongside information on availability and suggestions for alternative supply options. It provides the visibility and tools needed to manually plan for demand from both sales lines and component lines and then creates different types of supply orders directly.
Flexibility	Throughout the implementation of agile manufacturing techniques, a company will make significant changes to business operations. Software must have the flexibility to allow users to introduce new techniques in one area, while retaining old approaches in others. This flexibility	Built with a focus on modern customer-oriented manufacturing. The structure in the production orders allows a smooth workflow and a pragmatic way of handling orders. The whole system is optimized to minimize setup and to

	lends itself to a smooth, low-risk approach to agile manufacturing.	allow for different planning and work scenarios. Microsoft Navision Manufacturing foundation gives you the flexibility to change methods and processes on the fly, accommodate changing workloads and requirements, and take hold of new projects with maximum efficiency.
Openness	Supporting software must interface smoothly with other systems, as well as with networking solutions between multiple computers. The interfaces will typically include real-time quality control, computer-aided design/computer-aided manufacturing (CAD/CAM), shop floor data collection, and automated warehousing systems.	Open to integration through Microsoft Message Queue, text file import and export, and ODBC.

Microsoft Navision for Manufacturing: Features

A number of features in Microsoft Navision for Manufacturing relate directly to the areas indicated by Maskell as important for agile manufacturing.

Capacity Planning

Microsoft Navision for Manufacturing contains capacity planning functionality, including support for synchronous manufacturing, as well as parallel routings. The capacity planning system is a three-level structure. You can build work-center groups at the top level, assign work centers under work-center groups and assign machine centers under the work centers. The system routing supports routings and displays load and task lists to the planner. The solution also supports individual calendars per capacity.

Microsoft Navision for Manufacturing also supports simultaneous planning. This means that any changes made either in the planning worksheet or in the MRP will automatically be reflected in the capacity plan. It is not necessary to maintain lead times in several places. Microsoft Navision for Manufacturing always uses the routing information for planning.

For planning against constraints, Microsoft Navision delivers finite loading. Finite loading on constraints makes it possible to go ahead and plan against constraints, rather than the whole pool of resources. The finite loading system in Microsoft Navision is easier to manage if you do not want to manage the exact lead times in the routings, but want to focus on the important

constraints in your company. These planning systems are integrated with production orders and with supply planning functionality.

Microsoft Navision does not aim to provide finite scheduling systems to the market. We do however exchange ideas with companies that deliver best-of-breed solutions, and Microsoft Navision for Manufacturing integrates to several finite scheduling systems, different systems from market to market.

Backflushing and Inventory Pull

Microsoft Navision for Manufacturing currently supports both forward and backflushing. Flushing can be related to an operation as well as an order. If the flushing is related to an operation, flushing will occur when the operation is posted to. At the same time, the posting of time is added to an operation for which the plant schedules will be updated with the used time. Flushing can follow what we call a routing link code, which determines the place where the component will be used.

Microsoft Navision for Manufacturing also provides support for phantoms. Phantoms are blown through in the planning process to provide simpler bills of material and eliminate production orders in the system.

In addition, Microsoft Navision for Manufacturing gives support for serial as well as lot control, and multilevel extensive tracking forms display the way the product was actually built for field service issues. Individual

serial and lot numbers can be managed and blocked. Serial and/or lot numbers can be entered for both end items and components. The reservations system allows users to reserve components against inventory and orders, thereby allocating specific lot numbers and serial numbers for later flushing.

Microsoft Navision for Manufacturing does not currently provide kanban cards for production, nor do we have plans to do so. It is our experience that it is impossible to make kanban cards for a wide variety of customers, and it's not necessary if the customer can use the report designer in Microsoft Navision to create their own kanban card.

Order Entry and Customer Service

Microsoft Navision for Manufacturing comes with extensive support for customer service. There are blanket orders for long-term agreements as well as normal orders. For more customer-driven environments, the production order can be designed and created directly for the order. The cost of that production order can be rolled back to the sales order. Tracking with a special planning window gives the salesperson the ability to tell the customer exactly where the order is.

The order system is integrated to environments like inventory, credit check, customer-group specific pricing and line discounts, as well as order discounts. Items can be searched for by number, name, or any field on the item card. The solution provides customer specific cross-reference numbers and item substitution numbers if, for example, an item is out of stock. The user is able to reserve against inventory by using hard allocations, or through set-aside allocations, by reserving directly against a production order or a purchase order. Moreover, the user can see the available inventory directly from the order.

Microsoft Navision contains order promising which both supports available-to-promise and capable-to-promise. While available-to-promise looks at existing production orders, capable-to-promise simulates lead times using both supply planning and capacity planning with constraints planning to deliver reliable results. Sales personnel can promise a sales order directly from the sales order through the promising functionality, no matter if you are order based or having stock based manufacturing.

Microsoft Navision for Manufacturing already supports hard and soft allocations, where a part of the inventory can be allocated by choice to a specific order. On-the-fly availability provides soft allocation, while reservation forms enable hard reservations where specific products are reserved for specific orders. Allocation by serial numbers and lot numbers is also available. The allocation can be made at order or at picking time. Order management features include simple picking and pick lists that are based on sales orders.

Additional Customer Service Features

Microsoft Navision for Manufacturing covers both multi-plant and single-plant planning. Through our supply planning module, you can plan multiple warehouses and plants in one go or do them location by location, after your own choice. Each location can be set up with individual replenishment methods to stock inventory at the right place for optimum customer service.

On top of that, Microsoft Navision provides solutions in these areas:

- EDI³
Building an EDI system for a company is sometimes a complex job. Using the dataport in Microsoft Navision, the task of integrating an EDI solution is made easier. EDI solutions are often perceived as expensive projects. EDI protocols change, new customers arrive and those new customers require new interfaces to their system. The task of adjusting to customers' demands for exchange of data is often expensive. This is not the case with Microsoft Navision for Manufacturing, however, thanks to the easily customizable dataports.

For customers with extensive exchange of data from and to customers, Microsoft Navision delivers the commerce gateway. Through modern mapping technology like Microsoft BizTalk and Microsoft Navision Application Server data can be exchanged in real time.

- Order-entry configuration.
In most manufacturing areas today, product configuration is complex, however, Microsoft Navision for Manufacturing is able to integrate to most configuration systems and has already been delivered

³ Electronic data interchange

to several configurators around the world. Indeed, Microsoft Certified Business Solutions Partners have already made several configurators for Microsoft Navision for Manufacturing.

Procurement and Vendor Relationships

Microsoft Navision for Manufacturing includes requisition management, purchase order management and blanket orders. Items can be excluded from the MRP plan, which allows your shop floor to use the blanket order system for maximum benefit.

Purchase order management comes with a flexible workflow that eliminates the often-tedious step of receiving and controlling an invoice. In the case of long-term vendor relationships, you can automate the process.

Performance Measurement

With Microsoft Navision for Manufacturing, it is possible to measure performance through a set of tools. If you select the Microsoft SQL Server option, several data mining systems together with Microsoft Excel, Access and Word are available. Microsoft Navision Analyst—a tool built in Microsoft Excel—utilizes data from Microsoft Navision to present them through special reports or graphical displays. In addition, the flexible report writer from Microsoft Navision allows easy access and printing of any data in Microsoft Navision for Manufacturing.

Accounting

Microsoft Navision for Manufacturing provides two different types of costing functionality. First, operational managers can print out detailed cost analysis of the products manufactured. Second, financial managers can access reports concerning the value of inventory and the cost of goods sold. Microsoft Navision for Manufacturing supports both standard costing as well as actual costing. Actual costing provides actual flexible costs and does not burden the user with the task of explaining variances in the system. Nor does the user have to set up a large number of cost parameters. The program is simple and straightforward to use.

Backflushing eliminates the need to track work-in-process, and every work center can be posted to a G/L account, department or project code, providing a three-level view of the accounts.

Hardware, CIM⁴ and Data Collection

Open data systems with access to the database and an easy-to-integrate business logic are key issues here. With Microsoft Navision for Manufacturing, data can be put into the system through either Microsoft SQL Server, text files, ODBC or OCX modules that bind the ERP and the shop floor together. This applies to:

- Bar coding systems
- Radio frequency systems
- Machines with protocols to the outside world
- Your present shop-floor solution

Microsoft Navision for Manufacturing offers a choice of hardware provider and, together with Microsoft Navision for Manufacturing's object designer, you can create your own interfaces.

CONCLUSION

In order to ensure a flexible response to changing market conditions, manufacturers must become customer-focused by supplying customized products and services that match specific customer profiles. Manufacturers can manage change by recognizing the necessity to improve change management, and by focusing on the customer, leveraging resources and competing in collaboration with each other.

Agility provided the small manufacturer with the opportunity to succeed in the market by responding faster to customer demands. Every manufacturer needs to become an agile manufacturer. And the systems that support agile manufacturing can go a long way in helping to ensure that agile manufacturers are able, not only to manage, but also to master change.

Microsoft Navision for Manufacturing is a solution, which is based on simplicity and flexibility, allowing users to quickly adapt to new challenges, and even to create opportunities based on new levels of flexibility and increased responsiveness.

⁴ Computer-integrated manufacturing

APPENDIX

For further information about agile manufacturing, visit the following Web sites:

Brian Maskell and Associates

<http://www.maskell.com>

A New Jersey-based consultant who focuses on small companies. Brian Maskell is the author of *Software and the Agile Manufacturer*.

Agilityforum

www.agilityforum.com

Agilityforum is based in Bethlehem, Pennsylvania.

Agility International

<http://www.agility.co.uk/ai.html>

Publishers of the book *Agile Networking*. This book describes agility and collaboration with companies. Emphasis is given to the virtual companies that are expected to be part of the future.

About Microsoft Business Solutions

Microsoft Business Solutions, a division of Microsoft, offers a wide range of integrated, end-to-end business applications and services designed to help small, midmarket and corporate businesses become more connected with customers, employees, partners and suppliers. Microsoft Business Solutions' applications optimize strategic business processes across financial management, analytics, human resources management, project management, customer relationship management, field service management, supply chain management, e-commerce, manufacturing and retail management. The applications are designed to provide insight to help customers achieve business success. More information about Microsoft Business Solutions can be found at www.microsoft.com/BusinessSolutions.

Address:

Business System Solutions
401 Mobil Ave. Suite 8
Camarillo, CA 93010
Phone: (805) 484-6995
Fax: (805) 484-4289
www.navisioninfo.com

20/06/2004

© 2004 Microsoft Business Solutions ApS, Denmark. All rights reserved. Microsoft, Great Plains, Navision, Visual Studio, and Windows are either registered trademarks or trademarks of Microsoft Corporation, Great Plains Software, Inc., FRx Software Corporation, or Microsoft Business Solutions ApS or their affiliates in the United States and/or other countries. Great Plains Software, Inc., FRx Software Corporation, and Microsoft Business Solutions ApS are subsidiaries of Microsoft Corporation. The names of actual companies and products mentioned herein may be the trademarks of their respective owners. The example companies, organizations, products, domain names, email addresses, logos, people and events depicted herein are fictitious. No association with any real company, organization, product, domain name, e-mail address, logo, person, or event is intended or should be inferred.