

Manufacturing challenges of today and how Navision Axapta solves them- the solution for change; controlled by you.

| Manufacturing

In the current explosive economy, many manufacturers are struggling to keep pace with customer demands and increased competition. As a result, they are looking at ERP (Enterprise Resource Planning) software systems to make the manufacturing process more cost-efficient and productive. The ability of the software to adapt to changing needs and technology will determine their success in the future.

AMR Research states in their *1999 Outlook for Enterprise Applications*: "Supply chain thinking has dramatically altered manufacturers' views on competitive challenges, and many are now looking to technology to change their business. Reacting to shrinking tolerance for inventory, manufacturers are adopting new capability such as constraint-based planning, flow manufacturing, outsourcing, and strategic procurement. ERP vendors are just beginning to deliver these functions...including advanced planning and scheduling. AMR Research expects accelerated development and delivery of integrated applications that manage these alternative manufacturing styles."

The August 1999 issue of *Advanced Manufacturing* reports the following benefits to be gained by manufacturers from a fully functional ERP system:

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- Reduced inventories
- Reduced order-cycle times
- Increased production capacities
- Lower total logistics costs
- Decreased procurement costs
- Reduced manufacturing waste
- Lower distribution costs

The American Production and Inventory Control Society (APICS) has researched another effect of the role that technology like ERP plays in production management: job requirements in the manufacturing field are now technology-focused due to the growth of software driven production planning and management. It's no longer an area of business filled only with unskilled labor; nearly 75% of those surveyed have college degrees and more than one-fifth have completed additional master's or doctorate programs. Almost half have taken certification courses in production, inventory or resource management¹

Today's Production Manager is pressured from two sides: to address management's requirement for lower operation costs and customers' demands for fast order delivery and personalized service. These goals are possible with Navision Axapta as the integrated enterprise solution. "The right ERP provider must be a long-term provider who enhances, rather

than maintains, an organization's competitiveness and efficiency. Think of ERP systems as the information foundation of a company – a solid structure designed to improve performance and achieve company goals. The result: a robust and functional system that provides a framework for operations excellence. It not only must deliver real-time information to an entire enterprise, it must also provide the backbone for future advanced applications that promote a competitive advantage²."

For tighter control of materials

Navision Axapta offers flexible version capability for bills of materials; this ensures that all changes can be traced and supports inquiries, as well as reverting to previous versions. Navision Axapta's Materials Requirement Planning ensures that materials are ready along with the plant capacity and schedule openings when needed. Master Planning allows forecasting multiple instances (simulations) into the future.

For optimized production processes

Navision Axapta provides production activity control tools to manage the shop floor, including operations scheduling, job scheduling and feedback, as well as performance measures. The capacity planning can work together with the materials planning with graphic

¹ 1999 APICS survey of 3,485 members including supply-chain managers, directors of materials management, distribution and logistics managers.

² June 1999, Volume 9, No. 6 *APICS – The Performance Advantage*, author D. Michael Travis, partner and leader of the America's Enterprise Software group for Arthur Andersen.

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illustration, to eliminate gaps and overlaps in the production process. A master schedule is likely to look one to six months into the future, and multiple options (like an optimistic, pessimistic and average version) can be created for improved decision making. The master schedule takes into consideration forecast plans and performs detailed requirement calculations to ensure stocking enough inventory, producing on time and maintaining high customer satisfaction with shorter turnaround times.

For E-business

Navision Axapta allows expansion of the physical organization to the virtual extended organization that includes vendors, customers and transportation contacts. The system can be connected to extended business partners, improving and speeding up communications and service. Navision Axapta is based on Microsoft's NT Internet Information Server and Commerce Server; both integrate seamlessly via the Navision Axapta COM interface.

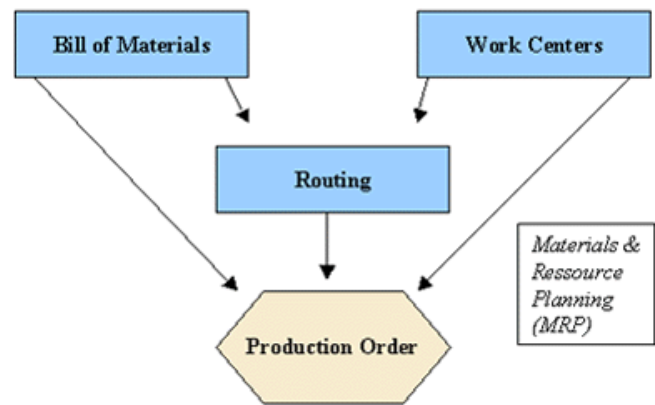
For ease and speed of implementation

Navision Axapta uses the Microsoft standard GUI (Graphical User Interface), which means that staff can intuitively navigate in the new system. Training costs are therefore minimized and transition to the new system is swift. This means a fast return on investment, ensuring that the workflow experiences the least amount of interruption possible.

For scalability

Navision Axapta accommodates a company's changing number of users and applications, to expand databases or add more functions and components in response to new demands. This ensures long-term return on investment and the ability to maintain a competitive edge in the marketplace.

Manufacturing Set-up



MRP

Navision Axapta can be scaled for the needs of small, medium or large midrange enterprises for MRP I and MRP II. MRP I offers Materials Requirement Planning with Bill of Material and inventory data for complete material planning and control. MRP II offers Manufacturing Resource Planning with capacity requirements planning, Work Centers, Routing, Operations & Jobs, complete Resource Planning and simulation. The system handles demand management



through forecast scheduling, Master Scheduling, and Production Planning.

In addition, the Navision Axapta manufacturing functionality has an integrated Master Planning that checks sales orders and purchase orders that are not yet updated. Resources can be booked and rebooked, and production orders can be simulated with bottlenecks on either material or resource requests, or both.

Bill of Material

BOM versions in Navision Axapta have to be approved, can be date driven and there can be only one BOM active at any time. Two BOMs can be created for production of one type of finished product: BOM 1 for when the manufacturer produces the complete product and BOM 2 for when part of the product comes from another supplier. One BOM can also be created for producing two types of finished goods, if there are two different item numbers but only one product type.

There is Product Configuration, Item Configuration and Measure Configuration. Bill of Material line types can be chosen as Items (from inventory taken directly from the warehouse), Production (to initiate a reference production or sub-production), vendor (when an external supplier produces the goods) or phantom. After specification, item groups are integrated to the Financials part of the system. BOMs

can also be exploded and shown graphically in a tree structure for easy overview.

Work Centers

Work Centers are used to complete a production process. In Navision Axapta, they are defined as Machine, Human Resources, Tools, and Vendor, each with one calendar linked to specify operation time in weekdays and hours. Each work center is also linked to a work center group, which includes parameters for calculating and simulation purposes, and for financial updates of item production. These parameters include efficiency percentages, operation scheduling percentages, work center times, ledger account data, alternative work centers, work center properties and route groups.

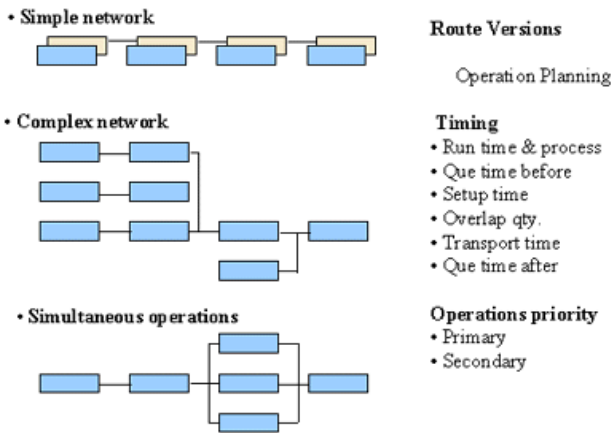
Work Centers are defined centrally, both for MRP and Projects; capacity can be displayed graphically on each resource or in a Gantt chart.

Routing & Route Relations

The operations network describes the manufacturing process. In Navision Axapta, the routing network can be split into simple or complex networks or simultaneous operations, combined with route versions, operation planning and timing with operation priorities. Within this, further detailed information such as queue time before, setup time, etc., must be specified in order to simulate the production as close as possible to real production time.

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Routing



All routes need to be approved. Route version can be date driven and there can be only one route active at any time. The number of operations to produce the same goods may vary due to whether all operations are in-house or take place through sub-contractors (in the latter case, two or more routs are set up to produce one type of finished goods). If there are two different item numbers, but they are manufactured from the same route,, one route is set up for producing two types of finished goods. With the Item table and the Route table set up individually, the two tables enable easy maintenance of the data.

Master Planning

To ensure all requirements are fulfilled, a Master Plan is made with the option to choose between Forecast Scheduling (for gross requirements) where purchase plus sales forecasts are combined to equal the stock forecasts, or Master Scheduling with only the net

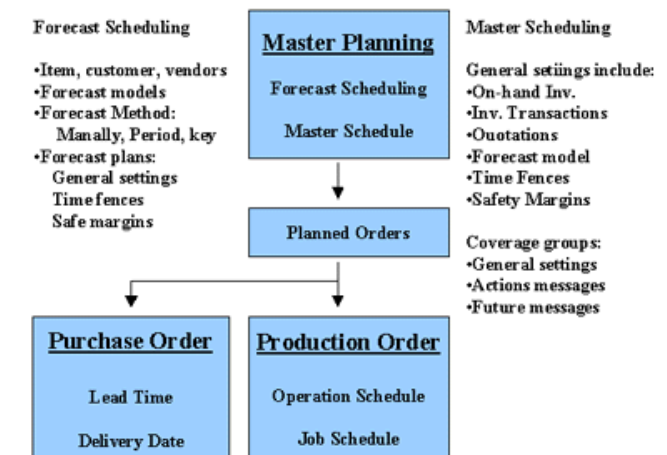
requirements or with both the net and gross requirements. The net requirements are composed of the on-hand and expected receipts minus the expected issues.

Master Scheduling has general settings that include on-hand inventory, inventory transactions, quotations and forecast models, plus time fences and safety margins.

Forecast Scheduling is based on items, customers and vendors with different forecast models and methods available: manually, by period, or key. The Forecast Plans have general settings, time fences and safety margins.

The output from Forecast Scheduling and Master Scheduling are purchase proposals and/or production proposals. Master Planning includes a forecasting tool to give a complete overview of bottlenecks and status

Master Planning



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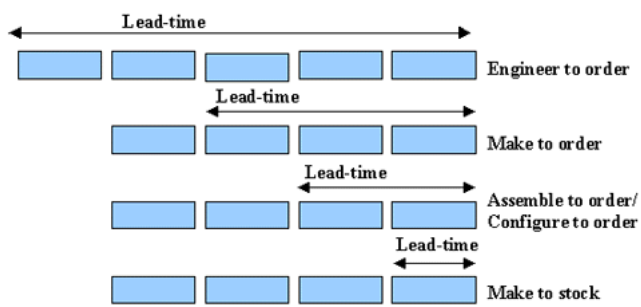
at a given date, not only for the production itself but also for item status in other modules such as purchase and sales. The Master Plan can be calculated using different parameters, such as models, to give results that can be optimized using actions.

Coverage Groups

Navision Axapta can generate coverage proposals of item needs on a variety of parameters: Coverage Code (period, requirement, minimum/maximum, manual), Coverage Time Fence (requirement, period), Safety Margin (receipt, issue, re-order), Requirement Days (day's date, day's date plus procurement time, first issue, first receipt, freeze period), Action Message (advance, postpone, decrease, writeup/ warning), Futures Message (which occurs as a consequence of not keeping to the prescribed actions), and Requested Production Status (create, estimate, schedule, released, started, reported as finished, cost accounted, ended).

Lead Time

Receiving, Process & Transportation Time

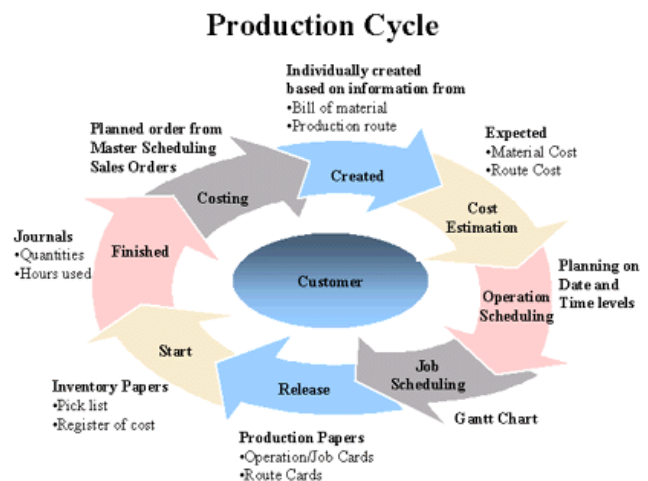


Lead Time

The manufacturing strategy in Navision Axapta can hold different lead times in production. The Engineer to Order includes a design phase, which the BOM is designed then transferred as a production BOM to the inventory. Make to Stock is always possible and covers serial production.

Production Cycle

The Production cycle in Navision Axapta is split into several phases, which at any time can be re-simulated or stopped: Created & Cost Estimation, Scheduling, and the Production Process itself.



Created & Cost Estimation

The production cycle starts with "Created". Updated forecasts and sales orders generate a specific requirement for either a purchase or production order. The proposals from purchase or production are the output from the Master Planning. When a production

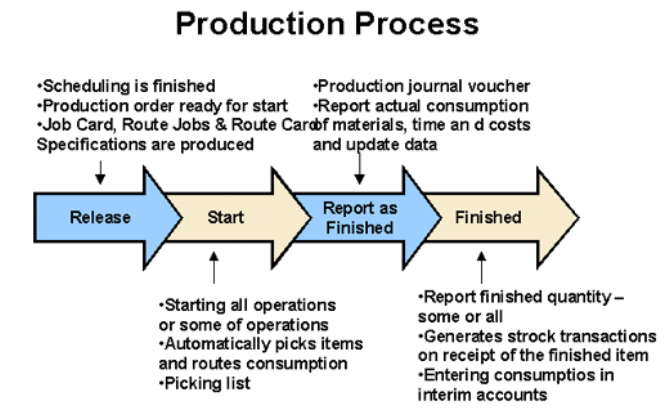
order is created manually or automatically from the Master Planning, the BOM and route can be handled in versions like BOM can be configurable according to rules, by groups and setup. The BOM is copied from inventory to the production order. After this, the BOM definition is open for changes as long as the production phase has not yet changed to Start.

The production phases from Created to Costing can be simulated and re-simulated according to the parameters set up in the system for achieving planning results.

Scheduling

Navision Axapta gives the option to break down Master Scheduling to Operations and Job Scheduling – the difference is planning production from either a date level or a time level, with the job scheduling having an influence on capacity.

Job Scheduling controls the operation flow. In Navision Axapta, there are many options: planning the production with focus on bottleneck operations (to calculate around it), planning the critical path, planning from a specific job identification and choosing between 12 different scheduling directions (e.g. forward from today, backward from delivery date, as last scheduling, etc.). A Capacity Profile indicates that the capacity utilization for a bottleneck operation never will exceed the capacity.



Production Process

In the production process, Navision Axapta updates the production order from release to start to finished and finally to Costing. Through the production process it is possible to set back status of the production, e.g. from Start to Finished if there have been some adjustments in the item consumption in the BOM. The final products from production are updated in the stock table as a receipt, and the items from the BOM are updated as an issue.

Costing of the production process includes cost prices and cost control, calculating and posting costs from a production order, realizing material and time consumption, comparing expected and realized costs when required. From Start to Costing, Navision Axapta controls Item In Progress (IIP), Work In Progress (WIP) and final cost calculation with integration to accounts in the General Ledger module.

In addition to handling such requirements of basic manufacturing, Navision Axapta offers an especially feature-rich system functionality to handle the unique production challenges facing manufacturers who operate with Discrete Repetitive or Batch Processes (Assembly, Make to Order and Make to Stock). Described on the following pages are some of these challenges and the Navision Axapta tools that give you the control you need to deal with them.

Manufacturing: Discrete Repetitive – Assembly & Make to Order

Business Challenges	Axapta Benefits
Systematic maintenance of components (frame orders)	A state of the art Bill Of Material (BOM) system includes various sets of separate versions (one active and no limit to other BOM versions, MRP can be executed from one to all versions at all levels at the same time), alternative parts, product and process documentation; route, resource, staff planning and control
Reference planning to deal with bottlenecks	The basic steps for Bottleneck analysis are part of the standard Navision Axapta MRP functionality. Further investigation is to be conducted manually, eventually supported by analytical and graphical tools such as OLAP or other graphical tools (windows based).
Quality management where tests are conducted	Quality assurance of inbound deliveries can be executed by setting up stock locations reflecting the physical quality testing.

Logs and analysis tool for rejected component log (errors) and logic finding of batch number and rejected components	Due to the open architecture of Navision Axapta, more advanced quality handling defined by the required output of error logging can easily be implemented by adding one new log table. A logic search of batch numbers and errors is available.
Operations simulation of push / pull production through the system	Production in planning phase is scheduled according to all pending production, including prioritized production. In the production execution, production at any time can be stopped or re-calculated/resimulated for full simulation purposes.
Sequence planning – simulation of futures and actions of production jobs	Sequence planning with proposals of futures and actions are available during simulation and provide the planning executive with a unique status overview and flexibility. Production in planning phase is scheduled according to all pending production, including prioritized production. In the production execution, production at any time can be stopped or recalculated /resimulated for full simulation purposes.
Master scheduling	In production scheduling, actions and futures (postponed or advanced time of production) can globally be rearranged on Work Centers or locally in one production.
Decentralization of master scheduling, Work Centers, planning, etc.	As the master scheduling can be executed with or without budgets and in different versions, it is a natural tool for the departments handling sales, inventory, purchase and planning, gaining a decentralization of master scheduling.

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Active control of job management	The Navision Axapta Shop Floor Control solution allows the operator to receive pending relevant job information, where full data capture is included, e.g. acceptance and completion of jobs. This information is reflected in the General Ledger.
Backflushing	Navision Axapta supports in full the backflush method, and changes in locations of items are reflected in the General Ledger when the job is completed.
Optimization of job execution is integrated with the General Ledger	The flow of material and resources in production is completely reflected in the General Ledger on transaction level. This provides an excellent survey of your pending production from a financial point of view. Shop Floor Control allows the operator to receive pending relevant job information, where full data capture is included like acceptance and completion of jobs. This information is again reflected in the General Ledger.
Integration with approved vendors	Integration with approved vendors is implemented in the MRP, where approved vendor production can be simulated equal to other internal production.
Comprehensive back-traceability on serial and lot numbers	Comprehensive back-traceability on serial and lot numbers is fully implemented as information is included on the transaction level.
Planning tools – calendar, resource management, purchase (fixed date of delivery)	A calendar per resource (Work Centers, subsupplier, operator, etc.) can be combined with the purchase schedule and be presented in MS Excel to allow the master planner to evaluate the current set up.

3D planning – limited capacity / percentage of production load / time issue	3D planning utilizes the Gantt chart in Navision Axapta production module from which all information is available.
Deviation management to ensure full overview of items not manufactured and capacity not used.	Deviation management is a manual function derived from the MRP module, hence decisions can be supported upon using graphical tools like OLAP for trend analysis.

**Manufacturing & Operations: Batch Process-
Make to Stock or to Order**

Business Challenges	Axapta Benefits
Materials with alternative materials and suppliers	Alternative materials can be specified on item level, which means automatically retrieving alternative item when stock of primary item reaches zero. Main supplier is specified on item level, where alternative suppliers are specified in the trade agreement setup. The main and alternate suppliers are used in the purchase proposal generated from the integrated master scheduling across all modules. Integration to the document handling system provides the opportunity to attach a Word document, containing approved data specification on item level, even in the BOM at all levels.
Full traceability from raw material through receiving, warehousing, raw material handling, the production & packing	Navision Axapta provides full traceability backwards through receiving, warehousing, raw material handling, the

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processes, the final Q&A approvals	production & packing processes, the final Q&A approvals.
Comprehensive batch and order management	Batch number functionality is implemented on inventory transaction level. In case the batch number is to be created prior to commencement of production, logic handling reserve batch numbers used in pending production has to be implemented.
Material management – deviation and waste	Material management in Navision Axapta provides for handling deviation manually by comparing pre-calculated items and time consumption with actual costings. Deviation management is a manual function derived from the MRP module, hence decisions can be supported by using graphical tools such as OLAP for trend analysis.
Printing of labels	Due to various setups for printing, labels can be printed out from the Inventory module at any printer supporting the Windows environment.
Work center, route control	As the production route links the selected Work Center, BOM and Product Configuration, it determines the phase split in the manufacturing process. Routes can be extended as long as they are not started or active, and are linked to versions of BOM. As all phases can be rescheduled on route level, too, it provides high flexibility to alter the route to follow changes in production planning.

RMA (Return Material Acceptance) handling	Return material acceptance is conducted manually on the purchase level, where Navision Axapta proposes a suitable location. The operator confirms actual location manually.
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