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## Logistics Information Management

An Introduction to Enterprise Resource Planning  
with SAP R/3

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Industrial Management I

VAASA  
2006



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## **1 MODULE OVERVIEW**

Welcome to the module of Logistics Information Management! This module will give a hands-on exercise in how information is managed in manufacturing companies by using computer systems.

### **1.1 Objectives for the course**

The objective of Logistics Information Management module is to give an overview on the general Enterprise Resource Planning (ERP) system. This course will introduce the concept of contemporary computer-based production planning and execution system. The course will focus on general structure of an enterprise resource planning software and how different parts of the organisation may benefit from a centralised system. On successfully completing this subject, the students will:

- (a) be aware of how ERP is used in manufacturing organisations
- (b) understand the structure of Enterprise Resource Planning software
- (c) understand the basic user interface and business logic in an ERP package
- (d) understand the basic production planning process
- (e) be able to apply information stored in ERP for business analysis

### **1.2 Contents**

The contents of this module comprises of three major sections. The first section deals with the theory of enterprise management system and especially how the production / operations management is performed in such a system. These aspects have a connection to other modules in logistics. The emphasis on the theory section is to apply the general logistics theory into perspective of information management. The second part of the contents is the labs section. This means hands-on excursions on different SAP R/3 modules. Applying the theory in context aims to give practical perspective for the work. The third part of the module is about the assignment, which is a requirement for completing the course. The assignment consist several project works which the user may select from.

<b>Theory</b>
Introduction
ERP System Architecture
MRP-2
Capacity Requirement Planning
Lot sizing decisions and ERP
Inventory control parameterisation
Scheduling and sequencing
<b>Labs</b>
Introduction on SAP R/3 4.6D
SAP R/3 General navigation
Example production system
MM – Creating parts for inventory control
MM – Creating Bill of Materials
PP – Running MPS
PP – Purchase orders
SD – Sales order
BAPI – An example on connecting a Java Programme to SAP R/3
<b>Assignment</b>
Literature part
SAP R/3 part
Further readings

### **1.3 Organisation**

The course will employ a mix of web-based material and group or individual exercises. The maximum number of people in a group is three. Should you have any further questions on the materials or you have problems completing the exercises please contact the author directly: Petri Helo, University of Vaasa, Industrial Management, PO BOX 700, FIN-65101 VAASA. Email: phelo@uwasa.fi. Tel. +358 50 556 2668.

### **1.4 Assessment**

Assessment will be based on completing all the exercises in the “labs” section and submitting these as documented. Secondly, a small project work is required as an assignment. Further readings may be used as reference for all parts during the course.

### **1.5 Additional bibliography**

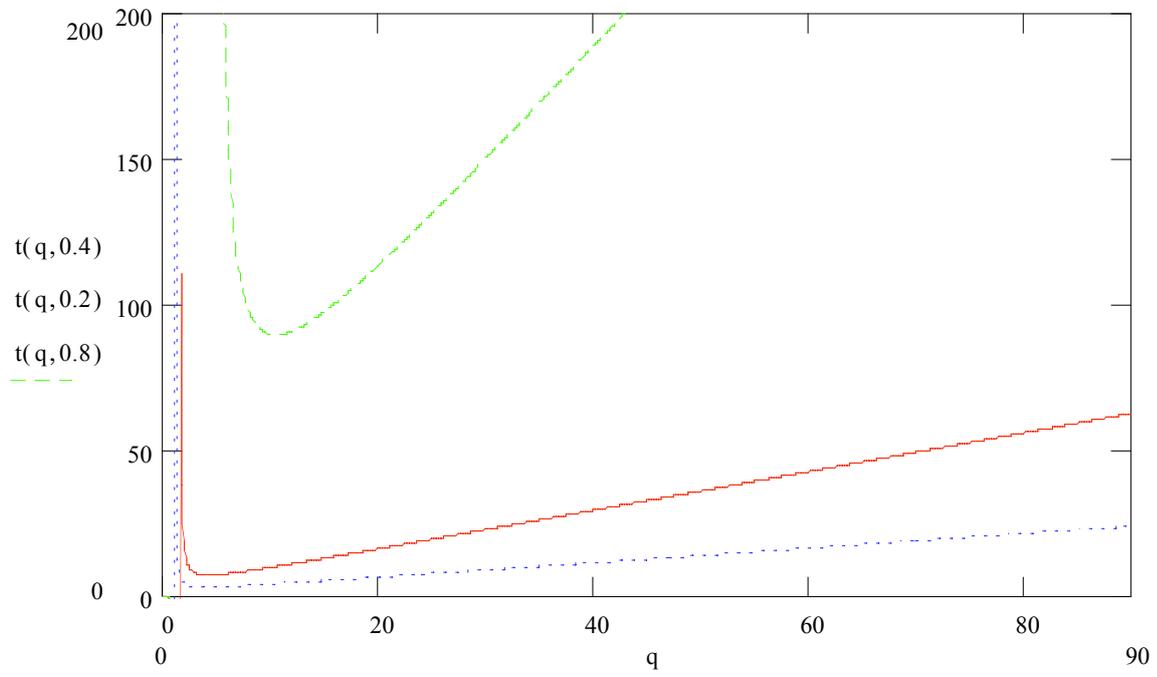
Course materials employed will consist of a packet of downloadable reference material (the virtual environment). However, additional readings are recommended for deeper understanding and technical details. For instance:

- (a) Wallace, Thomas F., Michael H. Kremzar (2001) ERP:Making It Happen: The Implementers' Guide to Success with Enterprise Resource Planning.
- (b) Hiquet, Bradley D. (1998). SAP R/3 Implementation Guide: A Manager's Guide to Understand SAP.(reference only).

**CREDITS AND CKNOWLEDGEMENTS**

The author wishes to express gratitude to SAP Finland Ltd. for giving the licence for SAP R/3 programme. Students of Advanced course of production management for helping to documents the process: Riku Rikkola, Heli Raunio, Mari Anttonen, Osmo Nissilä, Marko Innilä, Miikka Suominen, Tommi Kahinoja, Antti Rantakari and Jari Tolvanen.

Many thanks!

**PART I – THEORY**

## 2 INTRODUCTION

### 2.1 Management Information Systems

Management Information Systems (MIS) is a general term for the computer systems in an enterprise that provide information about its business operations. Additionally it may be used to refer the people who control and maintain these systems. In the early days, business use computers were used to maintain bookkeeping and payroll accounts. Later on several new applications has been introduced including inventory management, general ledgers, sales order system, purchasing systems, project management software etc. These systems that are used to manage the enterprise may be referred by using “MIS”. Today, new applications have been introduced on the data mining and decision making.

A list of potential corporate applications used in manufacturing companies:

- **CRM** – Customer Resource Management refers to software, which keeps records of customers and the activities during the past. CRM software includes the all kinds of data connected to customer, including offer history, orders, projects and even information how contacted last time the customer and how. CRM is used by many companies in order to track customer behaviour and to report the sales performance on different fields.
- **DSS** – Decision Support Systems are expert tools that help decision-making by analysing vast amounts of data. So-called data mining programmes may dig into customer data or product data and analyse which customers are the most profitable or which products have less quality issues.
- **Sales order systems** are used by sales people to manage inquiries from the customers, to record quotations and offers. When the customer decides to order, a sales order document is created including the customer name and address, details of products, terms of payment, terms of delivery and terms of transportation. Sales order system is an important link between sales and production departments in a company.
- **Sales configurators** are tools that allow a user to define a product that meets certain given criteria by combining a number of parts, features or functions. Configurators may be used by customer, salesman, product expert or designers

Sometimes configurators are referred as sales automation tools since they make a transparent interface between customer and manufacturing. For example, see configurators at Dell Computers, Ford Motor Company .

- **Project management systems** are tools used for managing resources and schedules projects. Project management is required in many industries that sell larger systems as entities rather than pure products.
- **General ledger** is software that keeps record of accounts payable and accounts receivable. G/L is a central tool for cash flow management in any type of company. G/L schedules the cash related actions in a company helps monitoring the requirements for financial services.
- **Human resource systems** are software that keep records of personnel in the company. Typically HR software includes payroll accounting systems and reporting required by the authorities such as taxation.
- **Production Planning System** is a tool for planning production based on demand forecast, customer orders, bill-of-materials, and inventory status. Production orders are released and may be traced during the routing in the manufacturing and subcontractors.
- **Materials Management Systems** keeps track on raw materials, work-in-progress and finished goods in inventory. Material management is used for inventory valuation and bookkeeping.
- **Warehouse Management Systems** are typically connected to materials management systems, but this software includes detailed information on warehousing operations such as picking, palletising etc. WMS may create plans for picking products, loading and unloading trucks etc. Sometimes WMS are connected to automated warehouses, where all operations are performed by cranes, robots and conveyors.
- **Bookkeeping** is software for external accounting. All financial transactions are recorder. The main output of bookkeeping is financial statements, including balance sheets and profit/loss statements.
- **Purchasing Systems** are used by material purchasing staff in the company for ordering right amount of required parts and components for the manufacturing.

Purchasing has a connection to production planning, inventory management and financial management of the company.

- ***Distribution Planning Systems*** are used in businesses where scheduling and managing distribution of goods is important. Distribution chain management include capability to see inventory levels in factories, terminals and in transportation. The planning is done centrally with regard to goal of keeping required service level for demand.
- ***Advanced Planning and Scheduling*** (APS) programmes calculate automatically how many products may be promised to customer and when based on a query. The automatic calculation may be based on inventory records, production plan, supplier capacity and a variety of other details.
- ***MRP***, Material Requirements Planning is software for calculating raw material need for each period of time based on bill of materials and production schedule.
- ***MRP II***, Manufacturing Resource Planning (Resource Requirements Planning) is a higher-level production scheduling approach which inputs production schedule for MRP in detailed level.

This short list gives an example on the plethora of applications used in many companies. The challenge is to connect the information exchange between right people in the organisation and from the information management point of view: the application systems together. In practice this objective may mean that information is stored in only one place. For instance, customer records should be in CRM system and Sales order system refers to this data. Duplicate information makes it difficult to maintain the system and ultimately the performance of the organisation diminishes into too complex systems.

**Task**

Find three (A, B, and C) examples of software mentioned in the possible enterprise applications by using Internet search engines. Try to find out the following details on each software package:

1. What is the purpose of the software?
2. References or customer industries that actually use the software?
3. Does the software support international operations?
4. Can this software be connected to other systems? If mentioned, what?

## **3 ERP SYSTEM ARCHITECTURE**

### **3.1 Enterprise Resource Planning**

#### **What is ERP?**

ERP is an acronym meaning Enterprise Resource Planning. It is a software package/solution most often used within the manufacturing environment. ERP is a business tool that management uses to operate the business day-in and day-out. It is usually comprised of several modules such as a financial module, a distribution module, or a production module.

Each of these modules shares information that is housed within the database structures on which the ERP system was coded. ERP helps to break down barriers between departments within a company. For example, many times the sales department may be selling 25% more product than the production department can produce.

By utilizing an ERP system, the sales department, production department, operations management, shipping, financial department, purchasing department all have access to the up-to-date information that is needed to operate smoothly within any manufacturing environment. An ERP system is completely different approach for information management compared to isolated software in organisations. Sometimes ERP is used to connect different parts of an international organisation into the same system. This could be in practice a case where the company selects one centralised system for production planning, even though there were many plants geographically distributed.

#### **Why ERP?**

No doubt that selecting software independently gives certain flexibility. The company may benefit by taking the best suiting package for each purpose. For this flexibility there are a lot of benefits that it is smart to take several software instead of a single ERP package. However, real time information should be stored in only one place at time and systems need to talk with each other as people in the organisations need too. This results that systems need be connected to each other in a way or other. The connection may be manual, meaning that the very same information is input to one system from other by typing. The connection may be semi-automated, which could be export /

import data functionality according to standardised file, database or protocol. Tailoring this kind of connections requires time and patience. Many companies want to concentrate on their main business and forget tailoring data systems in detailed levels. ERP programmes offer ready-made integration between each part of systems. The connections have been tested in practice and faster to implement. Generally ERP systems are justified by three main arguments:

- (1) Less maintenance – new software versions are released every now and then. A ready-made system needs no changes in connections when each part changes.
- (2) Cost effective – buying an integrated solution is claimed to be inexpensive during the time.
- (3) Less integration – the modules are connected to each other “naturally”. The modules are based on same platform. Sales and production software have the same requirements for hardware.

On the contrary, a lot of criticism and opposite opinions have been presented. There have been catastrophic ERP projects that have failed resulting great losses. The general trend nowadays seems that ERP software packages increase their market share compared to separate solutions. The situation is dynamic and evaluation between separate software or centralised ERP should be made case by case.

### **ERP in nutshell**

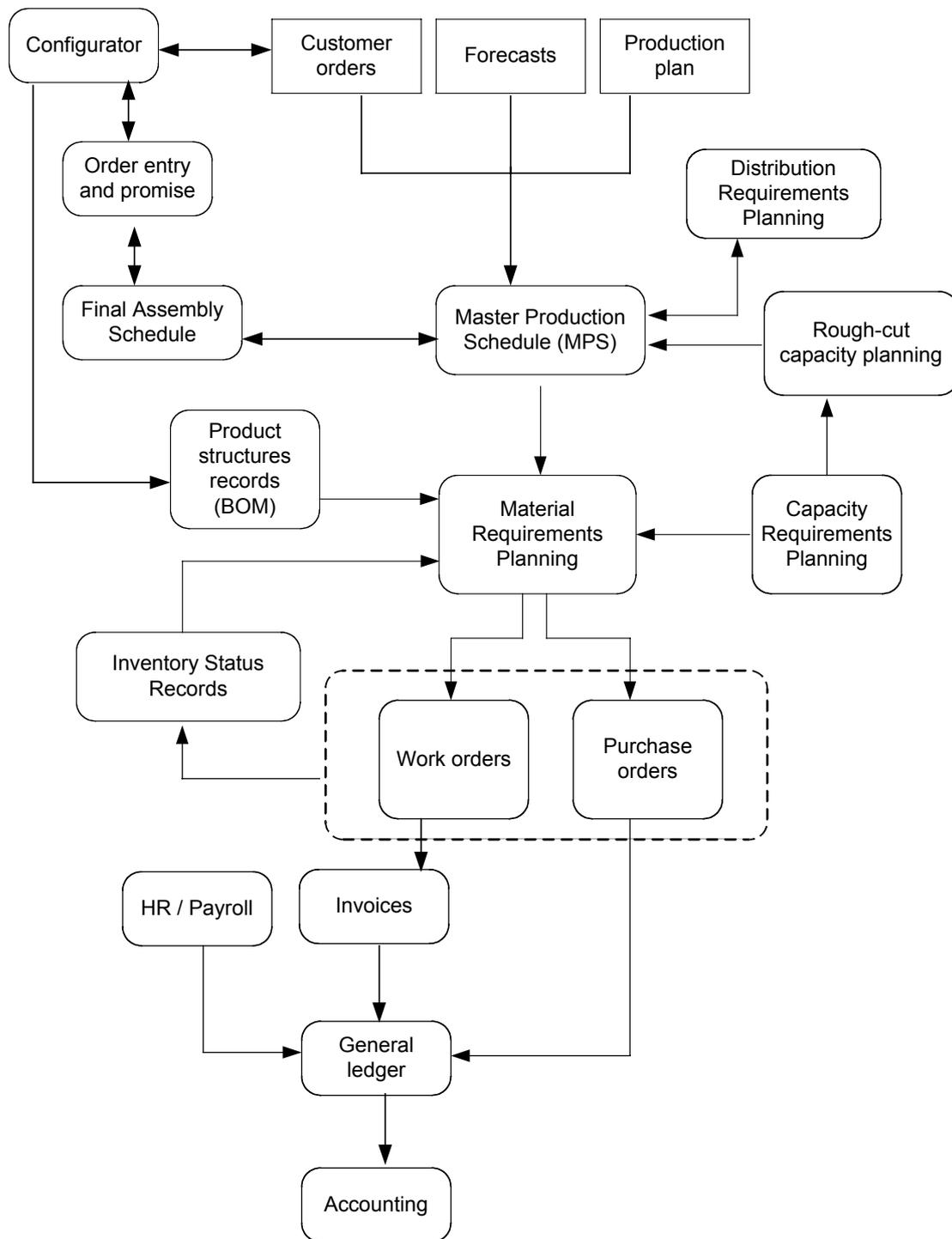
ERP comprises of several applications. There are lot of different software packages available in the market. The basic structure of most of them is reminds the others. The figure below describes typical modules in ERP systems. The names of software modules may vary, but they all have similar functionality. From information management point of view the information flows from the upper part of the picture downwards.

- (1) Production Master Schedule inputs sales orders and forecasts. In case of complex products, the products may be configured prior to taking

sales order in. Order entry and promise system may be connected if all required information is stored in the system.

- (2) MPS generates schedule, whereas Materials Requirements Planning creates purchasing orders for suppliers and production orders for plants based on MPS, capacity, Bill-of-materials, and inventory records.
- (3) Inventory statuses are updated based on shipments and receiving of parts, components and finished products.
- (4) Financial control follows the real process. Invoices are sent to customers, employees are paid according to payroll accounting and suppliers are paid with regards to received goods and services. Financial records end up with bookkeeping, which creates the balance sheet as well as profit/loss statement for the fiscal period.

Each part of the software is connected to each other and every piece of information should be stored in only one place. Duplicate records are avoided by linking the information in the single database.



**Figure 1.** General structure of ERP system.

The practical part of this tutorial will use SAP R/3 as an example of ERP package. However, there are lot of other competing packages available for different purposes. The following list is not complete (far from that!), but gives some ideas what kind of

tools are available to solve the very same problem – how to manage the information in an enterprise.

ERP software in the industry:

- Adapta Solutions, Inc. - *DynaSys*
- AGILE SOFTWARE CORP. -*AGILE*
- Baan Company Home Page -*TRITON*
- *Dataform - Dafo*
- Delectia Oy -*KEYBOX*
- Dialogos-Team Oy -*LEAN SYSTEM*
- *Geac*
- Intenia - *Movex*
- Intuitive Manufacturing Systems, Inc. -*MRP9000*
- JD Edwards
- Lawson Software
- Liinos -*VISIO3*
- Solagem - *Solagem Enterprise*
- Microsoft Industry solutions
- Modultek -*MST9000*
- M&D Systems Incorporated -*Myte Myke*
- Obvious Professional Services Inc.- *Obvious MRP*
- *Oracle Manufacturing*
- *PeopleSoft*
- Powercerv - *ADAPTlications*
- SAP -*R3*
- Scala International AB -*SCALA*
- Siemens-Nixdorf Oy -*FENIX*
- Symix Computer Systems, Inc. -*SYMIX*
- System Software Associates, Inc. - *BPCS*

### 3.2 Order-fulfilment process

Process knowledge is everything in implementing an ERP system. Information systems are built to serve business processes. Process thinking is about analysing flows of actions instead of functional entities. Typical processes of any manufacturing company include:

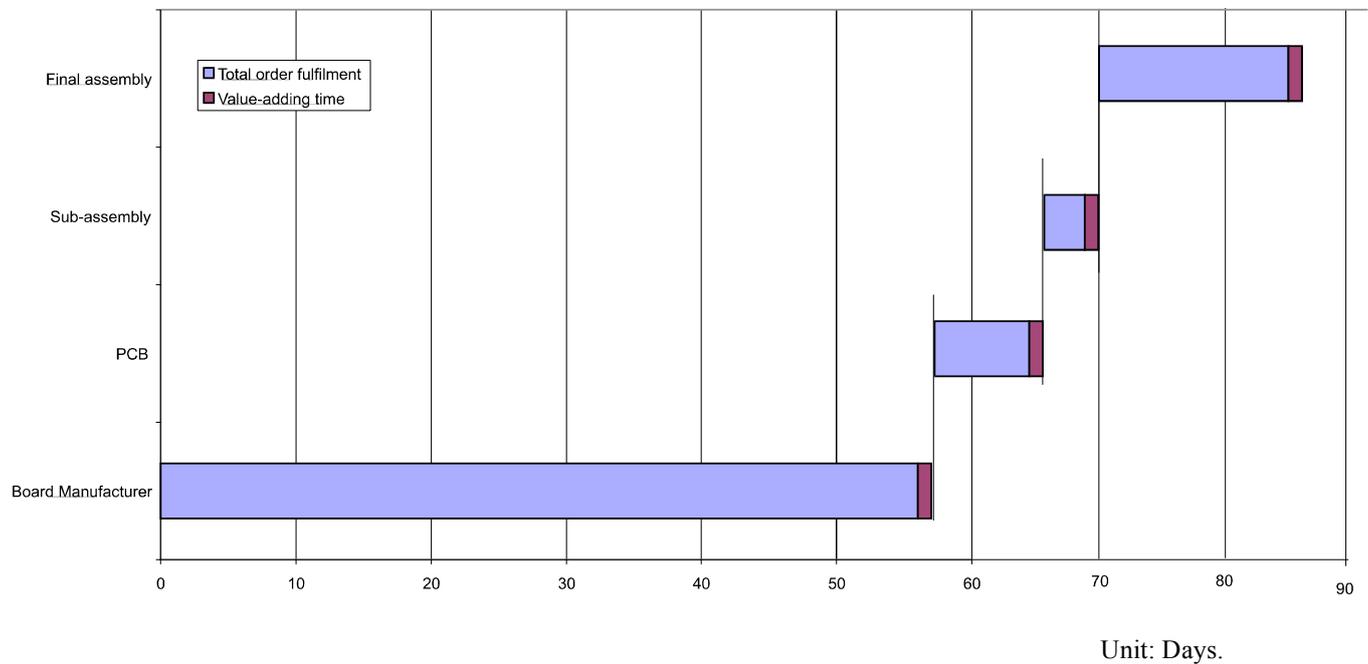
- (1) Offer-quotation process – customer asks for quotation. Company responds with quotation and hopes for an order. Marketing and sales are closely connected with this process.
- (2) Order-fulfilment process – customer has decided to order a product. Company purchases the required parts, manufactures the product and ships it to customer according to agreed details.
- (3) Adding a new product to system and release it for manufacturing and sales.

Typical for any process is that activities are performed in different organisational units: sales departments, production plant, purchasing department etc.



The benefit of a process based ERP system is that it allows a company-wide measurement of operations. The figure below illustrates an example of time-analysis of an order-fulfilment process. The diagram shows where time is spent in a four stage manufacturing operations. Reading from left-to-right: Supplier of printed circuit boards takes several weeks of time prior to sending to Printed Circuit Board (PCB) manufacturing phase. This part of the operations takes only few days. PCB boards are then sent to subassembly and finally to assembly and shipping operations. Finally the product is distributed to customer site. Company-wide ERP allows this kind of

analysis and improvement of the material control chain in a way that total chain performance will be optimised instead of partial cost minimisation.



To give more information management related example of processes, a list of SAP R/3 processes are as follows:

### **Sales**

Inquiry, quotation, sales orders, delivery, goods issue, billing

### **Material management**

Consumption based planning, purchase, inventory management, warehouse management, stock-taking

### **Production planning**

Production order, scheduling and resource planning, goods issue for production, complete confirmations, goods receipt in the warehouse

## **Financial accounting**

Payment run, clearing open items, dunning, closing (balance sheet, p/l statement)

For managing different types of processes, most ERP packages may be customised by changing parameters of the system. SAP system includes a component called *Business-Navigator*, which includes a reference model for all business models in SAP. This includes more than 600 processes. From information management point of view document flow is the basis for process oriented ERP. This means how offer becomes to sales order and finally to production order for a production plant. Another example of automatic workflow control could be when travel expenses are approved by the area boss and accounting clerk. Each event in the workflow posts a document for record. SAP also includes an integrated mailing system, which allows emailing documents for approval etc.

## **3.3 ERP Projects**

### **Work Breakdown System**

Implementing an ERP system into a company is a big project and ultimately is about changing the way, how the company works. For this reason, there are a lot of risks involved in every stage. Typically an ERP project is done in several parts. Stages of an implementation project may include:

- (1) Feasibility study – technical and business level analysis of the software packages available in the market. Selection of suitable software according to criteria given.
- (2) Requirements specifications for each process and module. This means writing down the events in process. This may include industry specific features and country specific issues such as bookkeeping charts and reporting languages.
- (3) Project plan – scheduling the implementation by taking into account the information dependencies in different parts of organisations and software modules.

- (4) Pilot phase – the actual implementation should be performed in stages. The initial pilot may consist of one sales department and one production plant or for one product group. Once the complete process has been tested with limited amount of data, it is easier to extend pilot into next stages and finally into full implementation.
- (5) Data entry is sometimes regarded as a separate task. This is due to its speciality. While moving to a new system, a vast amount of data needs to be imported. Sometime new data is required to collect from the organisation. It is very typical that ERP system includes more than 10 000 customers and more than 40 000 items.
- (6) Roll out is probably the most important stage. This means in practice the training and all functions that are required with the users to ramp up the system in practice.

These tasks are very generic, but they all are involved in some level all ERP projects. The phases mentioned here are in many cases overlapping.

### **Budgets**

With regards to budget of an installation, there is a great variety from inexpensive solutions to very costly high-end-systems. The projects should be justified based on value rather than cost. To illustrate any ERP implementation project a rule of thumb may be applied: Cost structure of a general ERP implementation is divided into three parts, which seem to be of equal size:

- Software licenses – 1/3
- Hardware – 1/3
- Training costs – 1/3

There are better budget templates available by commercial consultant companies and software providers, but this gives an idea how important all aspects are.

## **Pitfalls of ERP project**

There are many reasons, why scope of the project was set wrong in the first place or why the budget was ruined. The following list is an example of typical reasons for failing ERP projects:

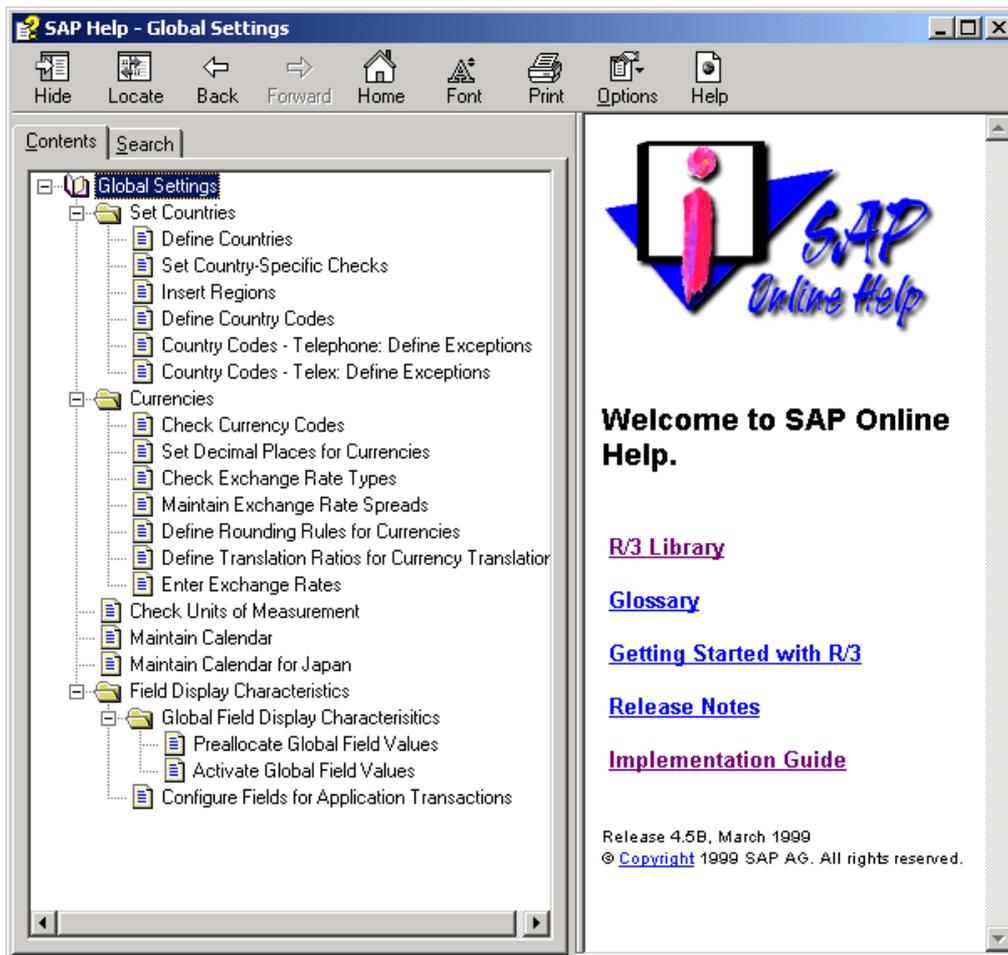
- Too much customisation – all the companies are different, but this may yield to endless customisation and tailoring of user interfaces, reports and even databases. It is not only the software that should be flexible but the business processes as well.
- Reports – too special reports require creative use of data structures. Sometimes these issues are industry specific.
- User interfaces – a reason for tailoring a user interface is to make the new ERP look like the “old good” software. Consultants programming on hourly base have nothing against modification; however, the budget may be ruined faster than thought.
- Scope on details, not integration – if project plan concentrates too much on technical details such as server hardware and does not acknowledge that a lot of business processes are being changes – it is likely that project fails in some stage.
- Too much technical people, too little business process definers. Firstly, ERP is about business processes and secondly about IT project management.
- Organisational issues – implementation of a new system always brings the controversial issues to table. Commitment for new procedures is required from all parts of the organisation, especially from the management side.
- Result? Taken all possible causes above, the result may be very lean compared to planned benefits of the new system. The company may end up with a situation, where only sales orders are implemented, and the rest will be done in the future, maybe...

### **Customizing ERP for your company**

Parameterisation is the way how ERP software is tuned for the right industry and organisation. Typical adjustable parameters include some of the following issues:

- Sales areas
- Sales channels
- Factories
- Purchasing channels
- Product groups
- Area managers
- Product groups
- Personnel groups
- User groups and profiles

SAP system includes a whole bunch of possible variables to set. This gives flexibility for the software, but also requires a deep understanding of effects changing one parameter to another value.



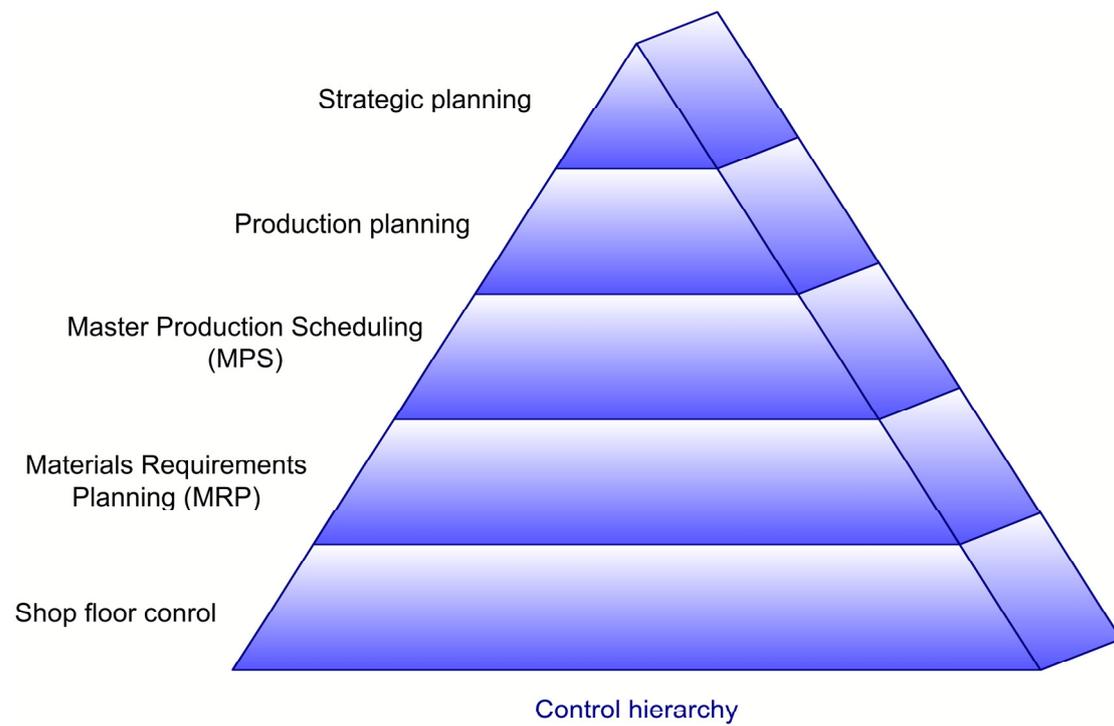
## Tasks

1. Find a case example of failed ERP project from the Internet and report the losses what happened.
2. Define three things what could be industry specific ERP issues in:
  - (a) automotive industry
  - (b) chemical industry
  - (c) pulp and paper industry
  - (d) banking
  - (e) hospital management

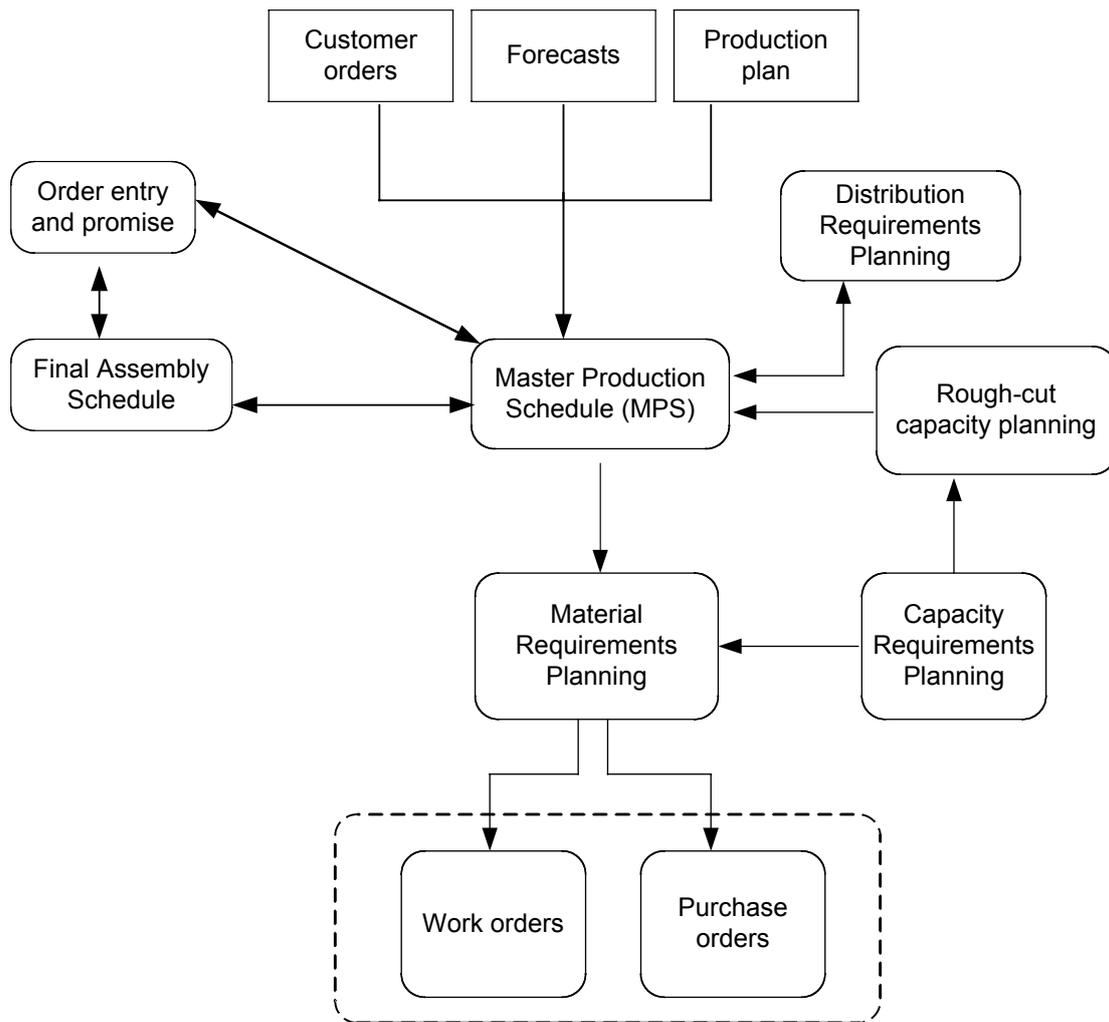
## 4 PRODUCTION PLANNING

Production planning from ERP point of view may be presented as planning pyramid. Planning pyramid refers to hierarchy of production planning. Contemporary ERP packages are involved in all the levels of pyramid.

- At the highest level, strategic planning considers issues such as “Who is the customer?” “What are the products?” “Where are we now? Where should we go?”
- This information is input to production planning where manufacturing strategy is considered. “Where should we have capacity?” “Should these parts be made in-house or outsourced?” “What equipment to use?”
- Master production scheduling is production planning in finished goods level. This is related with aggregate capacity planning and order-fulfilment process in general level.
- Material Requirements planning takes schedule in and generates production orders for manufacturing and purchase orders for suppliers.
- Detailed scheduling at shop floor control is fine-level capacity management. This involves with sequencing and scheduling of jobs for each machine or capacity group.



In more detailed form the components of the production planning system may be presented as follows. This part of the pyramid is included in ERP systems. Strategic and production planning level issues are managed by the executive and management boards of the enterprise.



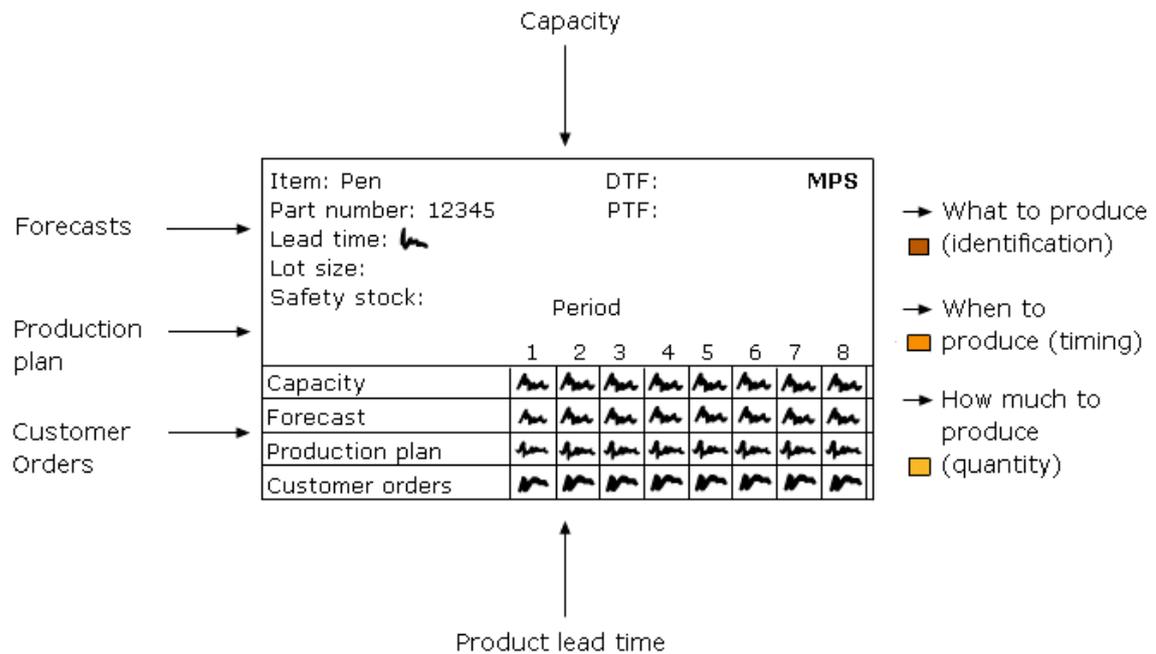
(Animation text: Production planning principles of any ERP package follows this kind of structure. The heart of the system is Master Production Schedule (MPS). It gets information from demand forecasts, actual customer orders, and planned production. MPS may exchange information with Final Assembly Schedule programme and Distribution Requirements Planning. Order entry and promise systems, such as sales tools, may query product availability from the MPS). Material requirements are calculated based on agreed schedule for each period. Capacity Requirements planning may be calculated to ensure the capacity availability. The result of material requirements planning is work orders for the production and purchase orders for suppliers.)

#### 4.1 MRP-2 -Master Production Schedule (MPS)

Master Production Schedule is answering to three main questions:

- (1) What to produce?
- (2) When to produce?
- (3) How much to produce?

In order to answer these questions, we need to know the production capacity available for each period of time, product lead time for each product, forecast of demand (if available or used), production plan for the period and actual customer orders received for each period.

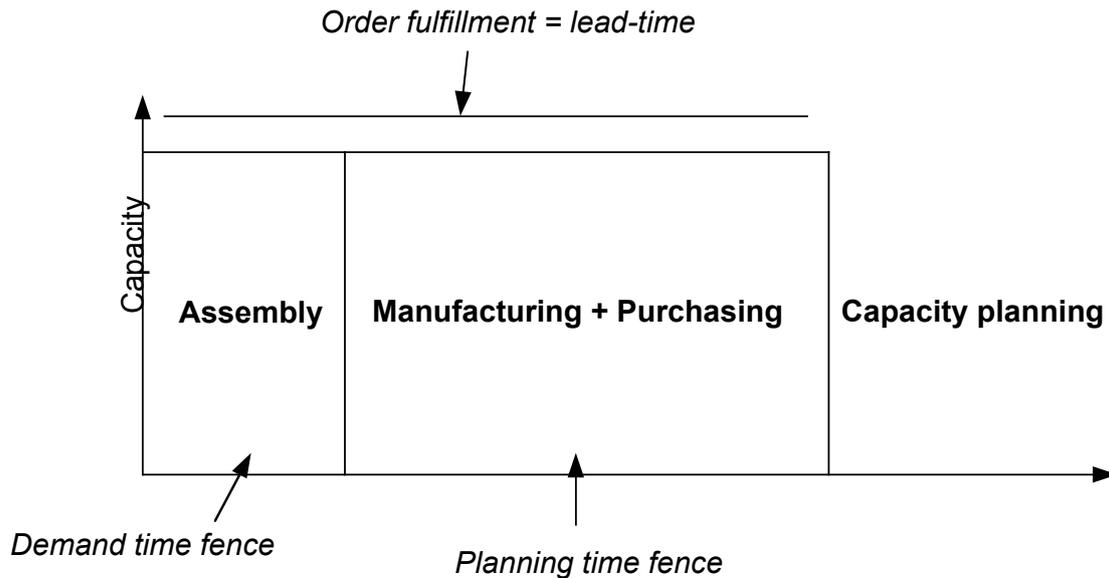


(Animation text: The Master Production Schedule gets Forecast for demand and actual customer orders for each period. Also already planned production will be inputted. For each product we need to know the lead-time and for the factory the capacity available. The three results of MPS are: (1) identification (what to produce), Timing (when to produce) and quantity (how much to produce).)

## Figure 2. Function of Master Production Scheduling

### Timing fences in MPS

The time horizon on MPS Level may be divided into three parts: (1) demand time fence, which is the fixed period for production, where no changes should be allowed in the production schedule without specific notice; (2) planning time fence, where sales orders are reaching the sales forecasts and (3) capacity planning fence, which is almost completely covered by sales forecasts.



### Forecasting and demand planning

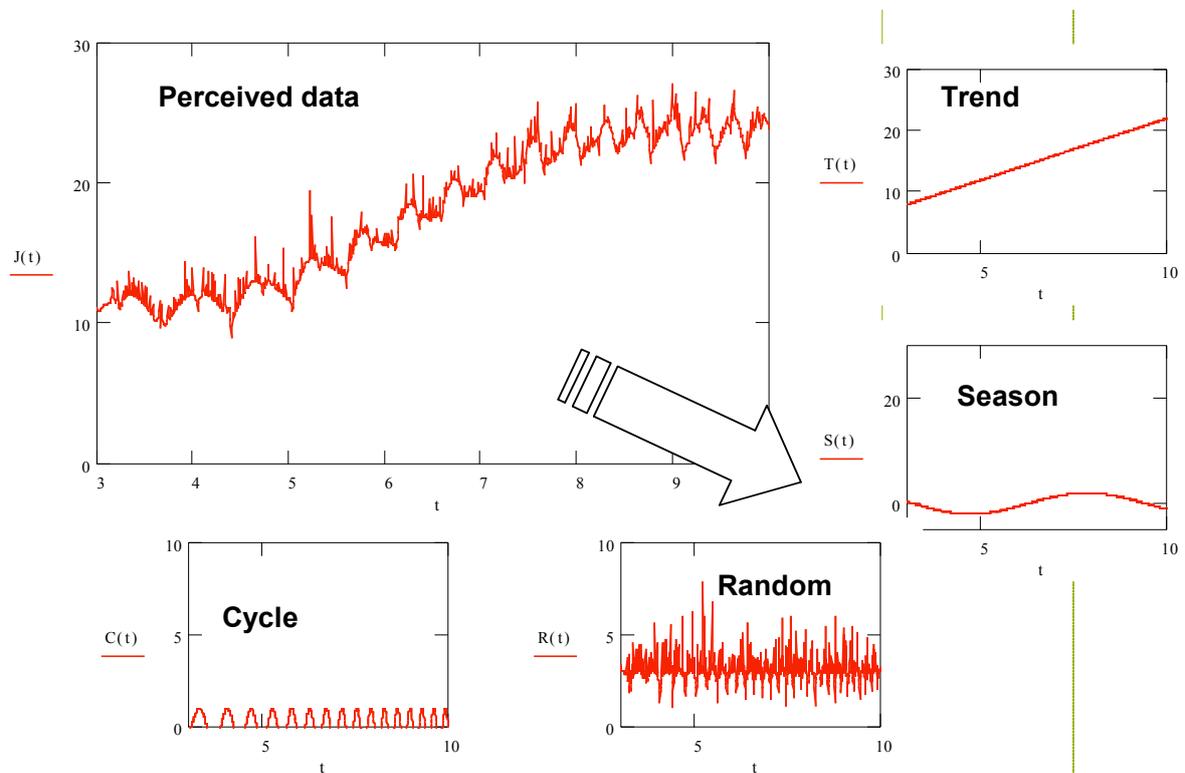
MRP-II systems make a distinguishing between two types of demand: (1) independent demand (sales of finished goods) and (2) dependent demand (purchasing parts). Forecasting may be used as production control technique for those finished products that are made to stock. Forecasting is a way to manage adjusting the production resources in uncertain demand. Typical approaches for generating a sales forecast include:

- (1) Top-down approach – Regions > Customer types > Business Units > Products.
- (2) Bottom-up – Products > Customer types > Geographical areas

Both ways are used for data collection. From any time series of sales forecast four main demand components may be identified:

- (1) Trend – sales of a product may have an increasing trend or decreasing trend. Sometimes this trend may be linear and sometimes exponential. Trends may be related to new technology or innovations.

- (2) Seasonal variation may be connected to economic cycles. Some products boost on high economic season and the demand will dampen when time goes by.
- (3) Cyclical variations are shorter repeatable patterns than seasons. Cycles may be caused by weekday demands for instance.
- (4) Random variation is the unexpected part or something, which occurs unrepeatably. For instance, a tornado may increase sales of construction materials increasingly.



**Figure 3.** Demand variation has components of trend, season, cycles and random (Tersine 1986).

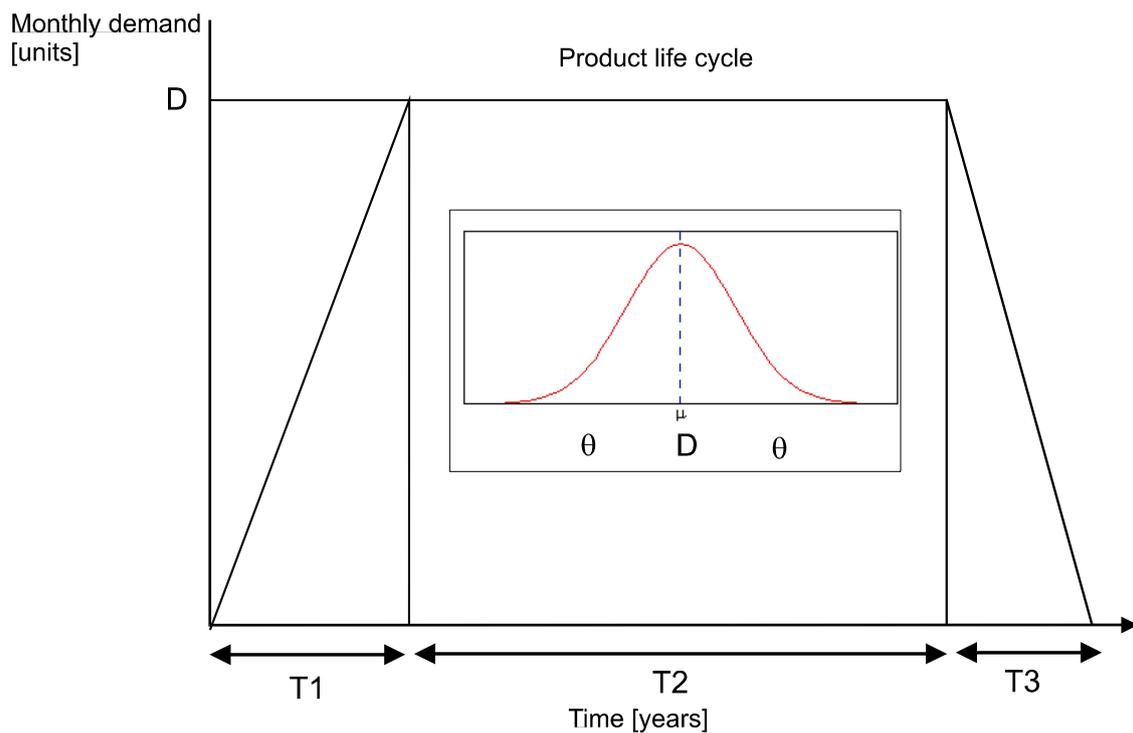
Ptak's (1997) three rules of forecasting:

1. Forecasts are always wrong
2. Longer horizon -> less accurate forecasts
3. Shorter horizon -> more accurate forecasts

### Life cycle of a product

Another issue which should be taken into account on forecasting product demand is the life cycle of the product. To put the life cycle very simple, we can consider three stages for a product:

- (1) T1 ramp-up – the product is introduced and the sales is seeking its demand level.
- (2) T2 – the normalised demand is the time period where the level of sales is not growing more but just fluctuating around the average.
- (3) T3 – ramp down of the product – All products have reached they maturity in some stage. Production of the product will be stopped and replacing products are given for the sales people.

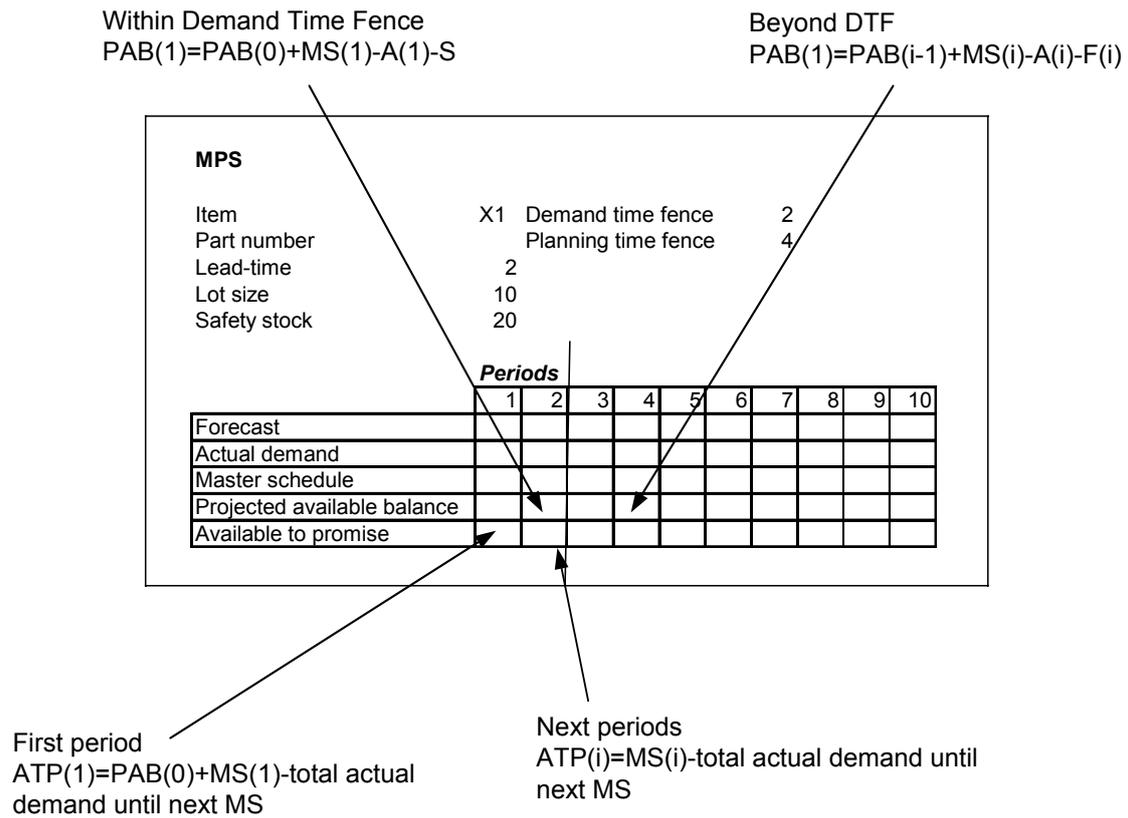


## Creating an MPS

Most MPS systems work with the principles described below. The key definitions for each part (Tersine 1985):

- Forecast is the anticipated demand for the item for each period (sometimes divided to two different components: spare part requirements and production forecast).
- Actual demand is the quantity sold (or warehouse orders), recorded in the periods when shipments occur. It should be noted, that forecasts are reduced with same amount, when orders are received and actual demand increases.
- Master Schedule is the quantity of items scheduled to be available in a given period
- Projected Available Balance is the expected number of completed items on hand at the end of each period
- Available to Promise is the number of units that are available for sale

The calculation of each period depends on which fence we are in. The equations below show how Projected Available Balance and Available to Promise may be calculated based on forecast, actual demand and the length of demand time fence.



### Task

1. Consider the following statement and try to justify:

*“Assumptions of traditional continuous and independent demand are wrong:*

- *Individual demands are not independent*
- *Demand is not uniform or continuous*
- *Variations in demand are not caused by random fluctuations”*

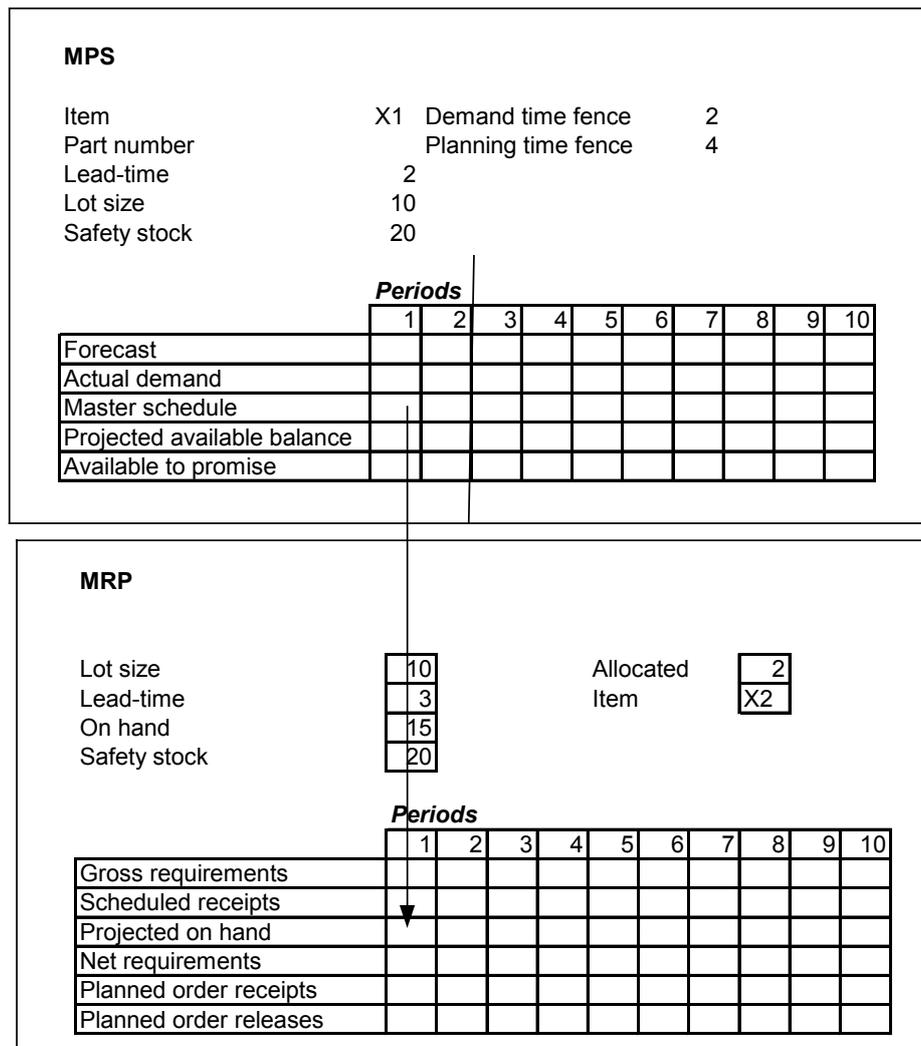
2. Calculate an MPS example with Excel sheet.

## 4.2 Material requirements planning - MRP

The purpose of MRP is to give the answers to following questions in the production department:

- (1) What to order?
- (2) How many to order?
- (2) When to order?

Similarly the questions may be asked from own production: What to produce, how many and when? The basic principle remains the same. Master Schedule from MPS is input in MRP calculation for each period.

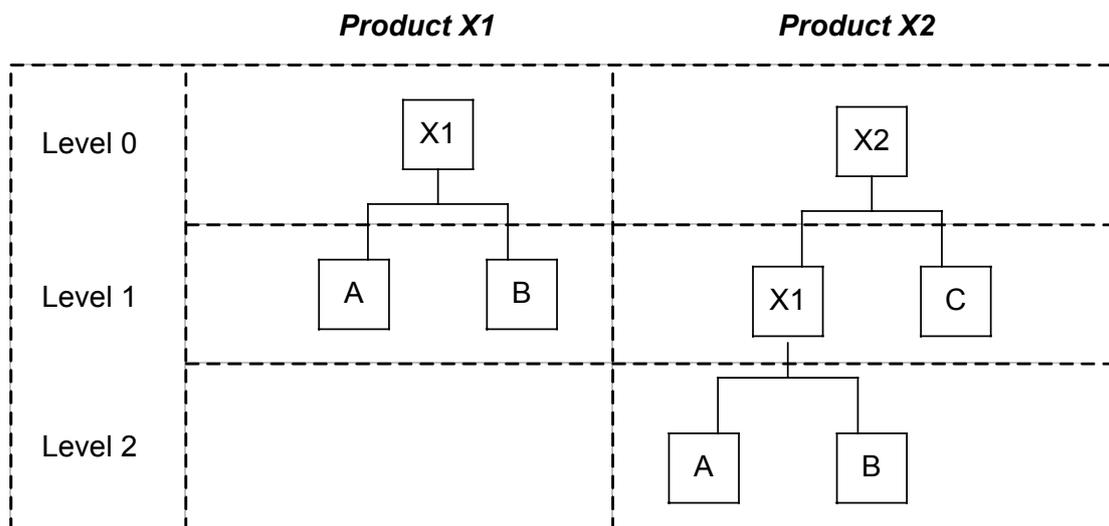


In this stage we need to know the product structure (Bill of materials) that tells which parts are needed to form the product.

### Bill of materials - BOM

The following figure shows an example of multi-level bill-of-material. The ERP systems commercially available are based on relational database systems and the central element is the BOM table. The BOM information is used in many applications. These include for instance the following functions:

- Demand forecasting for purchased items
- Production planning and control
- Product costs accounting
- Inventory control records
- Quality assurance systems - traceability
- Purchasing management
- Customer support (sales and after-sales information)



**Figure 4.** Multi-level Bill-of-Materials.

Low level coding is important parameter for MRP/ERP systems. If the company has the product structure shown above (only 2 products), then low level codes for items are as follow:

X1            0

A, B         1

X2            0

C             1

A, B         2

With this information, can system determine, when to complete the MRP-requirements calculations successfully. There are several BOM types available for different purposes:

- (1) The Single-level explosion, gives BOM in single level, what components are used in this assembly.
- (2) The indented explosion shows one end-item and its assemblies and components with low level codes.
- (3) The summary explosion shows how many different components are used in the end-item totally.
- (4) The single-level implosion shows in what assemblies are components used on.
- (5) The indented implosion shows all the upper levels, where this particular component is being used.
- (6) The summary implosion, same as number 5, but shows total quantity of this component used in different assemblies.
- (7) Matrix BOM, lists all the components and how much of these are used in the different end-products.

How to manage in today's manufacturing world requirements with 200 up to ten thousands of different end items? No, BOM in its older form would not help you. We need to simplify our products, so our controllable variables are below 10 to 100. But also we need to have plenty of different variations. We need modularity.

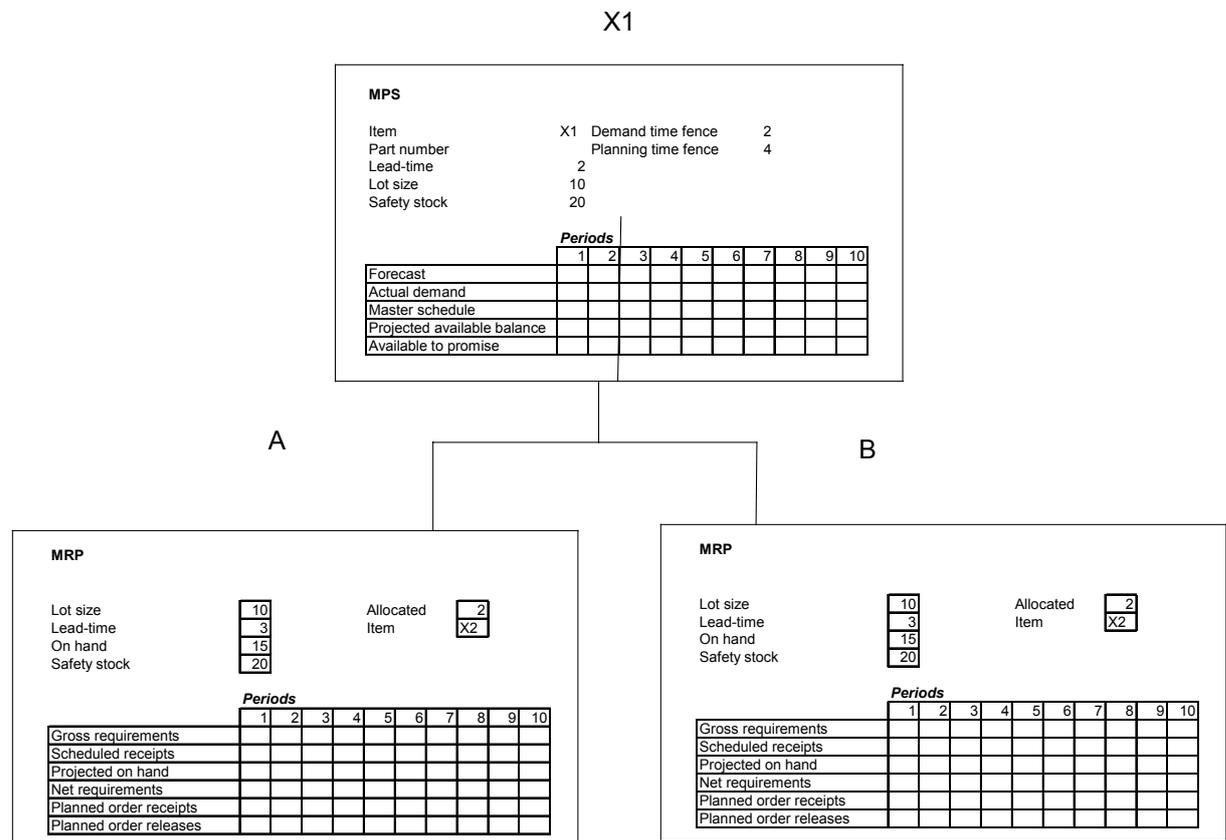
Of course we can start from the scratch and modularize all our products with modular engineering principles. The purpose is to minimize the number of different components to make production more effective. Four "key" performance metrics for more modular end products are:

1. In particular end-item: How many components are used as a total (number)?
2. In particular end-item: How many different components are used?
3. Ratio of first and second mentioned items.
4. In all end-items: How many different components are used?

This data may be collected from the ERP system for design analysis and production planning analysts.

### Material Planning in dependent demand

Once the product structure (for product A) is know and the Master Schedule, it is possible to calculate the material requirement for each part (B and C).



Concepts:

- Gross requirements, the total requirements for this item, if end-item then its quantity is derived from MPS (master schedule), if dependent demand item (from BOM) then its quantity is derived from the planned order releases of MRP-table.
- Scheduled receipts, material that is already ordered.
- Projected on hand, the expected inventory level of this particular item. Calculated with equation:  $\text{scheduled receipts} + \text{planned order receipts} + \text{projected on hand in previous period} - \text{gross requirements}$ .

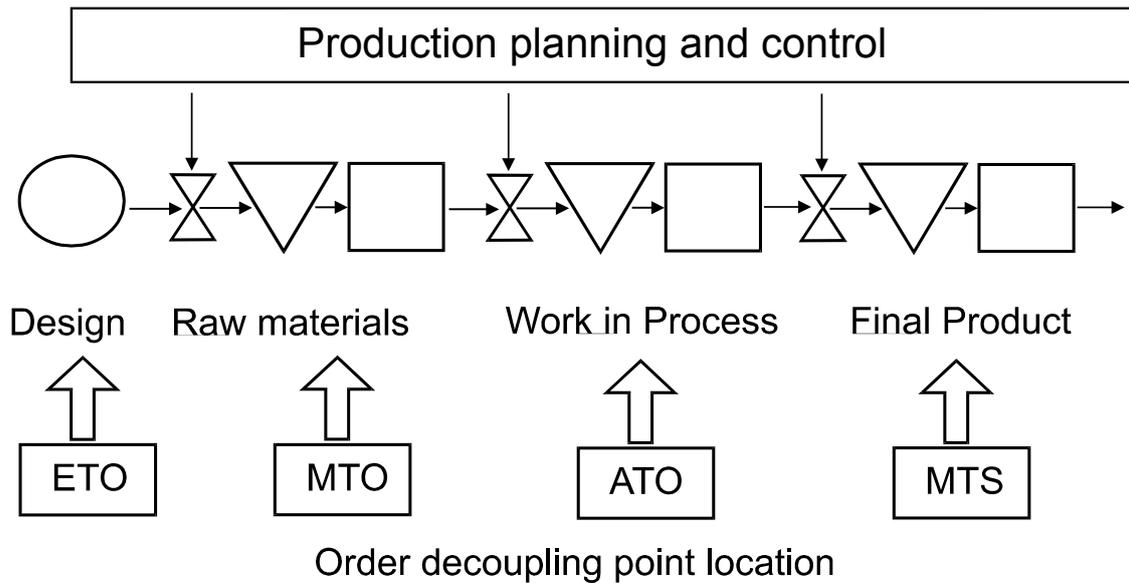
- Net requirements, how much items are needed to satisfy current period demand. Calculated with equation:
- Gross requirements - scheduled receipts + projected on hand in previous period
- Planned order receipts, the size of the planned ordered order. If lot-for-lot, then it is same as net requirements, but if something different, then inventory will be seen in projected on hand.
- Planned order releases, when ordering the order should be taken, this row indicates the outputs of MRP: what, how many, and when?

### 4.3 Production control principles

$$\textit{Production} = \textit{manufacturing} + \textit{distribution}$$

Production in general is understood as combination of manufacturing and distribution functions. There are several ways to classify the control philosophies. Here is one that suites well with most of ERP packages.

In production management, the process types are divided into control categories based on order decoupling point (ODP). ODP concept refers to the point where customer orders are inputted in the process. The generic process phases include design, raw materials, work-in-progress and finished goods. In case, the customer orders may be inputted directly to finished goods, which mean that the product has been produced before the order, the production type is make-to-stock. In the same way, if the customer order starts purchasing of raw materials, we talk about make-to-order production. If semi-finished goods are ready for the final assembly, and this is what the customer order starts, we are dealing with the assembly-to-order type of production. In case even the design and engineering needs to be done prior to purchasing and manufacturing, the production typology is engineer-to-order.



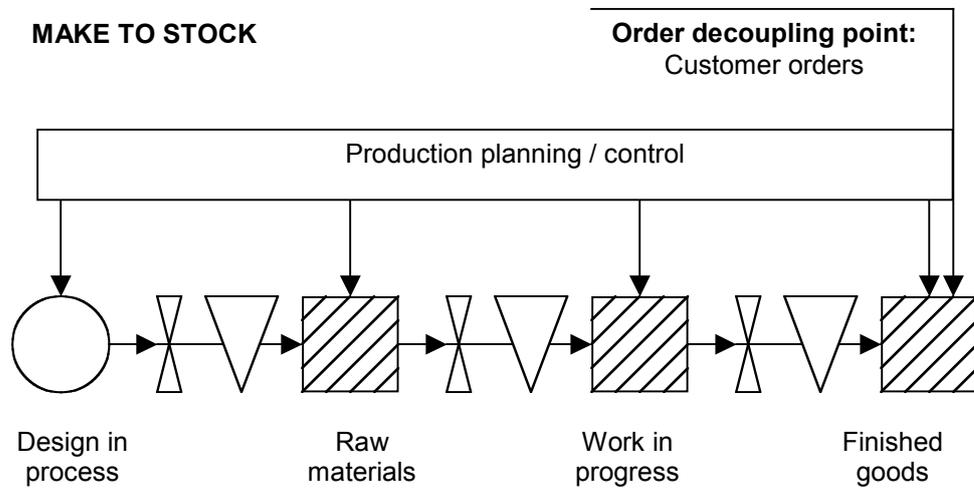
**Figure 5.** Order-fulfilment process of a manufacturing company. There are four possible stages in the process. First one is the design stage, second one the raw material inventory, third the work-in-process, and fourth one the finished goods inventory. Each stage has stock and control points from the general production planning and control.

Production types define the production control types required:

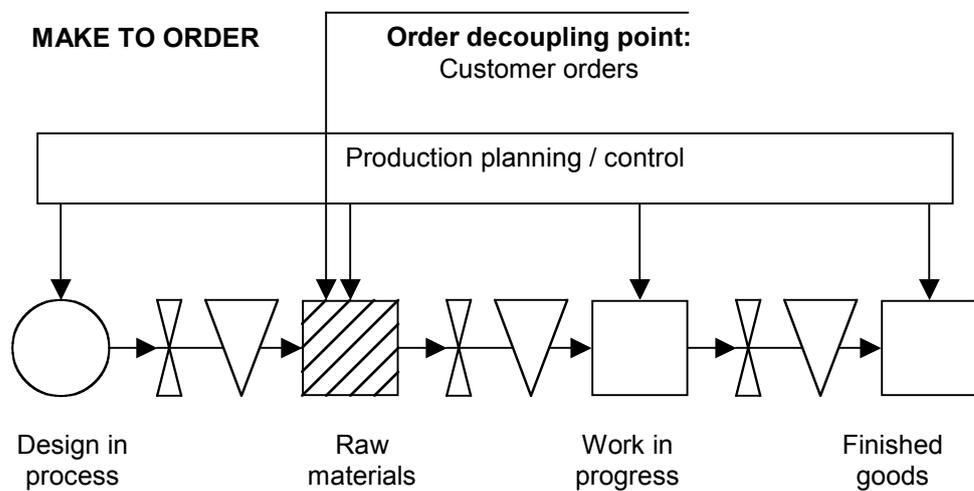
- MTS – Make-to-stock – ship to customer
- ATO – Assembly-to-order - manufacture - ship
- MTO – Make-to-order - purchase – manufacture - ship
- ETO – Engineer-to-order – design – purchase – manufacture - ship
- CS – Capacity selling – no own product – pure selling of machine time

There is a general trend of moving towards make-to-order. This is a way to get rid of finished goods inventory and add variety for product families. From production planning point of view, this gives more pressure on materials handling and purchasing

management. In many cases the results are obvious: lower finished goods inventory and fast order-fulfilment process for tailored products.



Make-to-stock-production – order-decoupling point is targeted to finished goods inventory.



Make-to-order production - order decoupling point targets to raw material purchasing stock.

**Task**

Name an example company or process for each type, justify your decision:

- MTS – Make-to-stock
- ATO – Assembly-to-order
- MTO – Make-to-order
- ETO – Engineer-to-order
- CS – Capacity selling

## 5 INVENTORY MANAGEMENT

### 5.1 Lot sizing decisions and ERP

There are several lot sizing decisions that have an enormous effect on production system performance. These decisions set the level of inventory and lead-time for production. Lot sizing decisions are an important ERP parameterisation for Materials Management and are related to following issues:

- Order lot sizes for each supplied item
- Run lot sizes for production
- Setup lot sizes for a single stage machine
- Transfer lot size for transportation of goods

The traditional theoretical approach for lot sizing optimisation presented in many textbooks is the Economic Order Quantity (EOQ). EOQ minimises the total cost of material handling by taking the following parameters into the equation:

$$TC = R \cdot P + \frac{R \cdot C}{Q} + \frac{Q \cdot H}{2}$$

$$0 = R \cdot \frac{C}{Q^2} + \frac{1}{2} \cdot H$$

$$\left[ \begin{array}{l} \frac{-1}{H} \cdot \sqrt{2 \cdot H \cdot R \cdot C} \\ \frac{1}{H} \cdot \sqrt{2 \cdot H \cdot R \cdot C} \end{array} \right] \quad Q := \sqrt{\frac{2 \cdot C \cdot R}{H}}$$

R = annual demand in units

P = purchase cost of an item

C = ordering cost per order

H = PF = Holding cost per unit per year

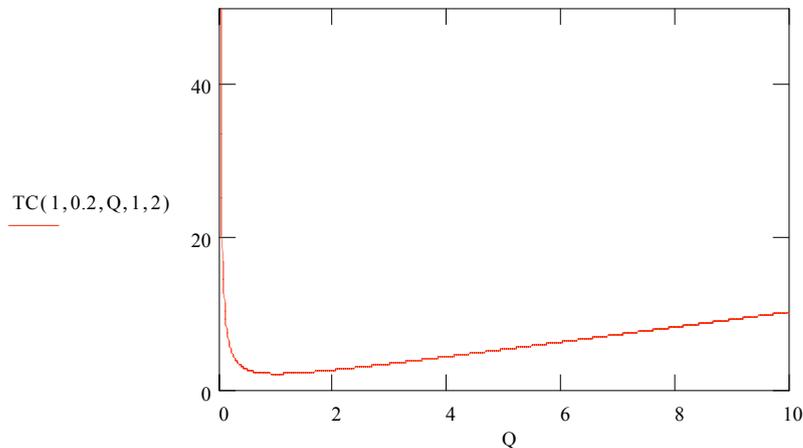
Q = lot size or order quantity in units

F = annual holding cost as a fraction of unit cost

L = lead-time

The minimisation of the function may be calculated by a simple differentiation calculation, which yields the traditional optimisation curve:

$$TC(R, P, Q, C, H) := \left\{ R \cdot P + \frac{R \cdot C}{Q} + \frac{Q \cdot H}{2} \right\}$$



The practice of ERP system is that several modern lot-sizing procedures may be used, including the dynamic EOQ. To name the corresponding lot sizing principles in SAP R/3, we will see three groups of procedures:

### Static Lot-Sizing Procedures

The lot size is calculated exclusively by means of the quantity specifications entered in the material master record. Possible criteria are selected based on company policies and may include:

- Lot-for-lot order
- Fixed lot size
- Fixed lot size with splitting / overlapping
- Replenishment up to maximum stock level

### **Period Lot-Sizing Procedures**

The requirement quantities from one or several periods are grouped together to form a lot. Various periods are supported and it is possible to define the number of periods which will be grouped to form a purchase order proposal. Possibilities include:

- Daily lot size
- Weekly lot size
- Monthly lot size
- Lot size according to flexible period lengths (based on accounting periods)
- Lot size according to planning calendar

### **Optimum Lot-Sizing Procedures**

According to SAP On-Line help the optimum lot-sizing procedures are described as follows: *“The requirement quantities for several periods are grouped together to form a lot, whereby an optimum cost ratio is determined between lot size independent costs and storage costs.”* The procedure generally follows something very close the EOQ principle. Possibilities available on this group:

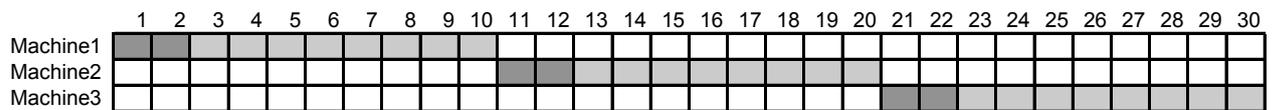
- Part period balancing
- Least unit cost procedure
- Dynamic lot size creation
- Groff reorder procedure

## **5.2 Inventory control parameterisation**

### **Lot sizes and lead time**

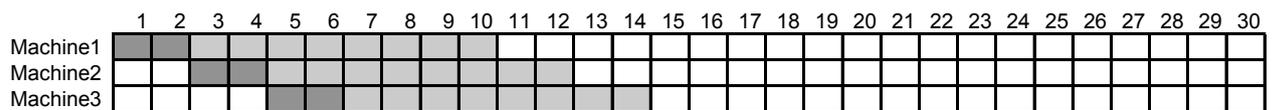
The importance of lot sizes for lead times may be demonstrated by the following example:

- (1) Product routing for product A is Machine 1, Machine 2 and Machine 3
- (2) Processing time for each produced unit is one period, setup for the batch is two periods. Lot size for manufacturing is eight pieces.
- (3) Transportation lot size is equal to manufacturing lot sizes.
- (4) The total lead time for processing all the machines is 30 periods. (figure below)



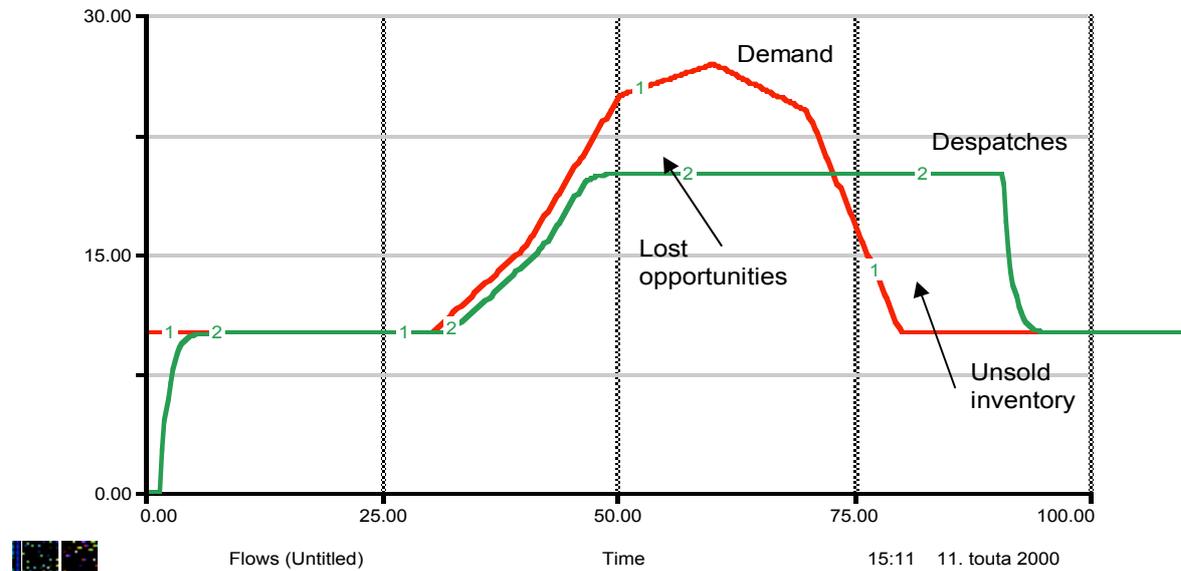
The lot sizing parameters may be changed as follows:

- (1) Transportation of goods from machine to the next may be started immediately when the first part is manufactured. (transportation lot size = 1).
- (2) This yields a dramatic change in total lead time for all machines. The same amount of goods may be processed in 16 units of time. This almost 50 % lead-time reduction was made possible by a simple lot sizing change. (figure below)



For further analysis on transportation lot sizes, refer to Hilmola (2001).

### 5.3 Scheduling and sequencing



The value of delivery performance (adapted from Houlihan 1987).

#### Scheduling

Scheduling allocates resources or capacity to orders, jobs, activities, or customers. Scheduling is concerned with the timing of occurrences (arrival to and departures from a system)”

- Master or aggregate scheduling plans – production for a factory level (3 month – 1 year)
- Detailed scheduling plans – day-to-day operations, machine levels.

The purpose of job shop scheduling is to perform the following functions:

- (1) Allocating jobs to specific work centres
- (2) Prioritising all jobs at each work centre
- (3) Revising priorities as changes occur
- (4) Monitoring the progress of jobs

Goals of production plant scheduling could include: 1. high % of on-time completion, 2. high utilisation, 3. low in-process inventory, 4. low overtime.

### **Production system features**

Selection of scheduling method depends on production type:

- Continuous production – flow control. control the rate at which a product flows through the facility. Standard products -> stock, not in customer order. Sequence of orders is fixed. Availability of materials and machines!
- Intermittent production – order control - a job shop – a variety of interdependent orders, requires distinctive processing, with individual and separate records required. particular order for a given product through the facility.

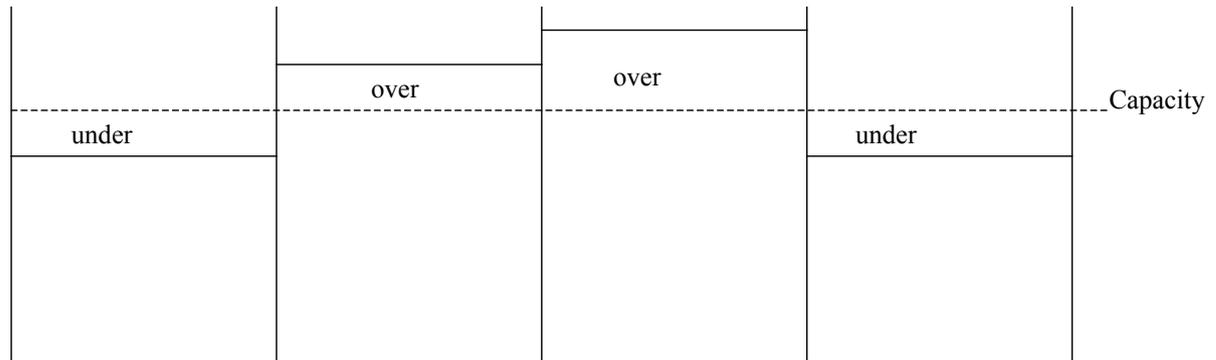
<b>Feature</b>	<b>Continuous</b>	<b>Intermittent</b>
Product	Standardised	Non-standardised
# of products	Few	Many
layout type	Product	Process
production control	Flow control	Order control
raw material inventory	High	Low
in-process inventory	Low	High
finished goods inventory	High	Low
worker skills	Low	High
process flexibility	Low	High
equipment	Special purpose	General purpose
work flow pattern	Fixed	Variable

(Tersine 1985)

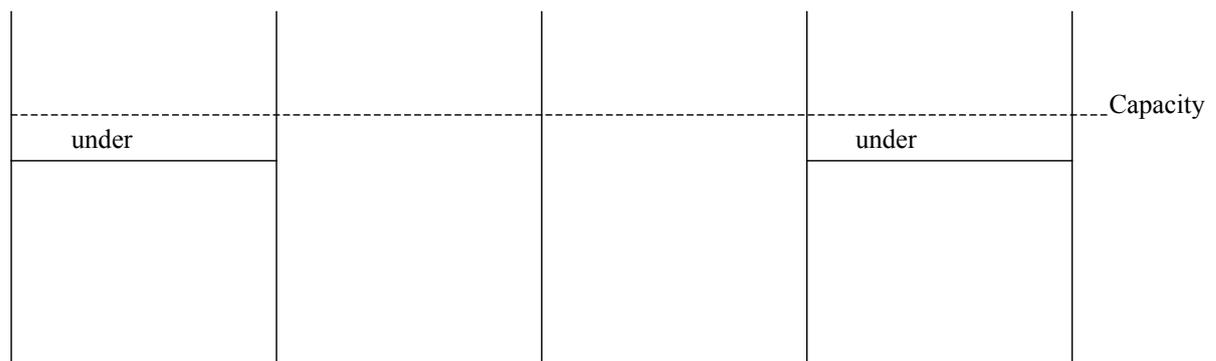
### Loading methods

There are two types of loading: infinite capacity method and finite capacity method.

Loading methods – infinite without regard for capacity



Loading methods – finite - never to exceed capacity



Indexing method of loading

Algorithm:

1. List the process times of each job in the work centres
2. Divide the lowest process time of each job into its respective process times
3. Assign jobs with the lowest index to work centres
4. Is sufficient capacity available in the work centre

5. Assign jobs to the work centre with the next lowest index

6. All jobs assigned?

Other methods include Assignment method of Linear Programming (LP), Transportation Method of LP etc. various operations research techniques. The ERP software use this kind of algorithms in fine scheduling.

### **Sequencing**

Once works are loaded on work centers then sequence them. i.e. the order of precedence for jobs

- loading - > capacity control
- sequencing -> work center priority control

To illustrate the number of possibilities of different sequences, consider a production system where  $n$  is number of jobs, and  $m$  the number of work centres. A situation where  $n$  jobs to pass  $m=2$ , these parameters lead to  $n!$  alternatives.

Sequencing methods include (1) Charts – Gantt, (2) Priority rules, (3) Optimisation methods and (4) Simulation.

Basic priority rules for operations

- FCFS – First Come First Serve
- DD – Due date of job
- SPT – Shortest processing time
- LPT – Longest processing time
- S – Slack (smallest amount of...)
- SO – Slack per remaining operation
- RS – Random selection

- PCO – Preferred customer order

Critical ratio technique is used with MRP sometimes

$CR = \text{demand time} / \text{supply time}$

$= \text{time remaining until needed} / \text{time needed to complete work}$

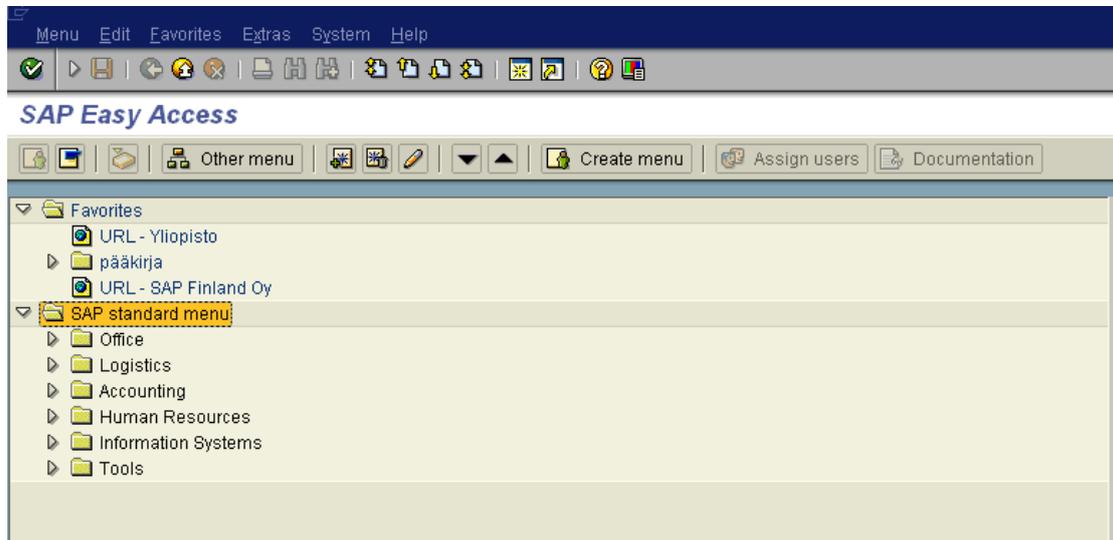
$= (\text{date req.}) - (\text{today's date}) / \text{days needed to complete the job} \text{ days of supply} = (\text{stock on hand}) - (\text{safety stock}) / \text{average daily demand}$

### **Task**

Give an real life example of five different sequencing priority rules. E.g. a queue in bank would be...

- FCFS – First Come First Serve
- DD – Due date of job
- SPT – Shortest processing time
- LPT – Longest processing time
- S – Slack (smallest amount of...)
- SO – Slack per remaining operation
- RS – Random selection
- PCO – Preferred customer order

## PART II – LABS



## 6 SAP LABS

### 6.1 Introduction on SAP R/3 4.6D

#### Long journey

The company SAP AG was founded in Walldorf, Germany in 1972. At the moment it has more than 10 000 employees. SAP acronym stands for “Systemanalyse und Programmentwicklung”. R/3 is the current version new version developed since 1989. The first version was released at 1992/93. It uses graphical user interface and many advanced features. The system has been designed for the demand of companies, whose production base of the BOM. Examples of initial applications include automotive industry. For a more comprehensive overview on the history of SAP company and software, refer to [sapfans.com](http://sapfans.com) web site.

#### Modules and philosophy

SAP R/3 is a popular enterprise management system used by several international companies. The SAP R/3 system is a general-purpose programme, which has been adapted to several industries. In the Logistics Information Management module, we will concentrate on manufacturing related issues. The structure of SAP system is modular. Each of functionality is embedded into a software module. SAP R/3 consists of several modules, which have the functionality. Main modules in the software are:

- **SD**                Sales and distribution
- **MM**                Materials Management
  - **MM-WM**    Warehouse-Management
- **PP**                Production Planning
  - **PP-PI**        Process Industries
- **FI**                Financial Accountings
  - **FI-AA**        Asset Accounting
  - **FI-IM**        Investment Management
- **CO**                Controlling
- **PM**                Plant Maintenance

- **QM**            Quality Maintenance
- **HR**            Human Resources  
                    Payroll accounting, Personnel administration
- **PS**            Project System

In addition to these standard modules, SAP R/3 is available for industry specific versions. These special modules include automotive industry, hospitals, retail, banking, oil and gas etc.

SAP R/3 is truly multinational software, which supports multiple locations and multiple operation types. This includes several country-specific and language specific features. E.g.

- Different user interface languages
- Different report languages
- Use of multiple currencies
- Localised charts of accounts
- National versions of modules. E.g. FI – accounting for Finnish laws.

The global EPR means also that more than one company in the client is possible. The system includes an organisational structure that shows the relationships between entities.

The philosophy of SAP R/3 system is document flow based. This means that each event performed in the system creates a document or several documents. The documents are related to each other and may present the development of the process with steps. A document may be created only if the data inputted is valid and complete. For instance, sales order document may have several status, which is changed according to process.

**Task**

The examples in this part are meant to be followed as “learning by doing”. This means that you should try to create your own product with parts, BOM, suppliers, customers etc. everything that is needed to complete automatic purchasing orders and production orders. In order to do this, you need to follow the instructions and search for references in details. This is something what all SAP implementers will face. You will learn to search help files, books, web references etc. everything that you might need to get the production working. Your work is very independent.

Your delivery should include:

- (1) List of items that you have created in the system
- (2) Documentation of your work (preferably with screenshots) and if possible,
- (3) List of possible pitfalls you might have come with. How did you overcome these, or did you not?

If you have problems that you are really stuck with, give an email to [phelo@uwasa.fi](mailto:phelo@uwasa.fi). Remember to attach details of what are you aiming to do and what have you done.

Enjoy!

References are readings:

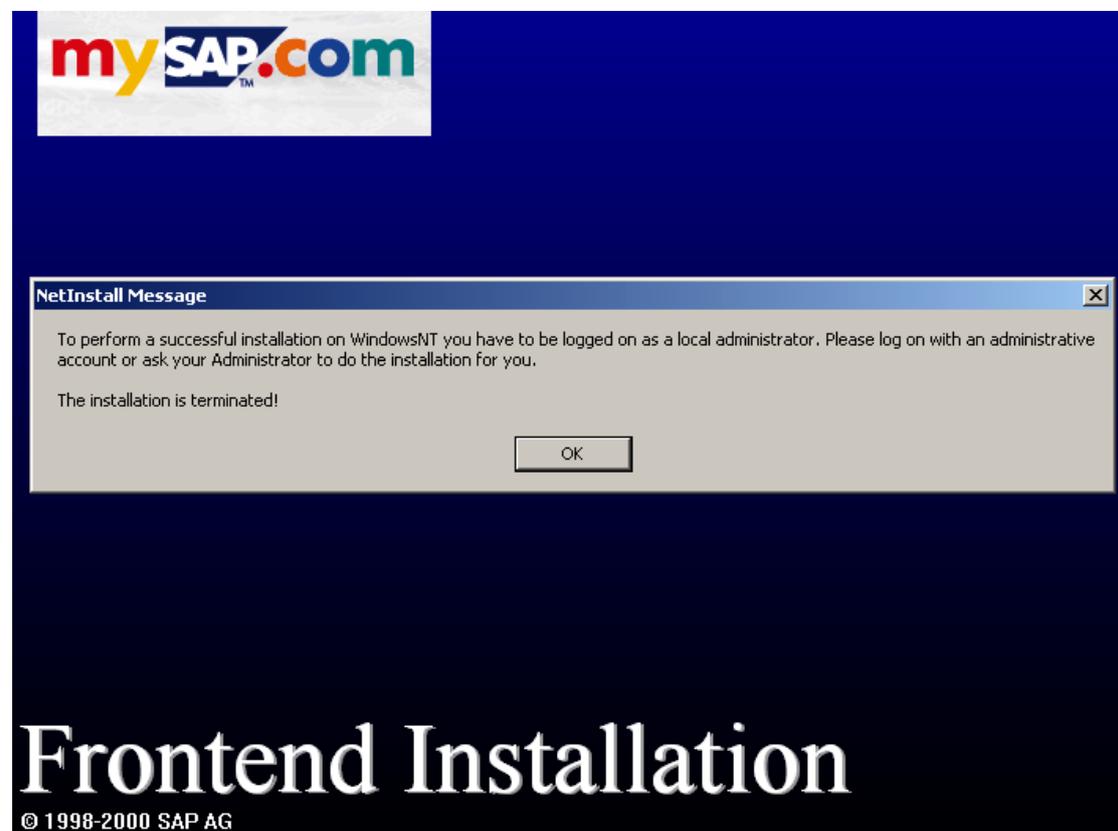
- MRP – Carol A. Ptak (1996). MRP and Beyond: A Toolbox for Integrating People and Systems.
- Vollman, Thomas E.; Berry, William L.; Whybark, D. Clay (1997), Manufacturing Planning and Control Systems. Boston (MA), McGraw-Hill..
- Ptak, Carol A.; Schragenheim, Eli (2000), ERP: Tools, Techniques, and Applications for Integrating the Supply Chain. Boca Raton (FL), St. Lucie Press.
- MPS – Tersine, Richard (1985). Production / Operations Management – Theory, Concepts, and Analysis. Prentice-Hall.

## 6.2 Installation of SAP R/3 Client

A prerequisite for the using the SAP R/3 is to have a client installed on you computer. In case, you do not have the client installed yet, you need to follow the instructions here.

You can install the SAP GUI and the front-end components directly from CD on a local computer. Firstly, you need local administrator rights for the computer on which you want to install the SAP GUI.

Note in order to have access to SAP you need the client software, if you do not have access to it, please contact the author.

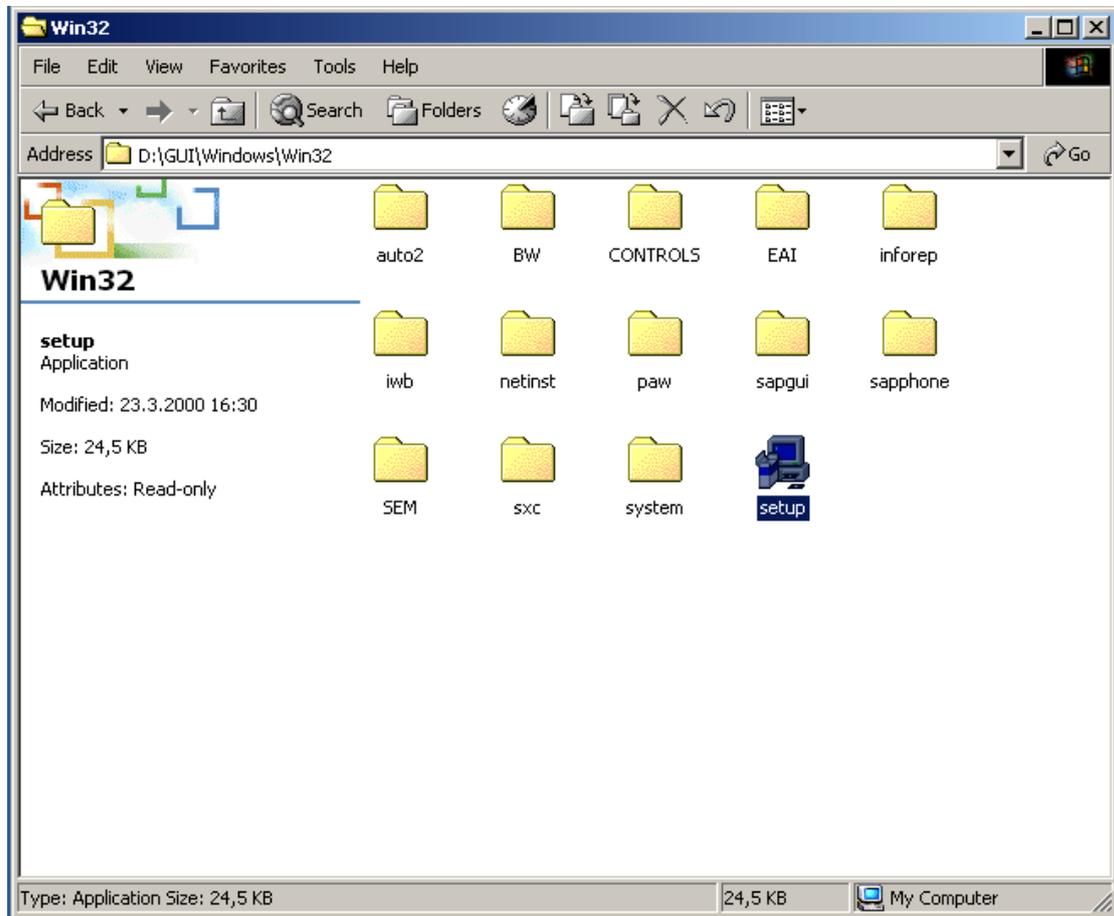


**Figure 6.** Installation sequence will be terminated if you have not logged on as a local administrator.

### 6.2.1 Local installation from CD

Follow this procedure whenever you want to install front-end software components on a single computer directly from CD without setting up a front-end server. For a local installation from CD under Windows NT or Windows 2000, you need local administrator rights.

1. Close all other applications on your computer to avoid problems during installation.
2. Start `setup.exe` on the *Presentation* CD (for your platform) in directory `Gui\Windows\Win32`. The *Welcome* dialog box appears.



**Figure 7.** Path to `setup.exe`-file.



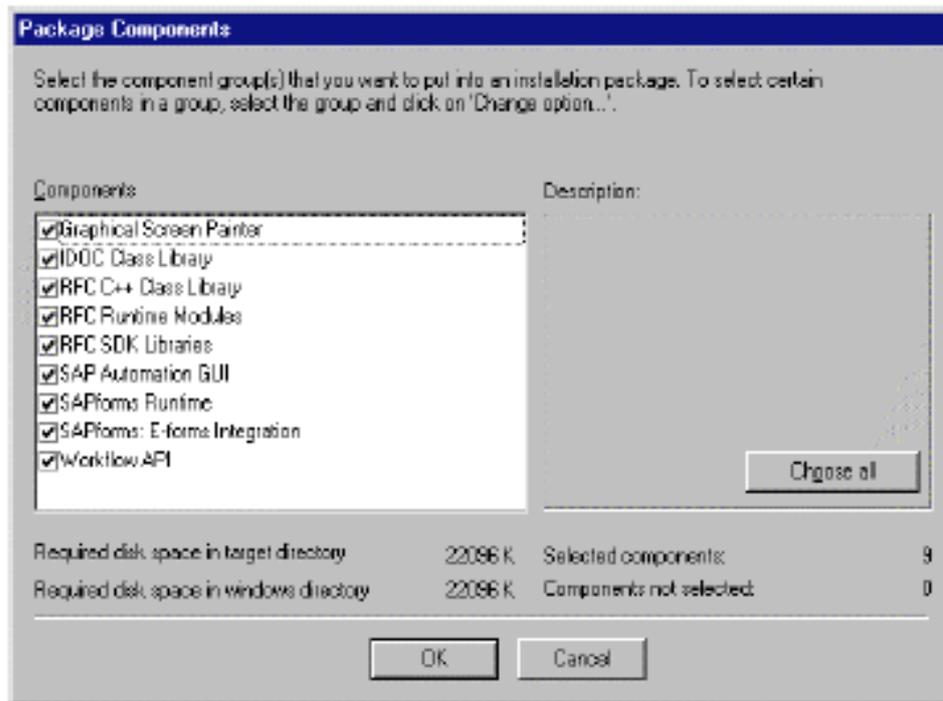
**Figure 8.** The Welcome dialog box.

3. Choose Local installation.



**Figure 5.** Choosing the installation type.

4. Specify the target directory for the program files.
5. Select the components you want to install. The components available for installation are combined to groups.



**Figure 9.** Choosing the components.

To return to the list of groups, choose *OK*. When you highlight a group or component, a short description is displayed on the right. In the lower part of the window, you see how much storage space is required by the components you have selected.

6. When you have selected all components and groups you want to install, choose *OK*.
7. In the dialog boxes that follow, enter all parameters needed for installing the selected components. The dialog box sequence depends on the components you selected.
8. Enter the required parameters until you reach the closing dialog box requesting you to install or cancel. During installation, a small status dialog box displays each installation activity, and a progress bar shows the status of the installation for each component.

If data cannot be exchanged or registered during installation because other programs are using it, you are requested to restart your computer when the installation has

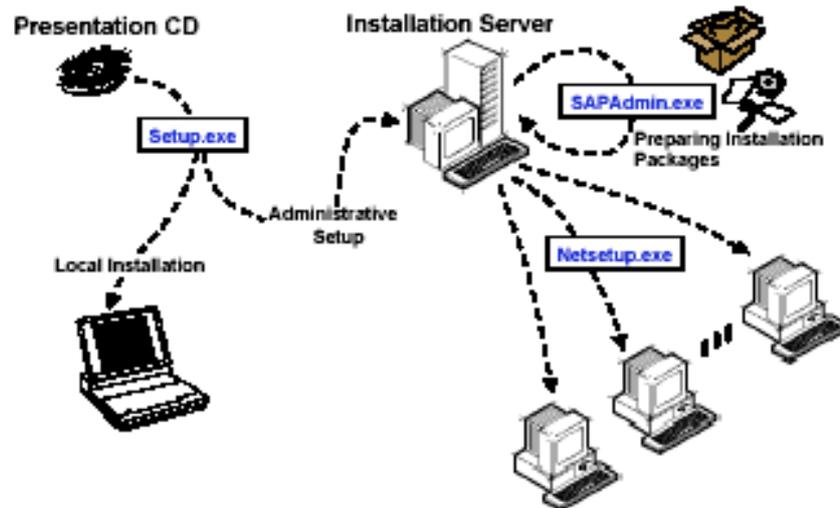
finished. You can do this at once or later, but you must do it before using the installed software for the first time.

### 6.2.2 Network installation

The installation procedure described below is only one of many alternatives.

1. Install the frontend components from CD on a local PC. Test your installation on this computer.
2. Run SETUP.EXE to set up an installation server.
3. Run SAPAdmin.EXE to define installation packages for different user groups. If you want to use SMS to distribute the frontend components, you must configure SMS integration using SAPAdmin at this stage. Afterwards, you must perform the normal steps for distribution using SMS.
4. If you use Windows NT or Windows 2000 as your frontend platform, configure the NetInstall Service and the Service Installation Service (SIS). If you use Windows 95, Windows 98 or Windows Me as your frontend platform, you can omit this step since these systems do not have a security concept like Windows NT and Windows 2000.
5. Log on to a user PC on which the frontend components are to be installed. When logging on, use a user account **without** local administrator rights. Start installation with the netsetup.exe program on the installation server.
6. If installation in step 5 was successful, try to distribute the packages needed using the logon scripts of the user PCs.

The following graphic summarizes the different functions of each installation program:



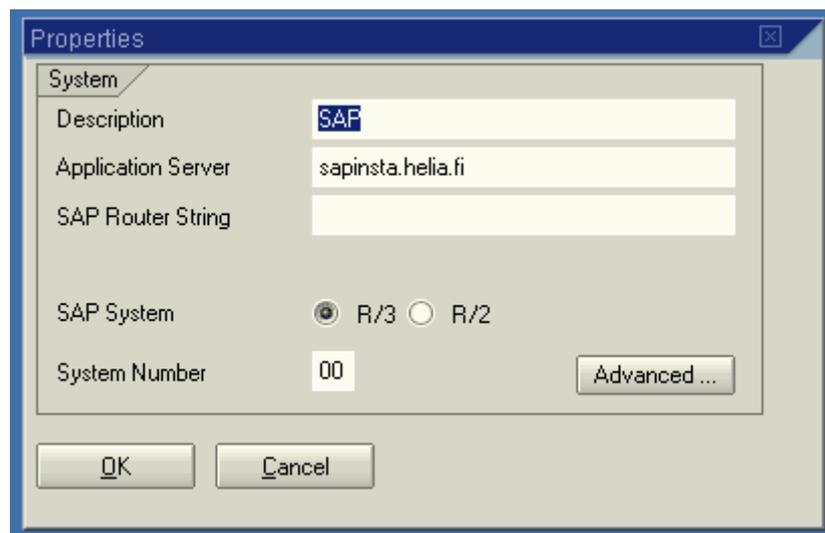
**Figure 10.** The different functions of each installation program.

### 6.2.3 Starting the SAP R/3 at first time

After starting the program the logon box appears. Click New-button to create new entry. Type the Description you want and Application Server sapinsta.helia.fi. There might be a default text in SAP Router String. You must delete the text because this field has to be empty. The correct System Number is 00.

The screenshot shows a 'New Entry' dialog box with a blue title bar and a close button in the top right corner. The dialog is divided into several sections. The top section is labeled 'System' and contains three text input fields: 'Description', 'Application Server', and 'SAP Router String'. Below these fields is a radio button group for 'SAP System', with 'R/3' selected (indicated by a filled circle) and 'R/2' unselected (indicated by an empty circle). To the right of the radio buttons is an 'Advanced ...' button. At the bottom of the dialog are two buttons: 'OK' and 'Cancel'.

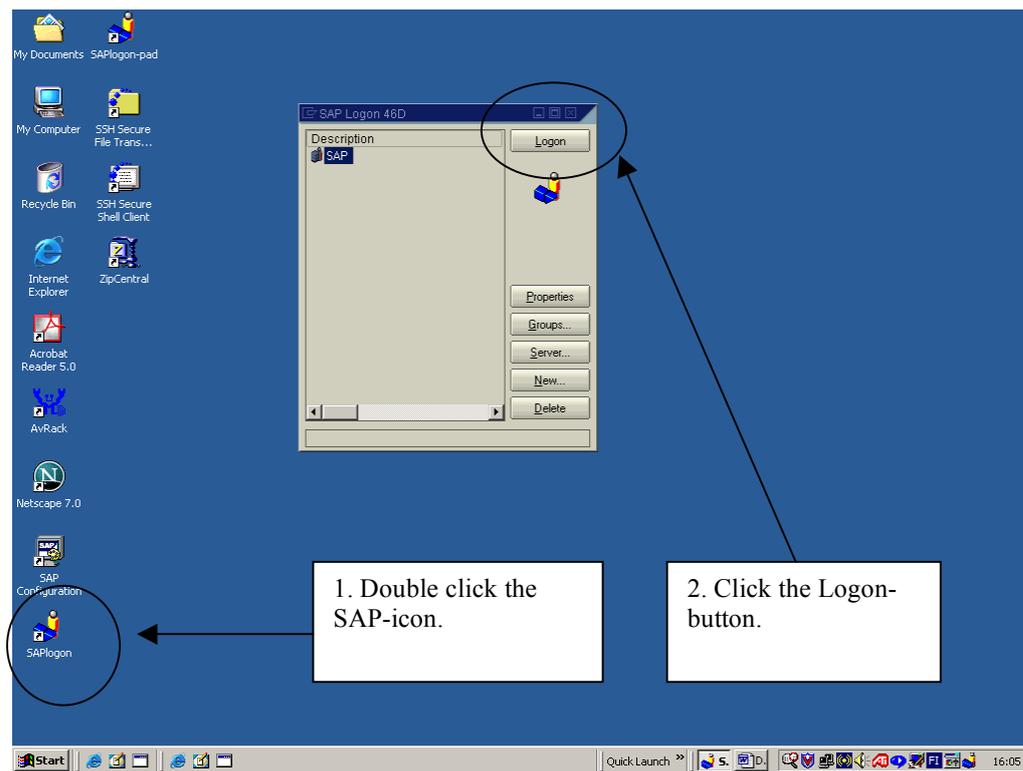
**Figure 11.** New entry.



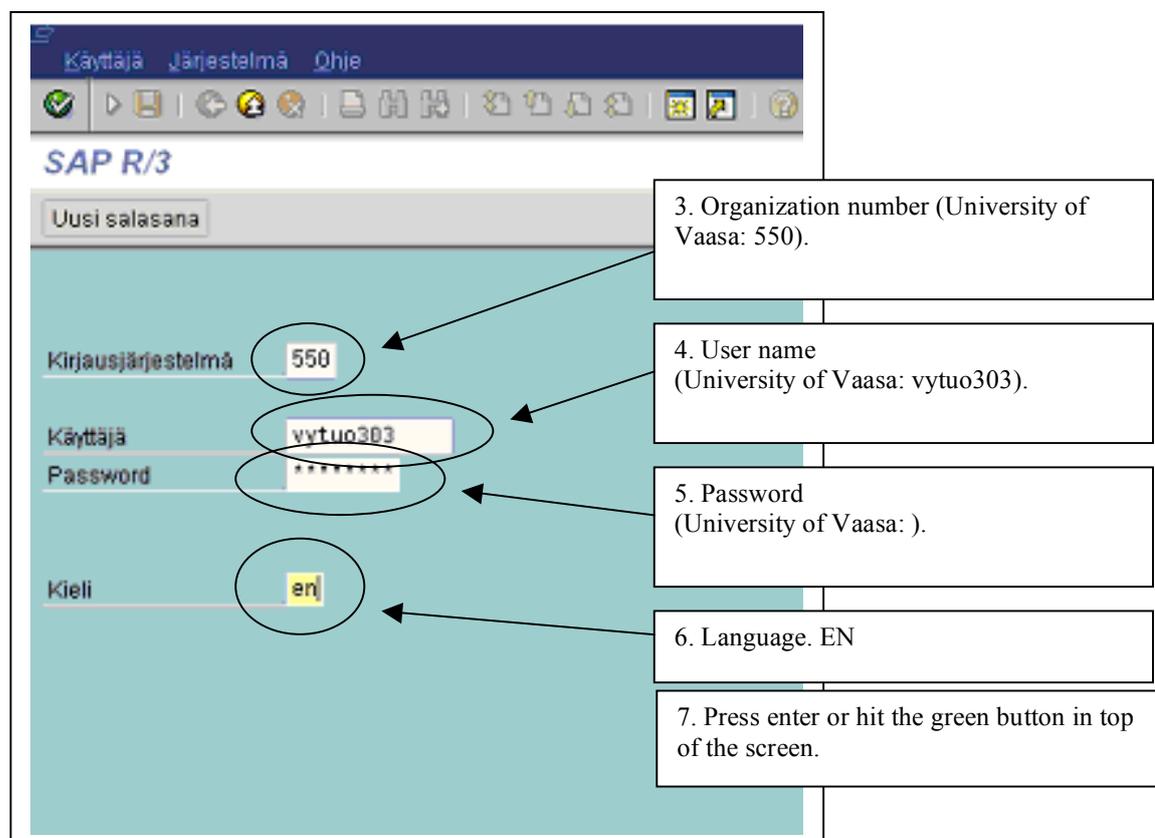
**Figure 12.** Correct properties.

### 6.3 Login to SAP R/3

Logon to SAP R/3 -system is very simple in Windows-environment. The logon process is shown in Figures 9 and 10.



**Figure 13.** Starting the SAP-program in Windows-environment.



**Figure 14.** Logon information needed to start SAP-system.

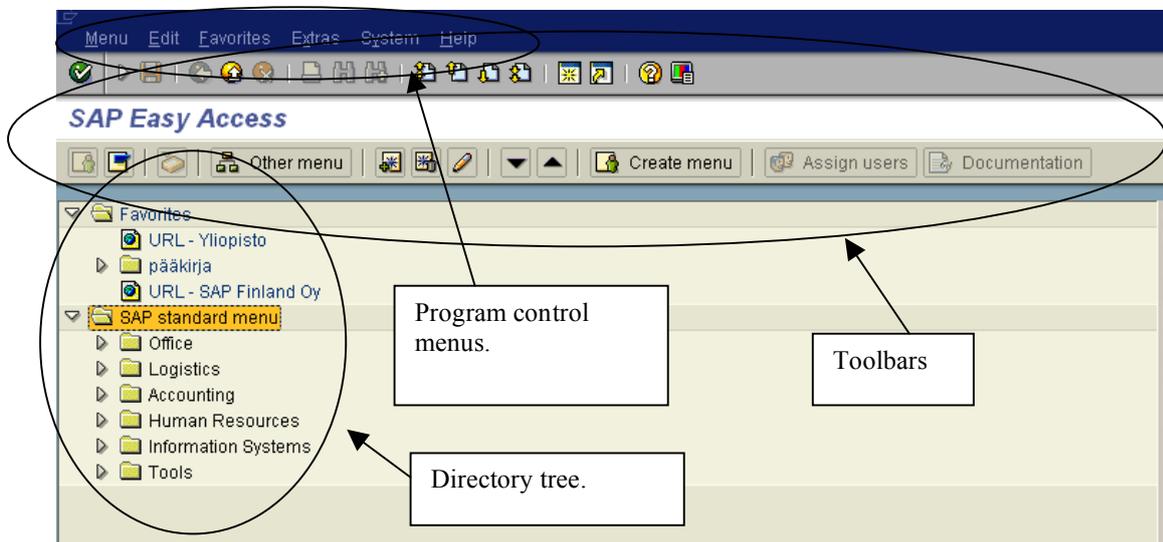
The user logs to the SAP-server which is located in Helsinki and it is owned by SAP Finland. You need organization number, user name and password. You can choose language between Finnish (FI) or English (EN). This installation does not have other languages.

If there are multiple logons to the system using same user ID the program will note that. The License Information for Multiple Logon -screen appears. The new user may determine what to do with other logons, delete them or leave them be. This may occur if several users are logged in with same account.

## 6.4 Basic navigation in SAP R/3

SAP-system itself is quite complicated, and inexperienced user will probably find it less user friendly. General knowledge about production processes, production control systems and production theories are required to create even simple SAP-procedures.

SAP R/3 is based on directory tree. Functions will be found at the end of the directory path.



**Figure 15.** Main menu.

Navigation is very easy by using the mouse. There are also good toolbars and many of the commands can be executed directly from keypad, for example to go to SAP standard menu push Ctrl + F11. You can navigate in directory tree by arrow keys and choose the directory you want by pushing Enter.

### **Browsing**

- To open a folder you have to kick the little triangle in the front of the word.
- Press enter or green V-mark from the tool table to accept a choice.
- Press the circle after the information block and then press enter so you will get the menu from which you can choose the right alternative by pressing enter or green V-mark

For further information on basic navigation, refer to SAP help files located at <http://help.sap.com>. The local SAP help does not necessarily work outside the local network.

## **6.5 Hands on SAP**

Now when you have the client installation working with a connection to server and you are able to login and navigate in the system, the real work may begin. The User names and passwords given to complete the lab part or the course are very powerful. You are going to configure a SAP production system and thus require access to many modules. Please pay attention when doing drastic changes such as deleting materials or accessing user data details. It is possible to many things with your accounts that you may not want to. After the words of warning, the overview of the lab exercises, once the installation is completed. Start working according to instructions. Follow the details and do your own product, parts, sales etc. The contents of the lab include:

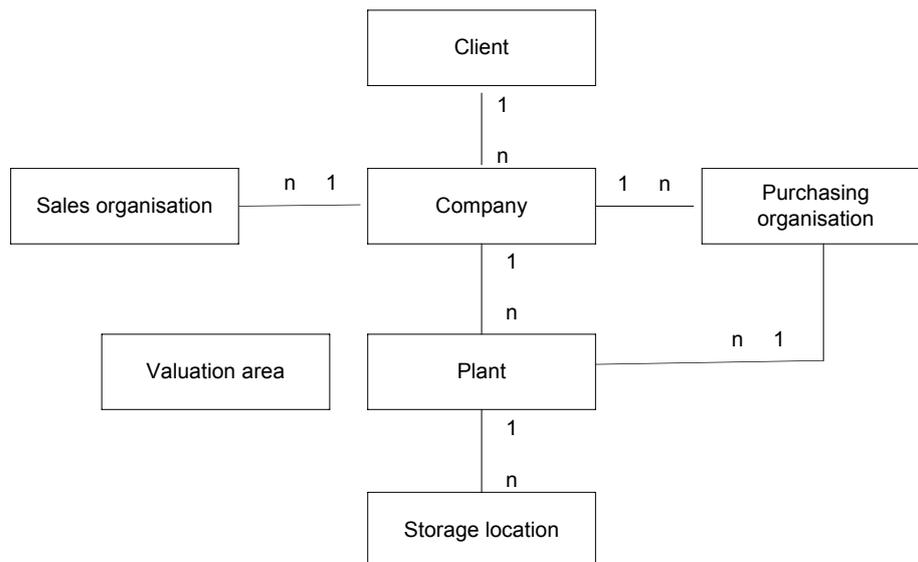
- Building up a new SAP system: Customizing, choosing the needed modules, creating new users, giving the users individual roles and access to chosen parts of the system, ....
- Working with a SAP system (doing the lab): creating material, creating material BOM, creating work centers, creating orders

You may have a general look on the lab sections before starting working with the details. This might help you to understand the what parts are required to complete the configuration work. Good luck.

## 6.6 Creating new users and updating user data

### 6.6.1 Organisational structure

Organisational structure is what makes SAP R/3 an ERP system that supports global manufacturing. The description of organisation defines who in the company can sell which products to a market area and who is allowed to purchase certain parts. This powerful feature on the other hand makes the administration of the system a bit harder. A lot of things needs to be defined prior to a product may be released for the manufacturing. The overall organisational structure is as follows.



- (1) Client is the highest level. Each client has separate master records and a complete set of database tables. (E.g. when you login on client 000 or 001)
- (2) Company is the organisational unit for independent accounting. This means that you can do profit and loss statements as well as balance sheets on company level.

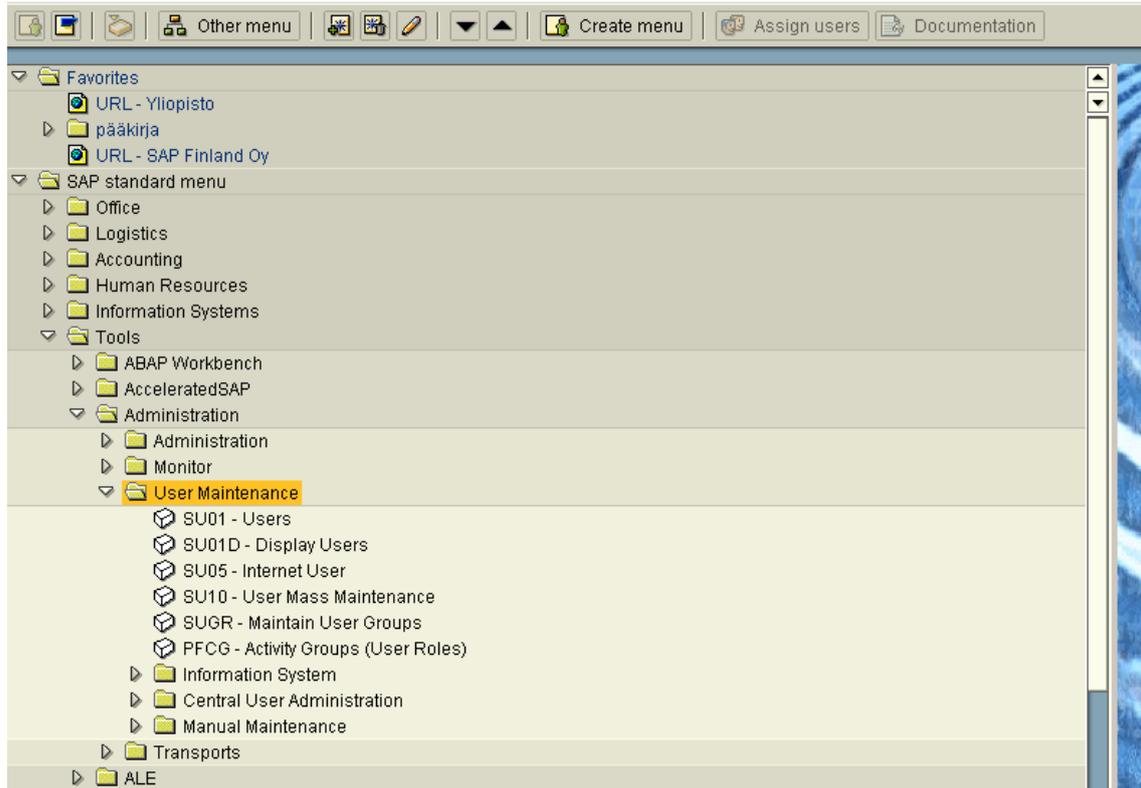
- (3) Plant is the location of operation within company. Plants may have shipping points.
- (4) Sales organisation may be described by using (a) distribution channels and (b) divisions connected to channels. Each product should be connected to sales organisation in order to release it for markets. All business transactions in SAP R/3 are processed in a sales organisation. Distribution channels may be for example direct sales and retail model. On division level it is possible to make customer specific agreements on details. Sales area is the entity consisting of combination of sales organisation, distribution channel and division.
- (5) Purchasing organisation is the organisation responsible for buying materials for the plants. It may negotiate the conditions and terms for delivery, payment etc. Purchasing organisation may be divided into purchasing groups.
- (6) Storage location is location of physical items in stock within a plant. This may be for example a warehouse, storage area, cross-docking area etc. This may be defined in 3D coordinates: row, stack and level.
- (7) Valuation area is the level where material inventory is valued. Valuation area in the normal case is the plant level.

### **6.6.2 Create a new user**

Accessing user information requires administrative rights for accessing the SAP system. Depending on your user rights, you may be allowed to access or modify these data or not.

User Maintenance File is found after path SAP Standard Menu/Tools/Administration/User Maintenance.

## SAP Easy Access



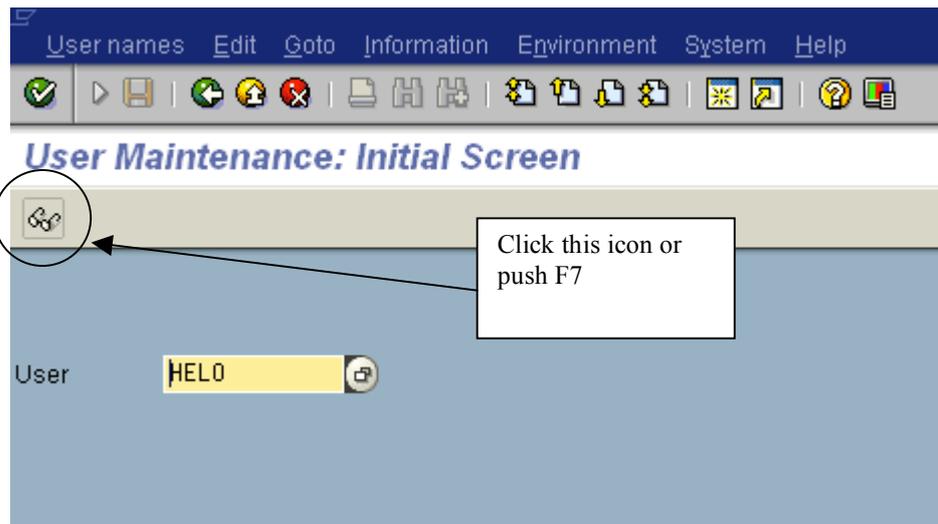
**Figure 16.** Directory path to create users.

You can choose a user from User List (Figure 13), and you are able to update the file.

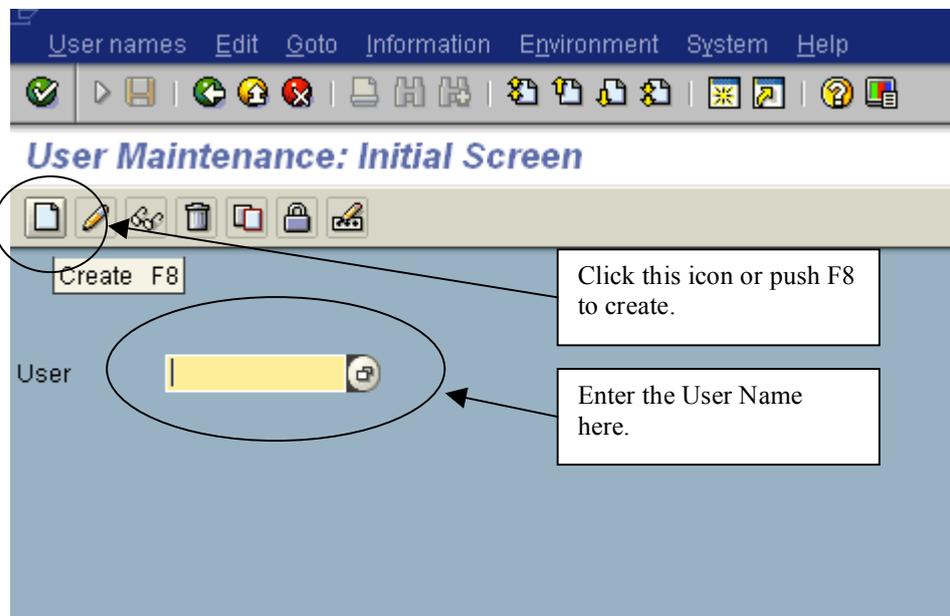
The screenshot shows the 'User Maintenance: Initial Screen' in SAP. The table below lists the users found in the user master record.

User name	Last name	First name	Department	Buildings	Room no.	Extensi...	CostCntr	Int. mail	Name
DDIC	DDIC								COMPANY ADDRESS, PLEA
E0000232	E0000232								VAASAN YLIOPISTO
HELMIMAST	HELMIMAST								COMPANY ADDRESS, PLEA
HELO	HELO								VAASAN YLIOPISTO
I010598	LARSEN	JAKOB BØG							COMPANY ADDRESS, PLEA
INSTANT	INSTANT								COMPANY ADDRESS, PLEA
MHL	KANKAANPÄÄ	MARIA	Vy/Laskentatoimen laitos						VAASAN YLIOPISTO
SAP*	SAP								COMPANY ADDRESS, PLEA
SAP_OSS	USER FOR REMOTE OSS LOGON			SAP					COMPANY ADDRESS, PLEA

**Figure 17.** List of users.



**Figure 18.** Choosing the user.



**Figure 19.** Creating the new user.

**Display User**

User: HELO

Last changed by: HELO 13.03.2003 10:11:09 Status: Saved

Address Logon data Defaults Parameters Activity groups Profiles Groups

**Person**

Title

Last name: HELO

First name:

Acad. title:

Format: HELO

Function:

Department:

Room no.:  Floor:  Building:

**Communication**

Language:  Other communication...

Telephone no.:  -

Fax:  -

Internet mail:

**Company**

Vaasan yliopisto / Wolffintie 34 / FIN-65100 VAASA

**Figure 20.** Common data of user.

In Logon Data -sheet (Figure 17) you can set rights for user. You may also set the dates when the user is able to logon (Validity Period). In Default-sheet (Figure 18) you can make personal settings for user, for example language, personal time zone and date format.

User: HELO

Last changed by: HELO 13.03.2003 10:11:09 Status: Saved

Address Logon data Defaults Parameters Activity groups Profiles Groups

User group for authorization check  
SUPER

Validity period  
Valid from:   
Valid to:

Other data  
Accounting number:   
Cost center:

User type  
 Dialog  
 BDC  
 Background  
 CPIC

**Figure 21.** Logon data of user.

User: HELO

Last changed by: HELO 13.03.2003 10:11:09 Status: Saved

Address Logon data Defaults Parameters Activity groups Profiles Groups

StartMenu:

Logon language: FI

Output Controller  
OutputDevice:   
 Output immediately  
 Delete after output

Decimal notation  
 1234567,89  
 1234567.89  
 1 234 567,89

Personal time zone  
CET

Date format  
 DD.MM.YYYY  
 MM/DD/YYYY  
 MM-DD-YYYY  
 YYYY.MM.DD  
 YYYY/MM/DD  
 YYYY-MM-DD

CATT  
 Test status

**Figure 22.** Defaults of user.

## 7 MATERIALS MANAGEMENT

### 7.1 MM – Creating parts for inventory control

This document is visualizing a process that is needed for creating material and work center data in SAP-system. Pencil and its sub-parts are used as an example for demonstrating process.

Before creating materials, we must know the structure of finished product. Our product to be created is a “a board marker”. Pencil is made up of following components:

- 1 pcs Frame (Pencil frame)
- 1 pcs Main cap(Cap for protecting lead)
- 1 pcs End cap (white cap for keeping colorpack in)
- 1 pcs Colorpack



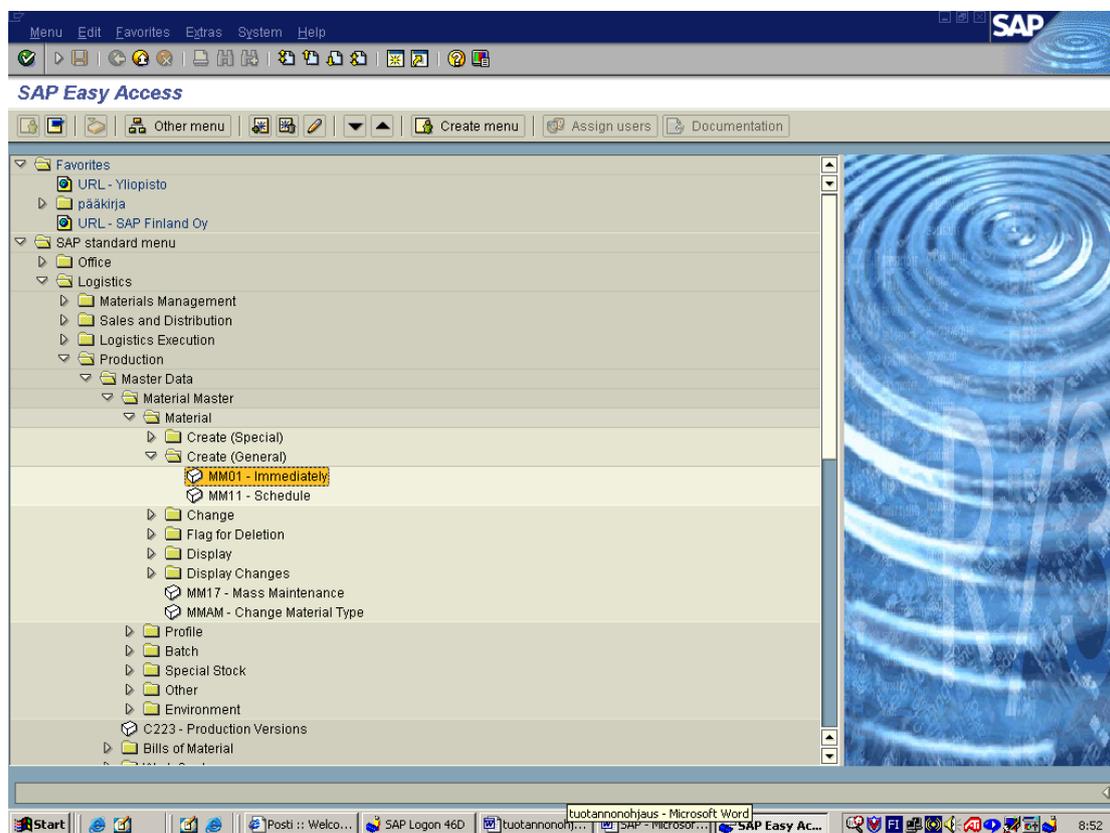
**Figure 23.** White board marker – the product to be manufactured.

## 7.2 Creating new materials

### Menu navigation

Logistics→production→ master data→ Material master→ Material→ Create general→CREATE IMMEDIATELY

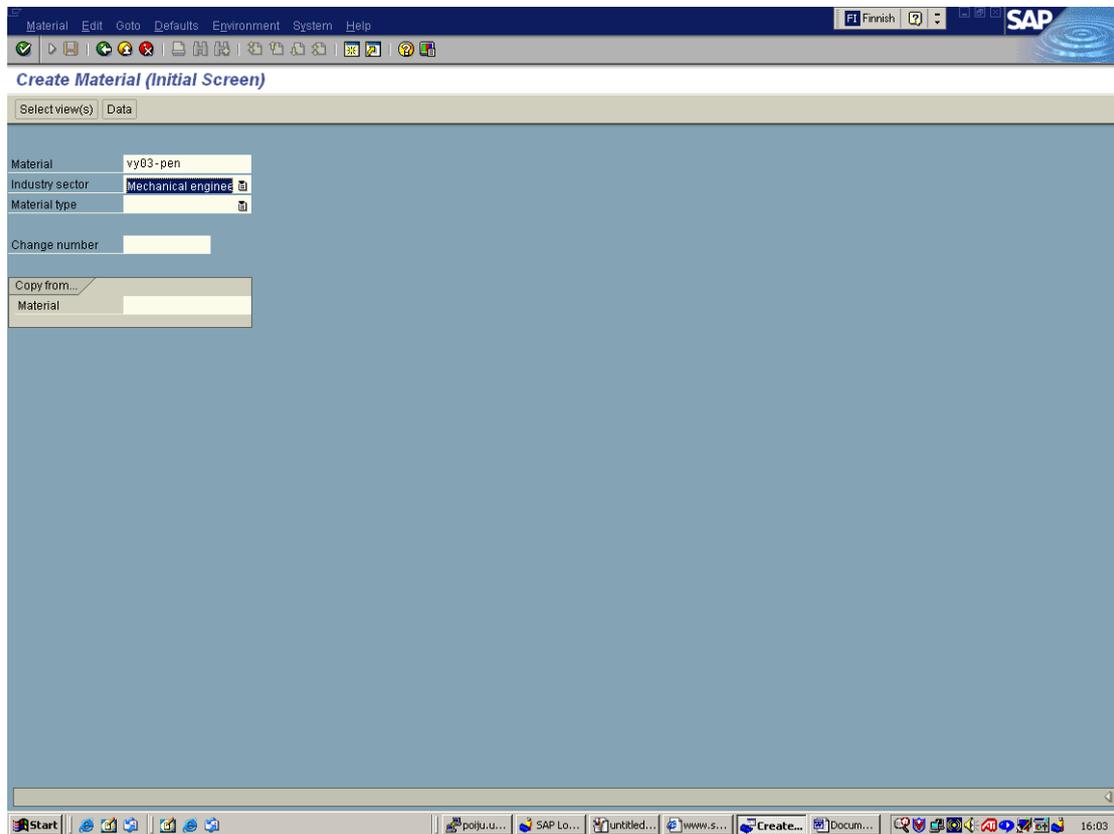
This is one of create materials. There is also different routes to do this eg. Logistics→production→master data→Material master→ Master→ Create Special→(and choose what you want to create). (Easiest way is to do one material proper and copy that to others).



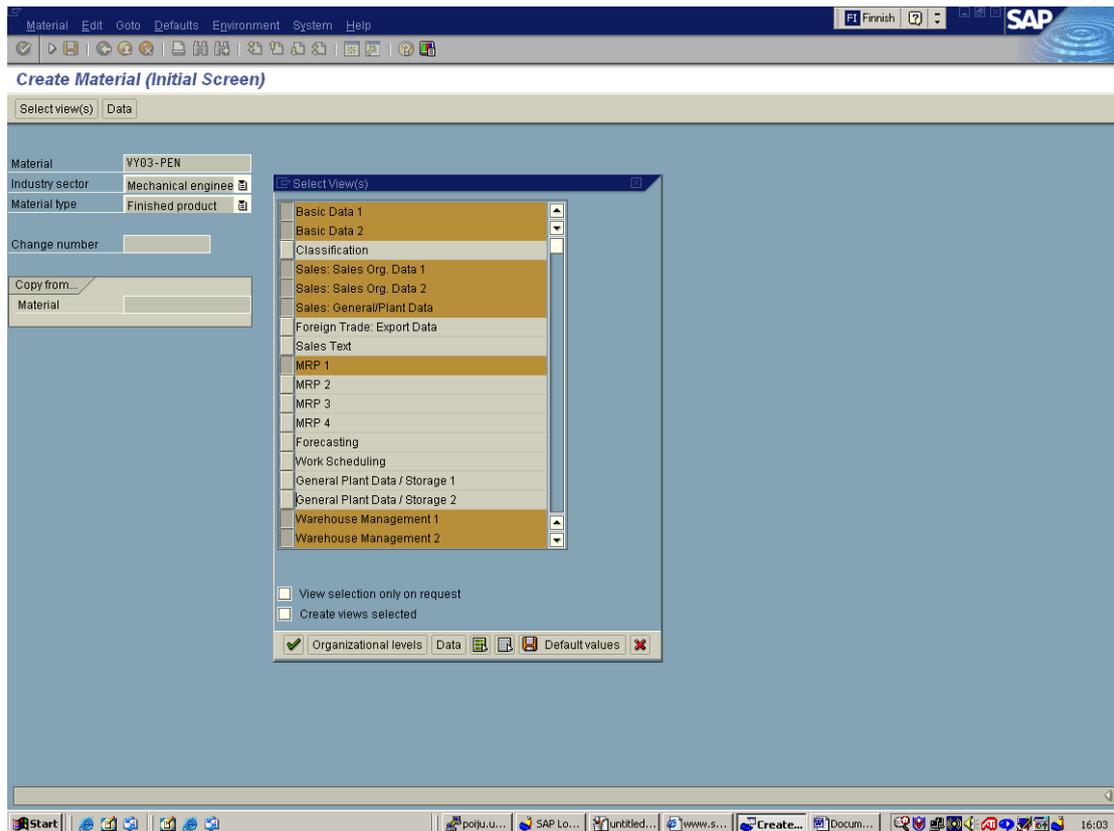
Naming materials: Please use you're the course code and the your initials for new material names. This makes it easier to recognise your components from others.

E.g. SAP-PH-My0001

## 1. First step for Create Material



Material definition is started by giving a name. Industry sector and material type must be defined.



Here we are selecting appropriate information sheets. Selections here might have impact in usage in some other areas that is why selections must be carefully chosen. Best way is to select all and take the time to fill all the fields. It is recommend to choose one sheet on most of the subjects. In this exercise we should not need CLASSIFICATION or FORECASTING tabs but the rest are required..

Note: In case of mistakes or for other reason you need to delete a material:

Permanently deleting materials use the following transaction:

MM70 -> Material Master -> Other -> Reorganization -> Material -> Choose

Build variant with selection range of material master records to be selected for deletion and maintain run parameters. Execute. Use transaction MM71 - Material Master -> Other -> Reorganization -> Material -> Reorganization

Maintain run parameters and execute. It is also important to remove the records manually from info record, POs, PRs, reservation etc for successful deletion of the material.



After selecting information sheets from popup screen select views, you automatically come to organizational levels popup screen. There you have the only chance to specify your sales org. You must choose it in this screen. (*Sales Org.4000*)

Production -> Master Data -> Material Master-> Material -> Create Material-> General ->Immediately ->Select views -> Organizational Levels -> Sales Org. -> 4000

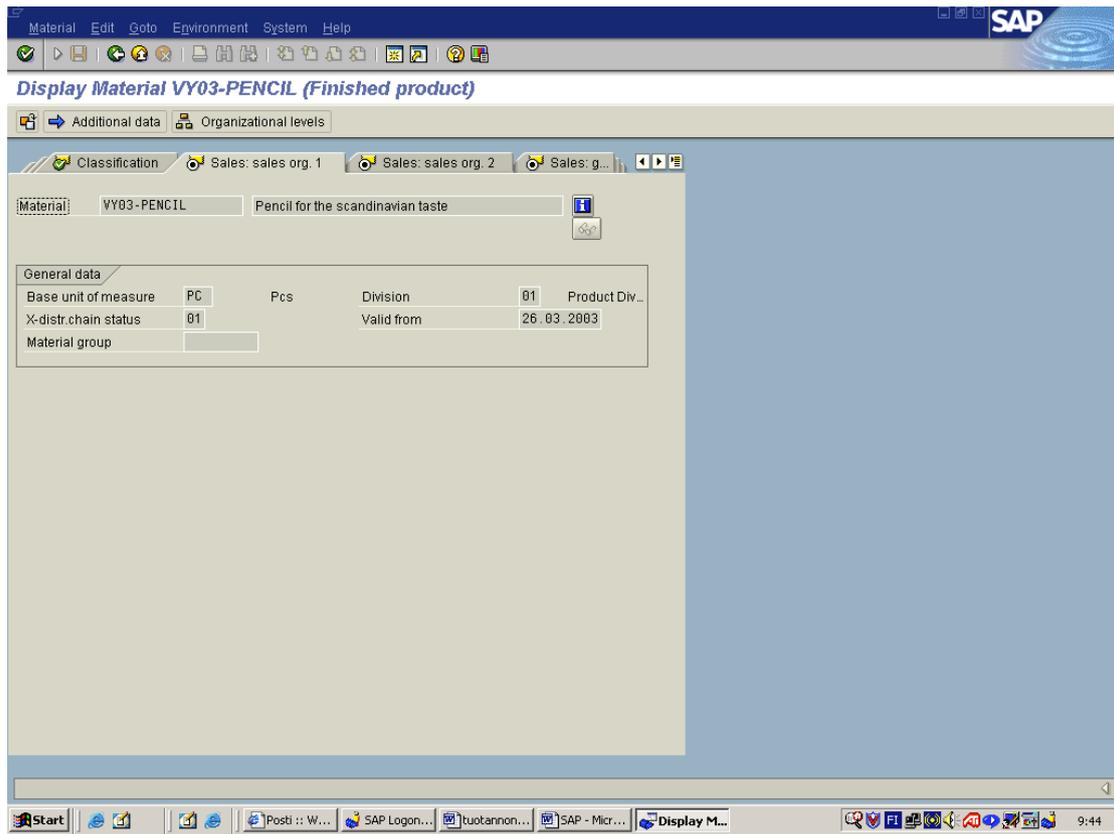
## 2. Second step for Creating Material

Following sheets are for filling product information for material. You must fill sheets that you have chosen in previous screen.

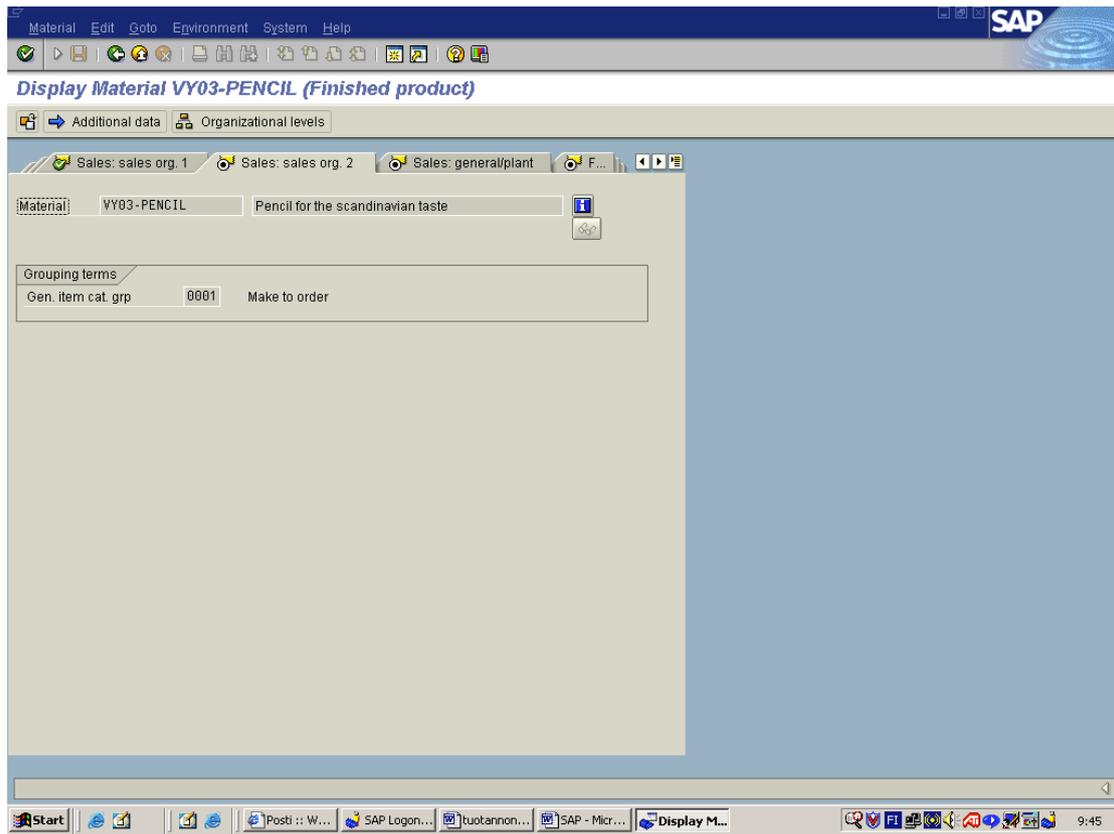
The screenshot shows the SAP Material Master 'Basic data 1' tab for material VY03-PENCIL. The material description is 'Pencil for the scandinavian taste'. The form is divided into several sections:

- General data:**
  - Base unit of measure: PC (Pcs)
  - Material group: [Empty]
  - Old material number: [Empty]
  - Ext. matl group: [Empty]
  - Division: 01
  - Lab/office: [Empty]
  - Product allocation: [Empty]
  - Prod.hierarchy: [Empty]
  - X-plant matl status: [Empty]
  - Valid from: [Empty]
  - GenItemCatGroup: 0001
  - Make to order: [Checked]
- Material authorization group:**
  - Authorization group: [Empty]
- Dimensions/EANs:**
  - Gross weight: 0,100
  - Weight unit: KG
  - Net weight: 0,100
  - Volume: 0,200
  - Volume unit: L
  - Size/dimensions: [Empty]
  - EAN/UPC: [Empty]
  - EAN category: [Empty]
- Packaging material data:**
  - Matl grp ship. mats: [Empty]

Here you can see what you have to fill. In our case: Base unit of measure, Dimension, Gross weight, Net weight, Volume, Weight unit and Volume unit.



Fill Base unit of measure and X-distr.chain status



You have to choose *Gen. item cat.grp* (production strategy).

Here you have to fill some fields, see screenshot below. Minimum requirements: Plant, Base unit of measure, Gross weight, kg, Net weight.

The screenshot displays the SAP Material Master 'Display' screen for material VY03-PENCIL. The interface includes a menu bar at the top with options like 'Material', 'Edit', 'Goto', 'Environment', 'System', and 'Help'. Below the menu, the title 'Display Material VY03-PENCIL (Finished product)' is shown. The main area contains several data sections:

- Material Data:** Material: VY03-PENCIL, Description: Pencil for the scandinavian taste, Plant: 4100, Component: Komponentituotanto FI.
- General data:** Base unit of measure: PC (Pcs), Gross weight: 0,100 KG, Net weight: 0,100, Availability check: 02, Individ.requirements:  Appr.batch rec. req.,  Batch management.
- Shipping data (times in days):** Trans. grp: 0001, On pallets: , LoadingGrp: 0002, Forklift: , Setup time: 0,00, Proc. time: 0,00, Base qty: 0 PC.
- Packaging material data:** Matl grp ship. mats: .
- General plant parameters:**  Neg.stocks, Profit center: , SerialNoProfile: , DistProf: .

At the bottom, there is a button labeled 'Ext. customer repl. parameters'. The Windows taskbar at the bottom shows the Start button and several open applications, including 'Posti :: W...', 'SAP Logon...', 'tuotannon...', 'SAP - Micr...', and 'Display M...'. The system clock shows 9:46.

Fill Plant, Base unit of measure, MRP type, Reorder point, lot size, Minimum lot size, MRP controller.

**Material:** VY03-PENCIL    Pencil for the scandinavian taste

**Plant:** 4100    Komponenttutuotanto FI

**General data**

Base unit of measure	PC	Pcs	MRP group	
Purchasing group	401		ABC indicator	
Plant-sp.matl status			Valid from	

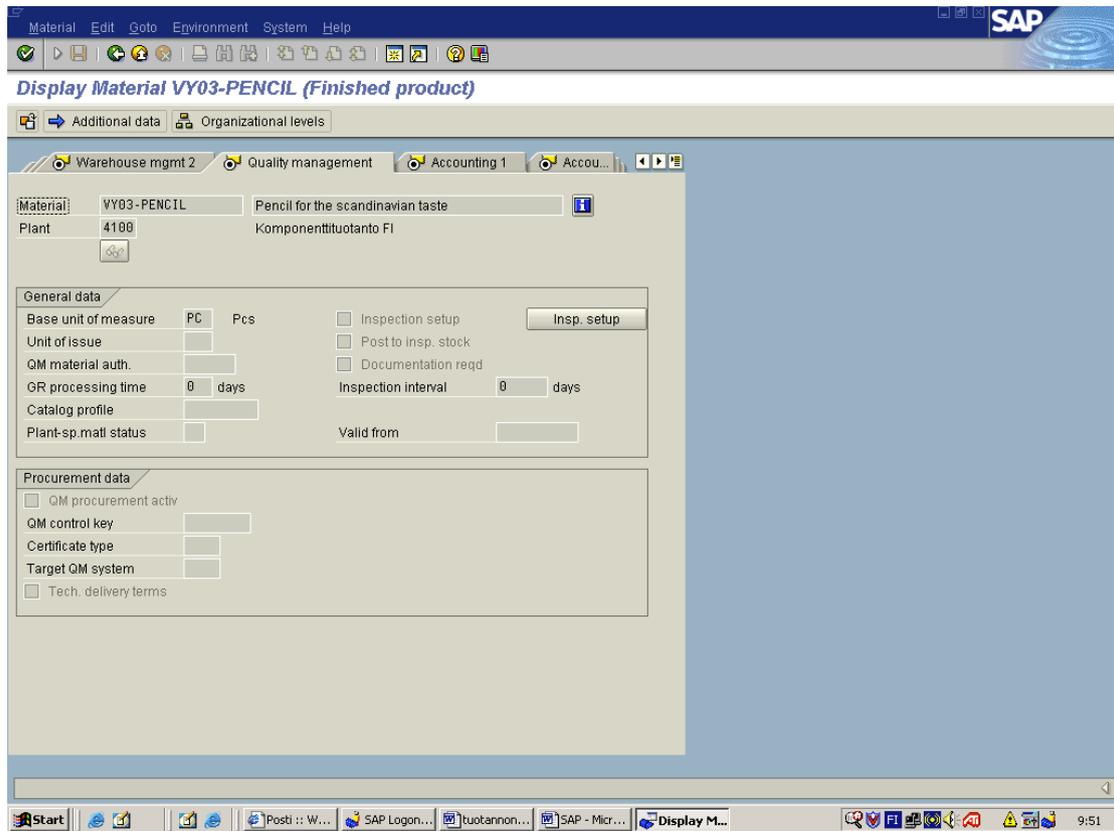
**MRP procedure**

MRP type	VM	Automatic reorder point plng	
Reorder point	50	Planning time fence	0
Planning cycle		MRP controller	001

**Lot size data**

Lot size	WB	Weekly lot size	
Minimum lot size	1	Maximum lot size	100
Assembly scrap (%)	0,00	Maximum stock level	0
Rounding profile		Takt time	0
Unit of measure grp		Rounding value	0

In this field you don't need to but much information, only Base unit of measure. Others are probably optional but it depend what kind of case you have.



In Accounting sheet fill the information to fields of Base unit of measure, Division, Mov. avg. price, and Standard price.

The screenshot shows the SAP Material Master Accounting 1 view for material VY03-PENCIL. The interface includes a menu bar (Material, Edit, Goto, Environment, System, Help), a toolbar, and a title bar. The main content area is divided into several sections:

**Material Data:**

- Material: VY03-PENCIL (Pencil for the scandinavian taste)
- Plant: 4100 (Komponenttutuotanto FI)

**General data:**

- Base unit of measure: PC (Pcs)
- Valuation category: B
- Currency: FIM
- Current period: 03 2003
- Division: 01
- Material price deter:  ML act.

**Current valuation:**

- Valuation class: 7920
- VC: Sales order stk:
- Price control: V
- Mov. avg. price: 120,00
- Total stock: 0
- Proj. stk val. class:
- Price unit: 1
- Standard price: 120,00
- Total value: 0,00
- Valuated Un
- Future price: 0,00
- Valid from:
- Previous price: 0,00
- Last price change:

Buttons at the bottom: Previous period/year, Std cost estimate.

The Windows taskbar at the bottom shows the Start button, several open applications (Posti, SAP Logon, tuotannon..., SAP - Micr..., Display M...), and the system clock (9:52).

The screenshot displays the SAP 'Create Material' screen for material VY03-PEN, categorized as a finished product. The interface is organized into several sections:

- Classification:** Shows 'Sales: sales org. 1', 'Sales: sales org. 2', and 'Sales: gene...'.
- Material Data:**
  - Material: VY03-PEN
  - Full product: pencil
  - Sales org.: 4000
  - Sales org. FI
  - Distr. chl: 01
  - Distribtn Channel 01
- General data:**
  - Base unit of measure: PC
  - Sales unit: PC
  - Unit of measure grp: [dropdown]
  - X-distr.chain status: [dropdown]
  - DChain-spec. status: [dropdown]
  - Delivering plant: [dropdown]
  - Material group: [dropdown]
  - Cash discount
  - Division: [dropdown]
  - Sales unit not var.
  - Valid from: [date field]
  - Valid from: [date field]
  - Conditions: [button]
- Tax data:**

Country	Tax category	Tax classification
F1 Finland	MWST Output Tax	

Entry 1 of 1
- Quantity stipulations:**
  - Min. order qty: [input] PC
  - Min. delv qty: [input] PC
  - Delivery unit: [input]
  - RoundingProfile: [input]

The bottom of the screen shows the Windows taskbar with the Start button and several open applications, including 'pojju.u...', 'SAP Lo...', 'untitled...', 'www.s...', 'Create...', and 'Docum...'. The system clock indicates 16:07.

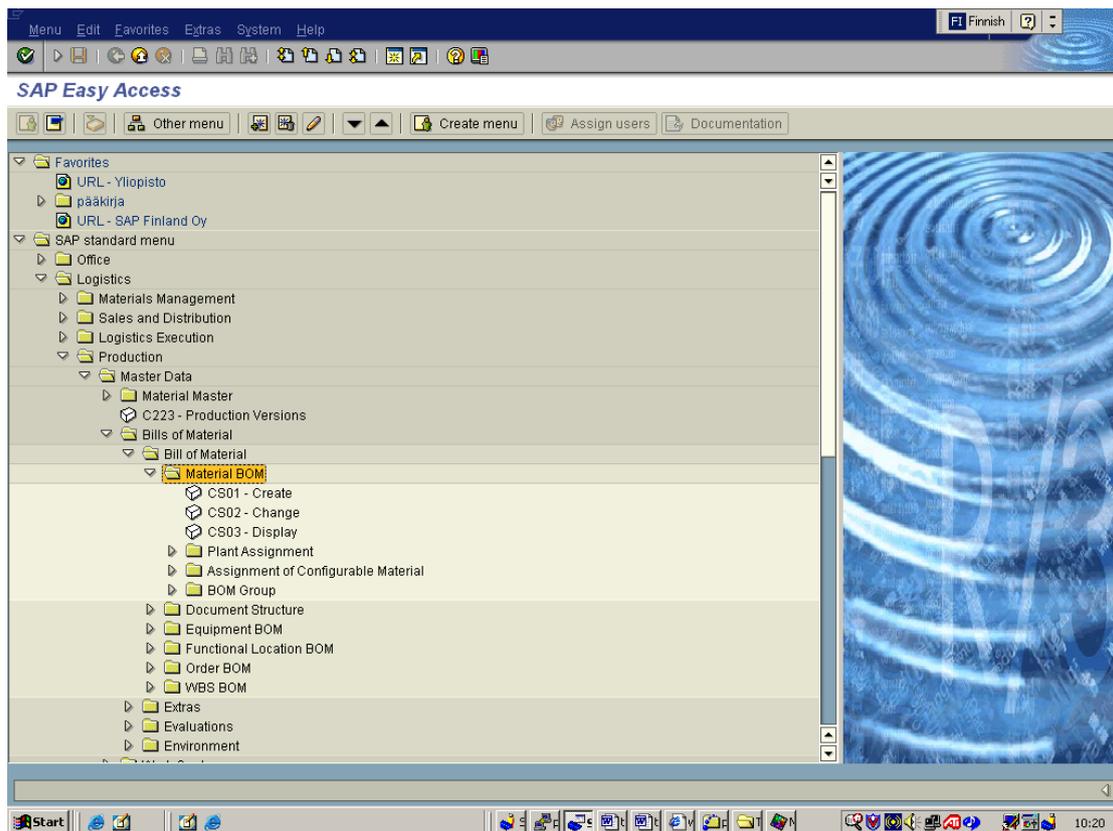
After creating material for finished product, components must be created in the same way. Only difference is that in “material type”-field you must choose raw material.

## MM – Creating Bill of Materials

The role of the BOM, or its equivalent is to provide master data for such organizational areas as the following:

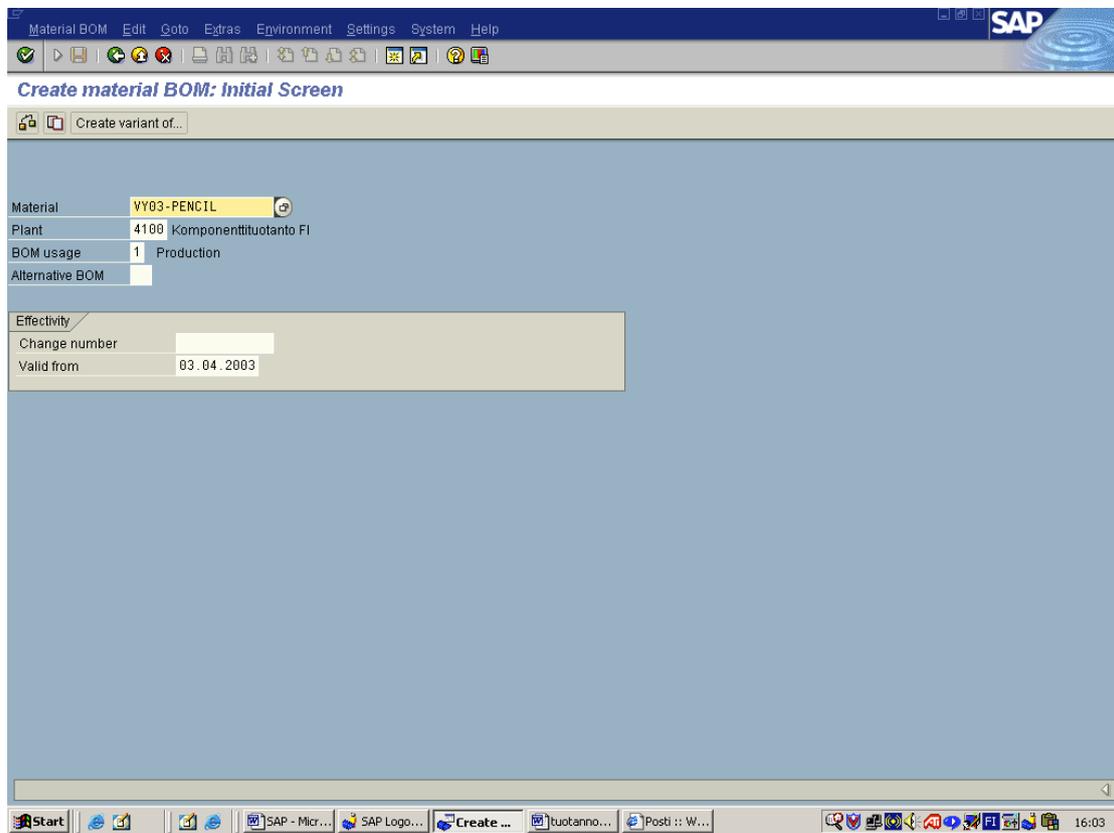
- Materials planning
- Staging of materials of production
- Product costing
- Plant maintenance

BOM needs to be defined, not only for production planning, but also if you intend to maintain complex document structures or technical specifications that require a hierarchical structure, as in assembly processing and plant maintenance.



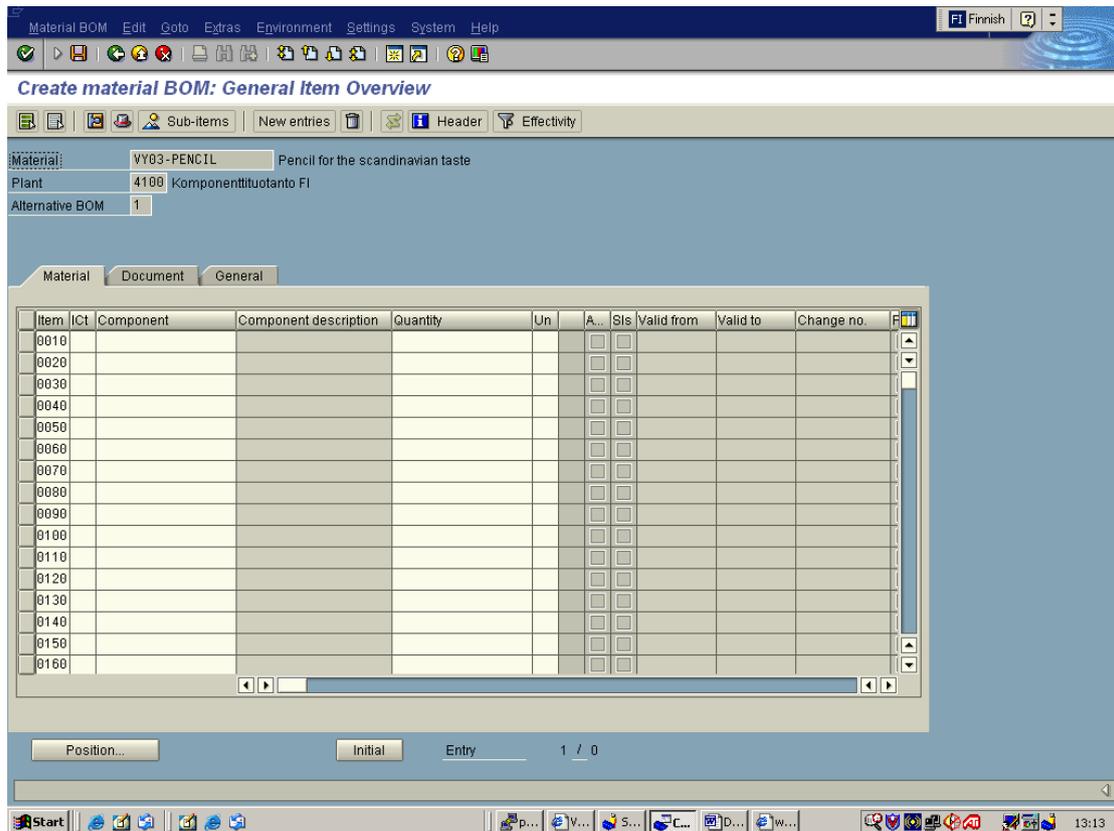
Logistics→Production→Master data→Bills of material→Bill of material→Material BOM→CREATE

## 1 First step for Create material BOM



Now you have to choose what you want to create. You just choose right product by using scroll and the name of the product came out. Then you have to fill Plant and BOM usage, these are required.

## 2 Second step for Create material BOM



Add components by clicking “component-field”. Line number will be given from system, ICt needs to be selected manually.

Other fields:

- quantity (how many items finished product consists)
- un (unit used in component quantity)
- Asm (an indicator that item has it’s own sub-structures and BOM)
- SIs (an indicator that item has it’s own sub-structures)

### 3. Filled BOM- table

Here you can watch all product components, which you chose before and that are actually the BOM.

Material: VY03-PENCIL Pencil for the scandinavian taste  
 Plant: 4100 Komponentituttanto FI  
 Alternative BOM: 1

Item	Ct	Component	Component description	Quantity	Un	A...	Sts	Valid from	Valid to	Change no.
0010	L	VY03-COLORPACK	color container	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	19.03.2003	31.12.9999	
0020	L	VY03-ENDCAP	Pencil end cap	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	19.03.2003	31.12.9999	
0030	L	VY30-FRAME	pencil frame	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	19.03.2003	31.12.9999	
0040	L	VY30-MAINCAP	pencil main cap	1	PC	<input type="checkbox"/>	<input type="checkbox"/>	19.03.2003	31.12.9999	

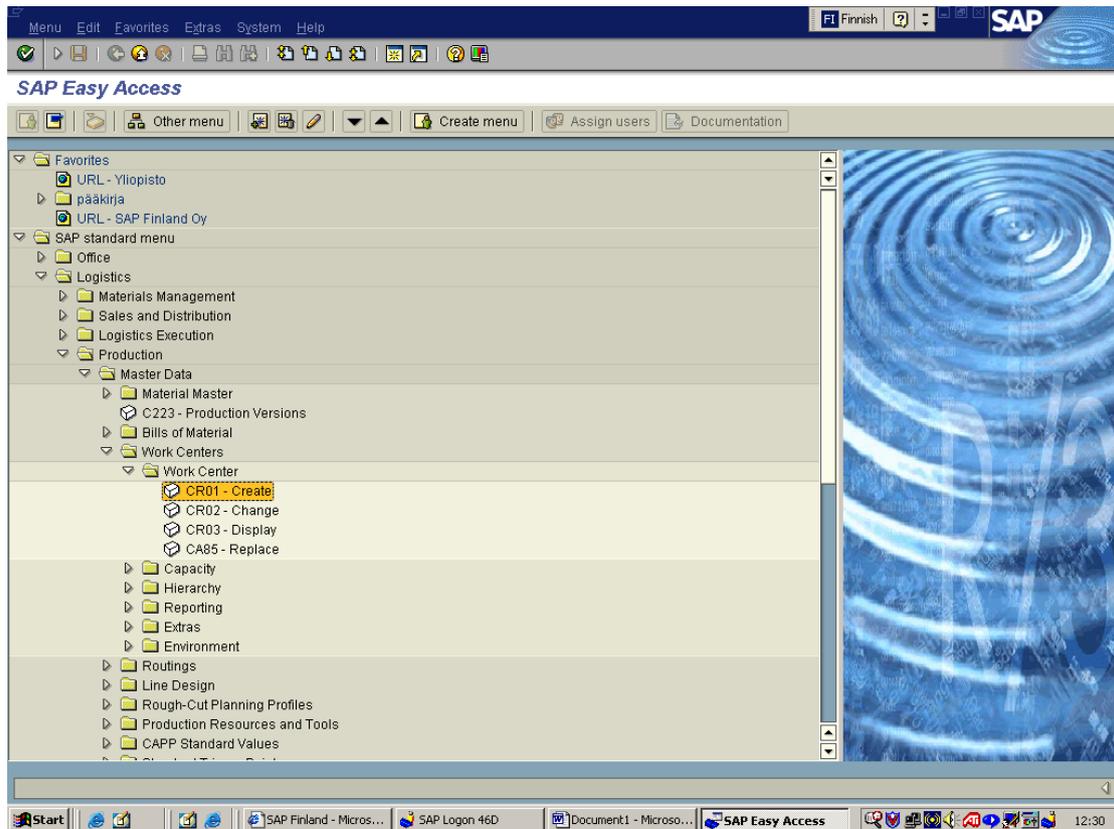
### 7.3 Creating work centers

The work center component defines the organizational units where operations or work steps are carried out that produce output of work.

A work center can be defined to include any combination of the following resources:

- Machines
- People
- Production lines
- Groups of craftsmen

Here we are creating work center for producing finished product.

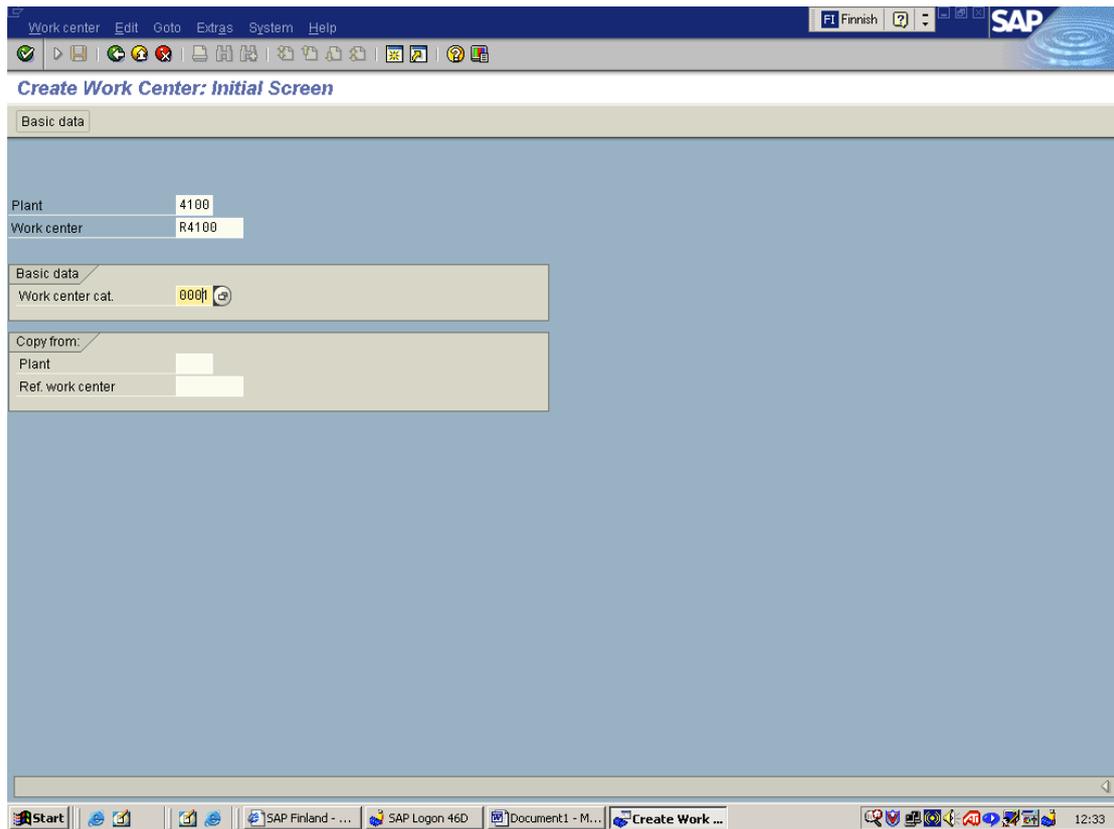


Logistics→Production→Master Data→Work centers→Work center→CREATE

Under work center also changing, replacing and displaying is possible.

### 1 First step for creating work center (Initial Screen).

In this field you fill all the required places and you can use scrolls which helps you choose option you need.



Work center Edit Goto Extras System Help Finnish SAP

**Create Work Center: Initial Screen**

Basic data

Plant 4100  
Work center R4100

Basic data  
Work center cat. 0001

Copy from:  
Plant  
Ref. work center

Start SAP Finland - ... SAP Logon 46D Document1 - M... Create Work ... 12:33

Required to fill:

- Plant: Key uniquely identifying a plant.
- Work center: identifying a work center.
- Work center cat.: Key which distinguishes the work center by their category (maintenance work center).
- When you have filled required places you just click button Ok

## 2 Second step for Create Work Center (sheet: Basic Data).

In this screen you fill options, which are required in all sheets (in this case we had to fill only this Basic data sheet). There is lots of scrolls which helps you make your choose. You can navigate from sheet to sheet by clicking items as Basic Data, Default values and so on. When you have filled all the required sheets and options you just save and it is ready. Remember that you have to fill enough options.

Required fields:

- Work center cat.
- Person responsible
- Usage (effect eg. routing, capacity, cost control)
- Standard value key

## 7.4 Adding Stock Balances

*Logistics --> Material management --> Inventory Management --> Goods Movement  
-->Goods Receipt -->MBIC- Other*

Inventory balances must enter like goods receipt but without any order.

The screenshot displays the SAP 'Enter Other Goods Receipts: Initial Screen' interface. The window title is 'Enter Other Goods Receipts: Initial Screen'. The interface includes a menu bar with 'Other goods receipts', 'Edit', 'Goto', 'Movement type', 'Environment', 'System', and 'Help'. Below the menu bar are navigation buttons: 'New item', 'To reservation...', 'To order...', and 'WM parameters...'. The main area contains several input fields and sections:

- Document date:** 24.04.2003 (circled 1)
- Posting date:** 24.03.2003
- Material slip:** saldon 11säys
- Doc.header text:** saldon 11säys
- GR/GI slip no.:** (empty)
- Defaults for document items:**
  - Movement type:** 501 (circled 2)
  - Plant:** 4100 (circled 2)
  - Storage location:** 4100 (circled 2)
  - Special stock:** (checkbox) (circled 3)
  - Reason for movement:** (checkbox) (circled 3)
  - Suggest zero lines:** (checkbox)
- GR/GI slip:**
  - Print
  - Individual slip
  - Indiv slip w.inspect.text
  - Collective slip

The Windows taskbar at the bottom shows the 'start' button, 'SAP Licon 46D', and several open windows: 'Enter Other Goods Receipts: Initial Screen', 'Display Material...', 'Material manage...', 'Document1 - M...', and 'My Computer'. The system clock shows 17:52 on 2/22/2003.

1. Document date – necessary –  
Material slip – not necessary –  
Doc header text – not necessary – but easier to find and archive if entered
2. Movement type – necessary – determines the rules of moving type  
Plant – necessary – number of the plant that receives or issues items  
Storage location – necessary –

Movement type: Enter 501 (receipts without purchase order into warehouse)

- works because doesn't need vendor defined
- adds warehouse balances to unrestricted use

Movement type user can choose from the list below. 501 for add balances.

The screenshot shows a SAP dialog box titled "Movement type (1) 104 Entries found". The dialog has a "Restrictions" tab and a toolbar with icons for OK, Cancel, Save, Refresh, Help, and Print. Below the toolbar is a list of movement types with columns for "M...", "S", "Text", and "No.". Entry 501 is highlighted in yellow.

M...	S	Text	No.
305		Transfer posting plant to plant - place in storage	1
306		Tfr. posting plant to plant - place in storage - reversal	2
315		Transfer posting SLoc. to SLoc. - place in storage	3
316		Transfer posting SLoc to SLoc - place in storage - reversal	4
451		Returns from customer	5
452		Returns from customer - reversal	6
501		Receipt w/o purchase order into warehouse	7
501	E	Receipt w/o purchase order into unrestr. sales order stock	8
501	K	Receipt w/o purchase order into consignment stores	9
501	M	Receipt w/o purchase order into unrestricted RTP	10
501	Q	Receipt w/o purchase order into unrestricted project	11
502		Receipt w/o purchase order into warehouse - reversal	12
502	E	Receipt w/o purch. order into unrestr. sales ord. - reversal	13
502	K	Receipt w/o purchase order into consignment - reversal	14
502	M	Receipt w/o purchase order into unrestricted RTP - reversal	15
502	Q	Receipt w/o purchase order into unrestr. project - reversal	16
503		Receipt w/o purchase order into quality inspection stock	17
503	E	Receipt w/o purchase order into QI sales order stock	18
503	K	Receipt w/o purchase order into QI consignment	19
503	Q	Receipt w/o purchase order into QI project	20
504		Receipt w/o purchase order into QI stock - reversal	21
504	E	Receipt w/o purchase order into QI sales order - reversal	22

Enter the materials and quantities you want to add balances.

Other goods receipts Edit Goto Movement type Environment System Help

SAP

### Enter Other Goods Receipts: New Items

To reservation... To order... To purchase order...

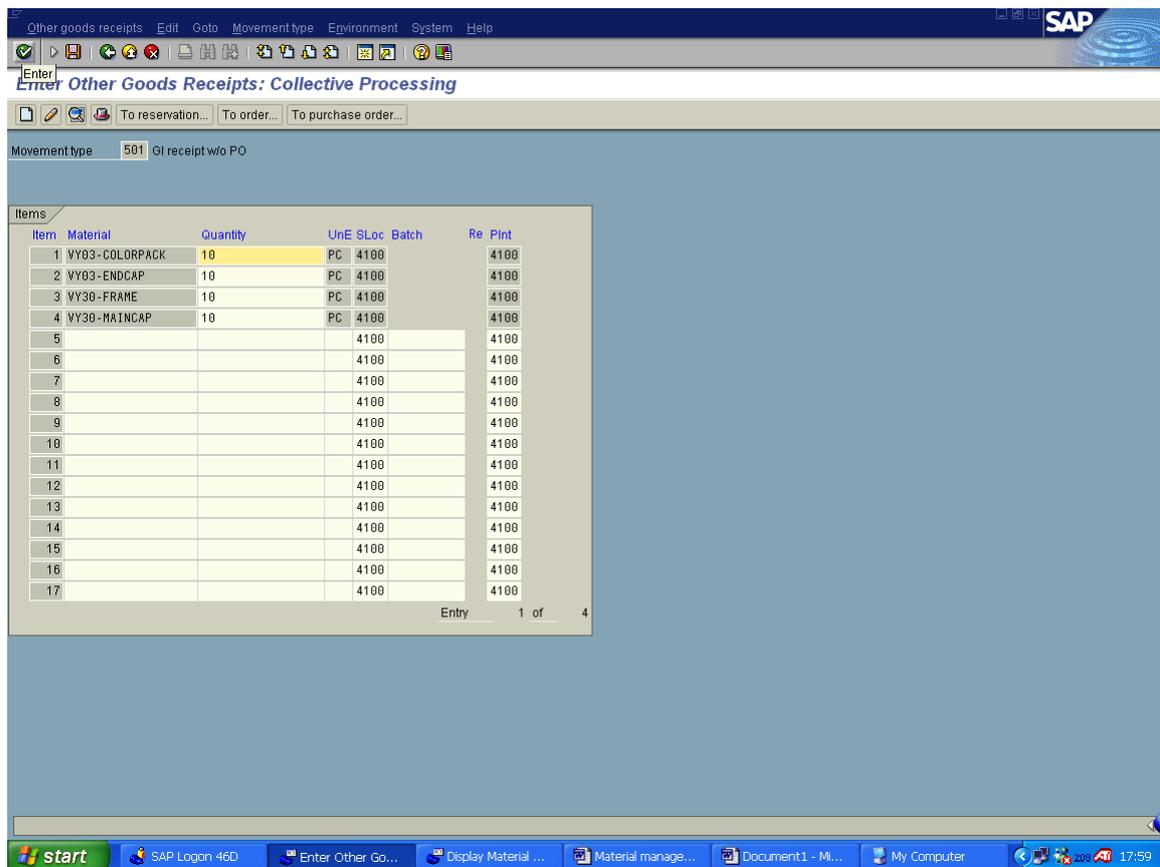
Movement type 501 GI receipt w/o PO  
 G/L account

Recipient

Item	Material	Quantity	UnE	SLoc	Batch	Re	Pint
1	VY03-COLORPACK	10		4100			4100
2	VY03-ENDCAP	10		4100			4100
3	VY30-FRAME	10		4100			4100
4	VY30-MAINCAP	10		4100			4100
5				4100			4100
6				4100			4100
7				4100			4100
8				4100			4100
9				4100			4100
10				4100			4100
11				4100			4100
12				4100			4100
13				4100			4100
14				4100			4100
15				4100			4100
16				4100			4100
17				4100			4100

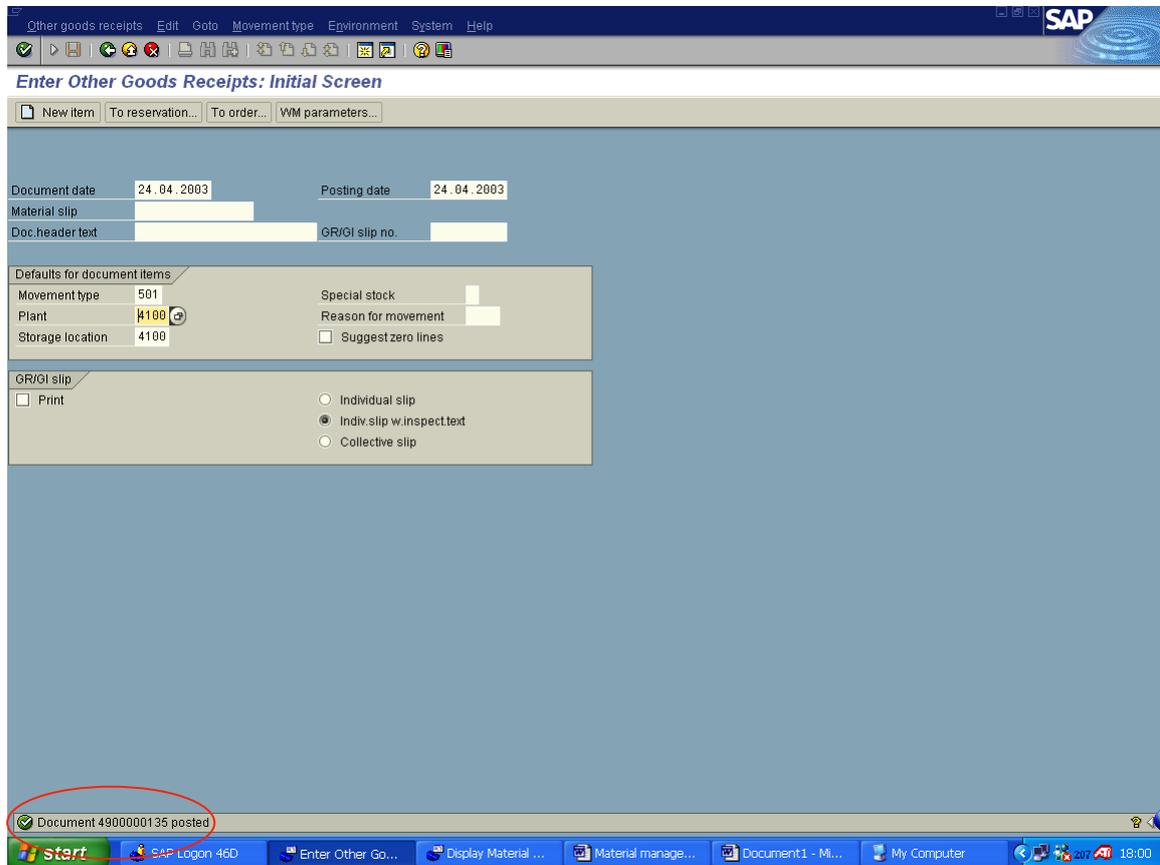
start SAP Logon 46D Enter Other Go... Display Material ... Material manage... Document1 - Mi... My Computer 211 17:59

If information entered is correct, screen should look like below. Accepted field will turn grey.



After that you have to post the document, that the changes take place. At the upside the display, choose *Other goods receipts* and *Post*.

After posting document ( choose upside the screen: *Other goods receipts-->post*) user is informed that document is posted (on the bottom of the screen)



If you want to see the changes you have done into stock, go *Logistics* → *Logistics Controlling* → *Inventory Controlling* → *Standard Analyses* → *MCBC – Storage Location*.

At this screen enter:

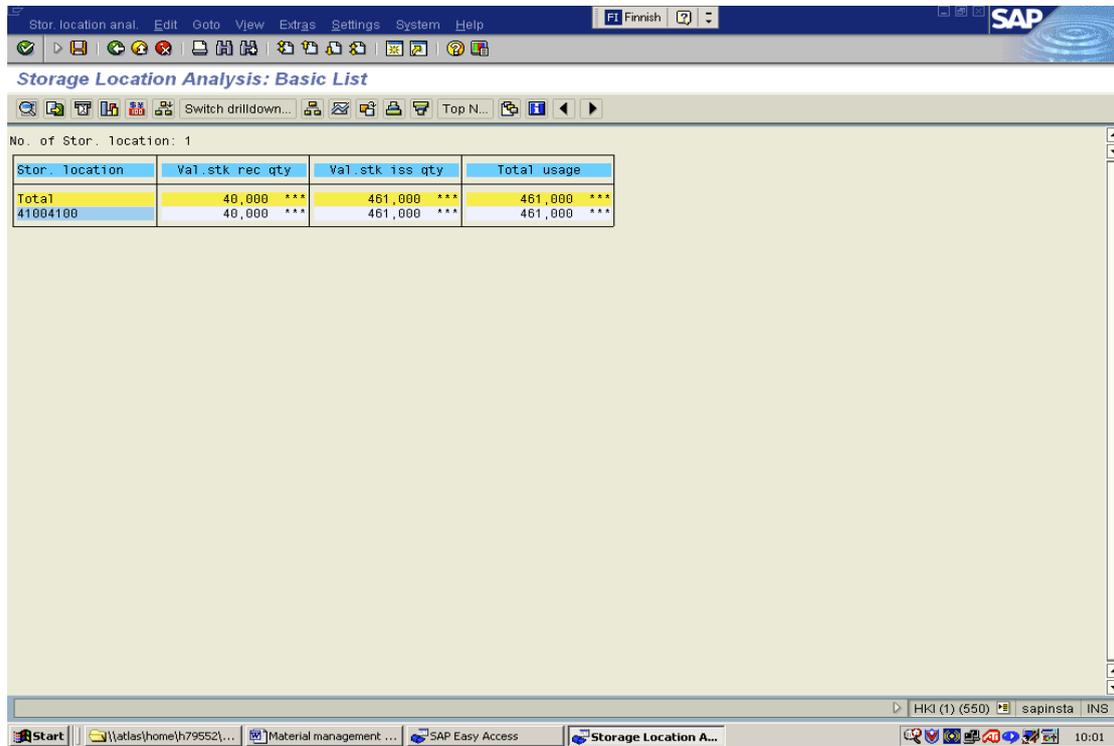
1. Plant and Storage Location
2. Press Execute (F8)

The screenshot displays the SAP 'Storage Location Analysis: Selection' screen. The interface includes a menu bar at the top with options like 'Stor. location anal.', 'Edit', 'Goto', 'View', 'Extras', 'Settings', 'System', and 'Help'. Below the menu bar, there is a toolbar with various icons, including a red circle around the 'Execute' (F8) button labeled '2'. The main area is divided into several sections:

- Characteristics:** A table with columns for characteristic name, value, and a 'to' column. The 'Plant' and 'Storage location' rows have the value '4100' entered, which is circled in red. A red '1' is placed to the left of the 'Storage location' value.
- Material groupings:** A table with columns for characteristic name, value, and a 'to' column. The 'Material type', 'Material group', and 'Valuation class' rows have empty values.
- Period to analyze:** A table with columns for characteristic name, value, and a 'to' column. The 'Month' row has the values '02.2003' and '04.2003' entered.
- Values:** A section with radio buttons for 'Standard' (selected), 'MaterialLedger active', and 'Current price'.
- Parameters:** A section with input fields for 'Analysis currency' and 'Exception'.

The bottom of the screen shows the Windows taskbar with the Start button, several open applications (Material management, SAP Easy Access, Storage Location A...), and the system tray with the date and time (9:53).

At this screen “double click” cell (41004100) under Storage location



The screenshot shows the SAP 'Storage Location Analysis: Basic List' interface. The window title is 'Stor. location anal.' and the language is set to 'Finnish'. The main content area displays a table with the following data:

Stor. location	Val. stk rec qty	Val. stk iss qty	Total usage
Total	40,000 ***	461,000 ***	461,000 ***
41004100	40,000 ***	461,000 ***	461,000 ***

The table is titled 'No. of Stor. location: 1'. The SAP taskbar at the bottom shows the current window is 'Storage Location A...' and the system clock is 10:01.

Now you can see the materials and their balances in the stock you have chosen.

Storage Location Analysis: Drilldown

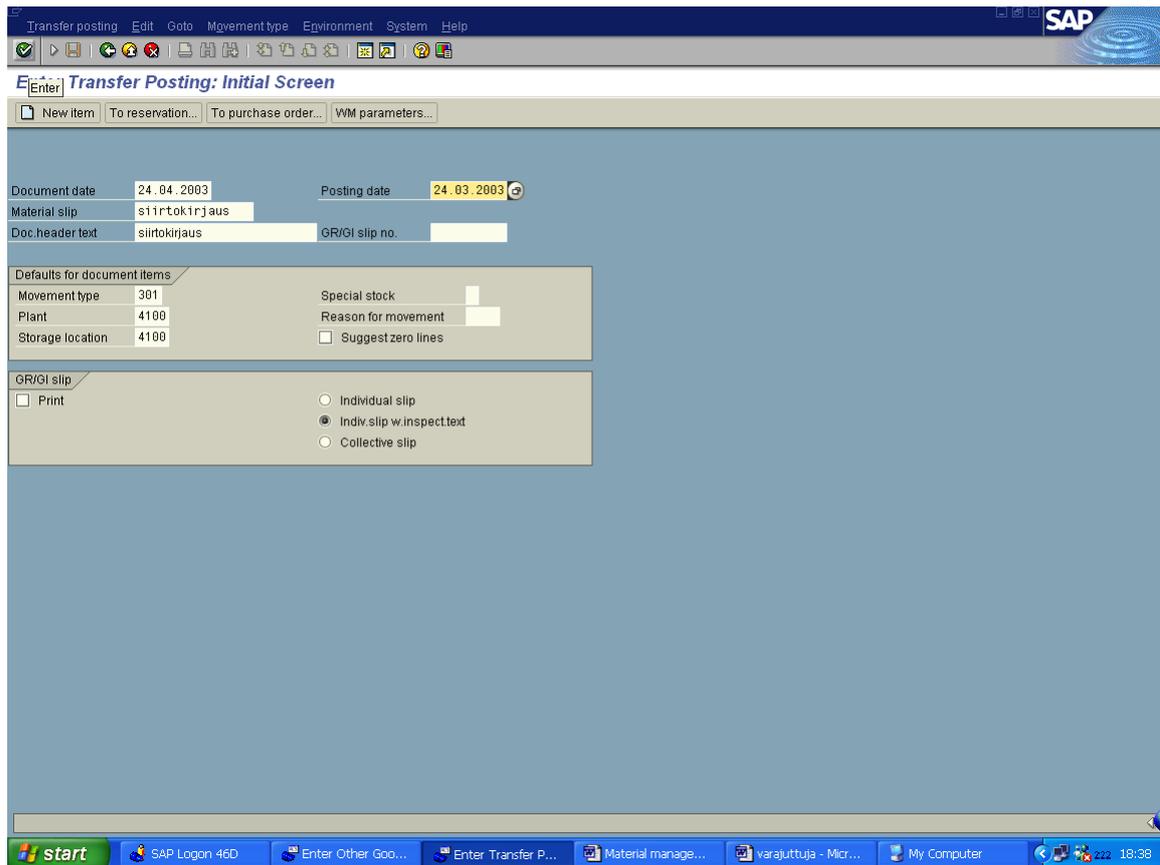
No. of Material: 7

Material	Val. stk rec qty	Val. stk iss qty	Total usage
Total	40,000 ***	461,000 ***	461,000 ***
M101	0 ST	461 ST	461 ST
M102	0 ST	0 ST	0 ST
VY03-COLORPACK	10 PC	0 PC	0 PC
VY03-ENDCAP	10 PC	0 PC	0 PC
VY30-FRAME	10 PC	0 PC	0 PC
VY30-MAINCAP	10 PC	0 PC	0 PC
VYR2_RENKAAT	0 ST	0 ST	0 ST

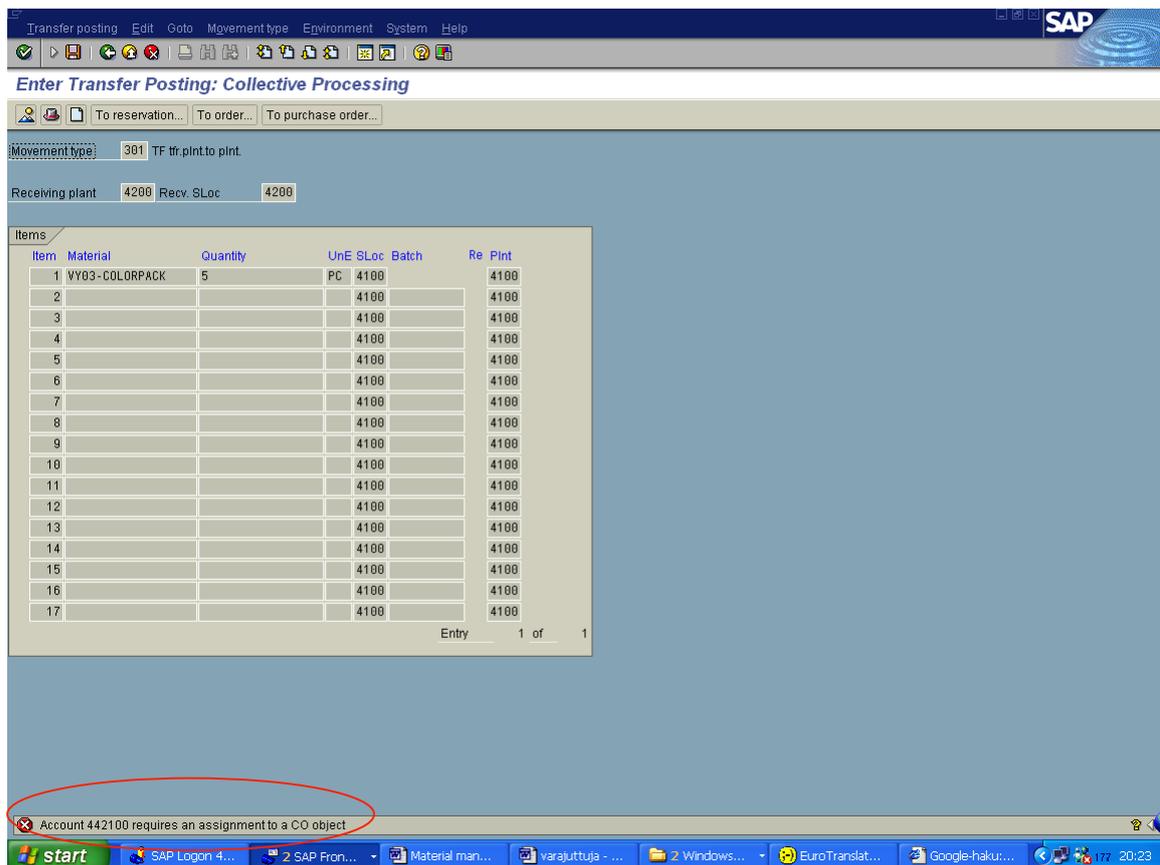
## 7.5 Making Transfer Posting

*Logistics → Materials Management → Inventory Management → Goods Movement  
→ MB1B- Transfer Posting*

If used Movement type 301 (transfer from Storage location to storage location) the CO account must be determined.



After trying to post the transfer, error text on the bottom of the screen occurs.



Transfer posting Edit Goto Movement type Environment System Help

**Enter Transfer Posting: Initial Screen**

New item To reservation... To purchase order... WM parameters...

Document date 24.04.2003 Posting date 24.03.2003

Material slip siirtokirjaus

Doc. header text siirtokirjaus GR/IR slip no.

Defaults for document items

Movement type	321	Special stock	
Plant	4100	Reason for movement	
Storage location	4100	<input type="checkbox"/> Suggest zero lines	

GR/IR slip

Print

Individual slip  
 Indiv. slip w. inspect. text  
 Collective slip

start SAP Logon 4... Enter Transf... Rekisteröi sir... Microsoft... tuotekehitys... EuroTranslat... Google-haku... 19:42

Movement type 321 can be used to make transfer inside the storage location. It transfers balance from quality inspection to unrestricted use.

Enter the material and quantity wanted to transfer. *Recv. Sloc* must be same as the existing storage location.

Transfer posting Edit Goto Movement type Environment System Help

Enter Transfer Posting: Collective Processing

To reservation... To order... To purchase order...

Movement type 321 TF quality to unrest

Recv. SLoc 4100

Item	Material	Quantity	UnE SLoc	Batch	Re	PInt
1	VY30-MAINCAP	5	PG	4100	4100	4100
2				4100		4100
3				4100		4100
4				4100		4100
5				4100		4100
6				4100		4100
7				4100		4100
8				4100		4100
9				4100		4100
10				4100		4100
11				4100		4100
12				4100		4100
13				4100		4100
14				4100		4100
15				4100		4100
16				4100		4100
17				4100		4100

Entry 1 of 1

start SAP Logon 4... Enter Transf... Rekisteri sir... Microsoft... tuotekehitys... EuroTranslat... Google-haku:... 182 19:43

Before posting the transfer the balance *in quality inspection* was 10 and *unrestricted use* 20.

Now balances has changed; 5 items has been moved to *unrestricted use*.

*Logistics --> Material Management --> Material Master -->Material --> Display -->MM03 – Display Current*

Material: VY03-COLORPACK color container  
 Plant: 4100 Komponentittuotanto FI  
 Stor. loc.: 4100 Varasto 4100

General data  
 Base unit of measure: PC Pcs Inventory blocking:   
 Current period: 03 2003 Previous period: 02 2003  
 Invent. corr. factor: 1.00000

Storage location stocks in current period

Unrestr.-use stock	25	Unrestr. consignment	0
Restricted-use stock	0	Restr. consignment	0
In quality insp.	5	Cnsgt in inspection	0
Blocked	0	Blocked consignment	0
Returns	0		
Stock in transfer	0		

Storage location stocks in previous period

Unrestr.-use stock	0	Blocked	0
Restricted-use stock	0	Returns	0
In quality insp.	0	Stock in transfer	0

## 7.6 c.) Defining Lot Sizes

*Logistics* → *Materials management* → *Material Master* → *Material* → *Change Immediately*. Choose sheet MRP 1.

The screenshot shows the SAP Change Material VY03-COLORPACK (Raw material) interface. The 'Lot size data' tab is highlighted with a red border. The data entered in this tab is as follows:

Lot size	EX	Lot-for-lot order quantity
Minimum lot size	10	Maximum lot size
Fixed lot size		Maximum stock level
Ordering costs	10	Storage costs ind.
Assembly scrap (%)		Takt time
Rounding profile		Rounding value
Unit of measure grp		

Into the red area you can enter lot size data.

Next steps are recommended:

- Lot size: The procedure how the system calculates quantities to be procured or produced
- Minimum and maximum lot sizes: The system optimizes lot sizes between these limits
- Ordering costs: fixed cost per lot, for calculating optimum lot-sizing procedures

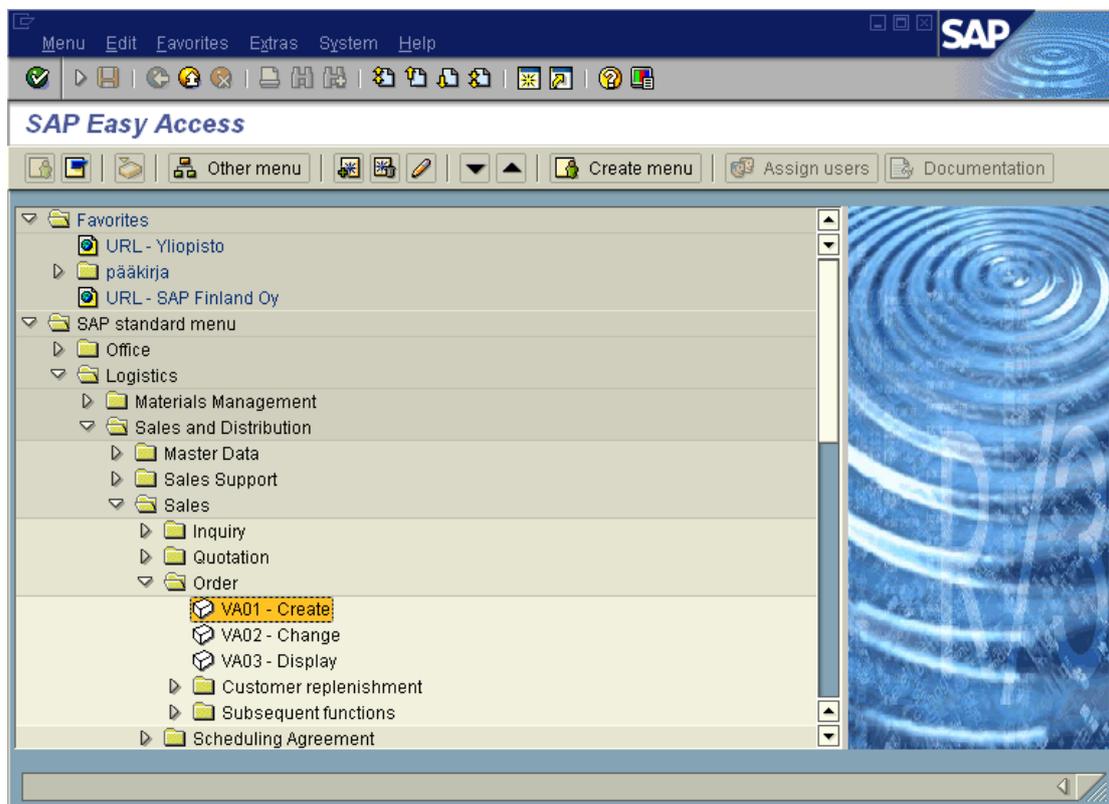
After entering the data, changes must be saved.

## 8 MAKE TO ORDER PRODUCTION

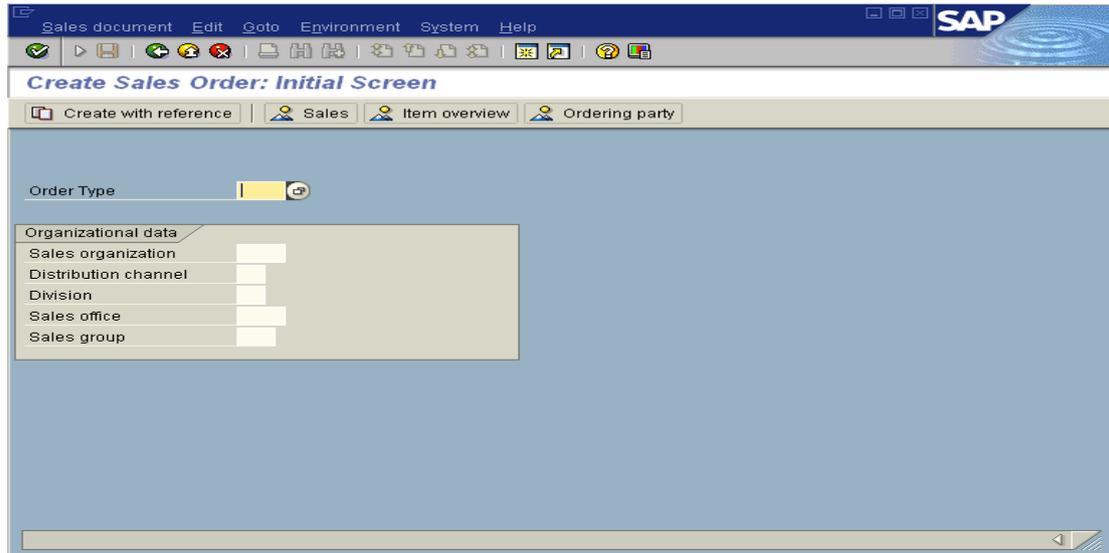
### 8.1 SD - How to make a sales order

When we have logged on to SAP R/3 system, installed it to our computer, feeded the basic information about the company, after bills of material –information has been defined and after we have input the quantity of all materials and semi products and ready products we can start making sales orders.

So the path to start making sales orders is displayed in the following slide:

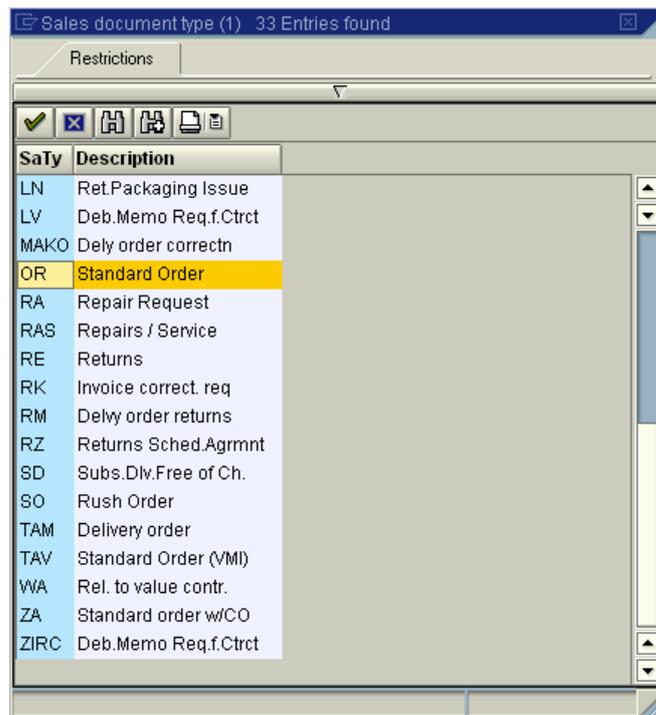


After we have walked through former path will following screen will open.



For making sales order we have to fill empty fields of the former form. At first you have to choose “Order Type” and if you do not remember all Order type abbreviations you can view the by clicking button which is at the right side of the activated field. After clicking the button you will see following screen.

The most important part of filling earlier document is to choose order type because it affects to whole SAP-system. The reason for that is because it defines how system handles the order: What kind of logistical events do the order need and how is the costs going to be covered.



Also the rest of definable variables are: 1.who has sold the goods: In this case sales organization is Finland whose code is 4000. 2. Then you have to define which distribution channel you are going to use. In this case we choose 01 which could be for example deliver to retailer. 3. Then you have to define in which product division does the ordered pen belong to (we choose number 1.). 4. Then you have to define who sold the product and also 5. which group sold it. You can make your own special options for every field.

Sales document Edit Goto Environment System Help

Create Sales Order: Initial Screen

Create with reference Sales Item overview Ordering party

Order Type OR

Organizational data

Sales organization	4000
Distribution channel	01
Division	01
Sales office	4000
Sales group	001

After you have defined all fields of last form you have to select SALES –option which is above the screen. Then will open following screen.

SAP  
Sales document Edit Goto Extras Environment System Help

Display Standard Order 5999997: Overview

Standard Order 5999997 Net value 595,00 FIM

Sold-to party 312 Pekka Pouta / Sääkatu 1 / FIN-65100 Vaasa

Ship-to party 312 Pekka Pouta / Sääkatu 1 / FIN-65100 Vaasa

Purch.order no. 696969696969 PO date

Sales Item overview Item detail Ordering party Procurement Shipping Reason for rejection

Req. deliv.date 27.03.2003 Deliver.plant

Complete delv. Total weight 0 KG

Delivery block Volume 0,000

Billing block Pricing date 27.03.2003

Payment card Exp.date

Payment terms 0001 Payable immediate... Incoterms CPT Helsinki

Order reason

Sales area 4000 / 01 / 01 Sales org. FI, Distribtn Channel 01, Product Division 01

Item	Material	S	Description	Customer material no.	ItCa	D	H	C	First date	PInt	B	CnTy	Rate	Curr.	Net price per	U...	Net value	Next sca...	Pa...	GV%	Rea
10	VY03-PENCIL	✓	Tussi kova	TUSSI KOVAAN KÄYTTÖÖN!	TAN	00			27.03.2003	4100		PR00	5,95	FIM	5,95	1 PC	595,00	0		0,00	

In this screen you have to define to whom (**Sold to Party**) and what (**Material**) and how many items (**Order quantity**) are you going to sell. Important part of filling this form is also defining **Purchasing order number** which you can define by yourself. You can also define to where (**Ship to party**) are you going to transfer the goods. Also definable is the day when customer requires **delivering** of the goods.

Note!. Also you have to add the **price of the product** if it hasn't been defined earlier when man has defined the product to SAP/R3. If you haven't defined the weight for the product system won't let you continue with out filling the missing numbers. But after we had saved order purchasing and went to overview it there wasn't any marks of the weight.

## 9 MAKE TO STOCK PRODUCTION

Following two chapters will guide user to use SAP R/3 to make MPS and forecasting. Production planning will be inputted using Production Planning -module. In first phase material, product group and required plan number are inputted. Next phase is to input unit amounts to be manufactured. After inputting all the necessary data you save the data and go back.

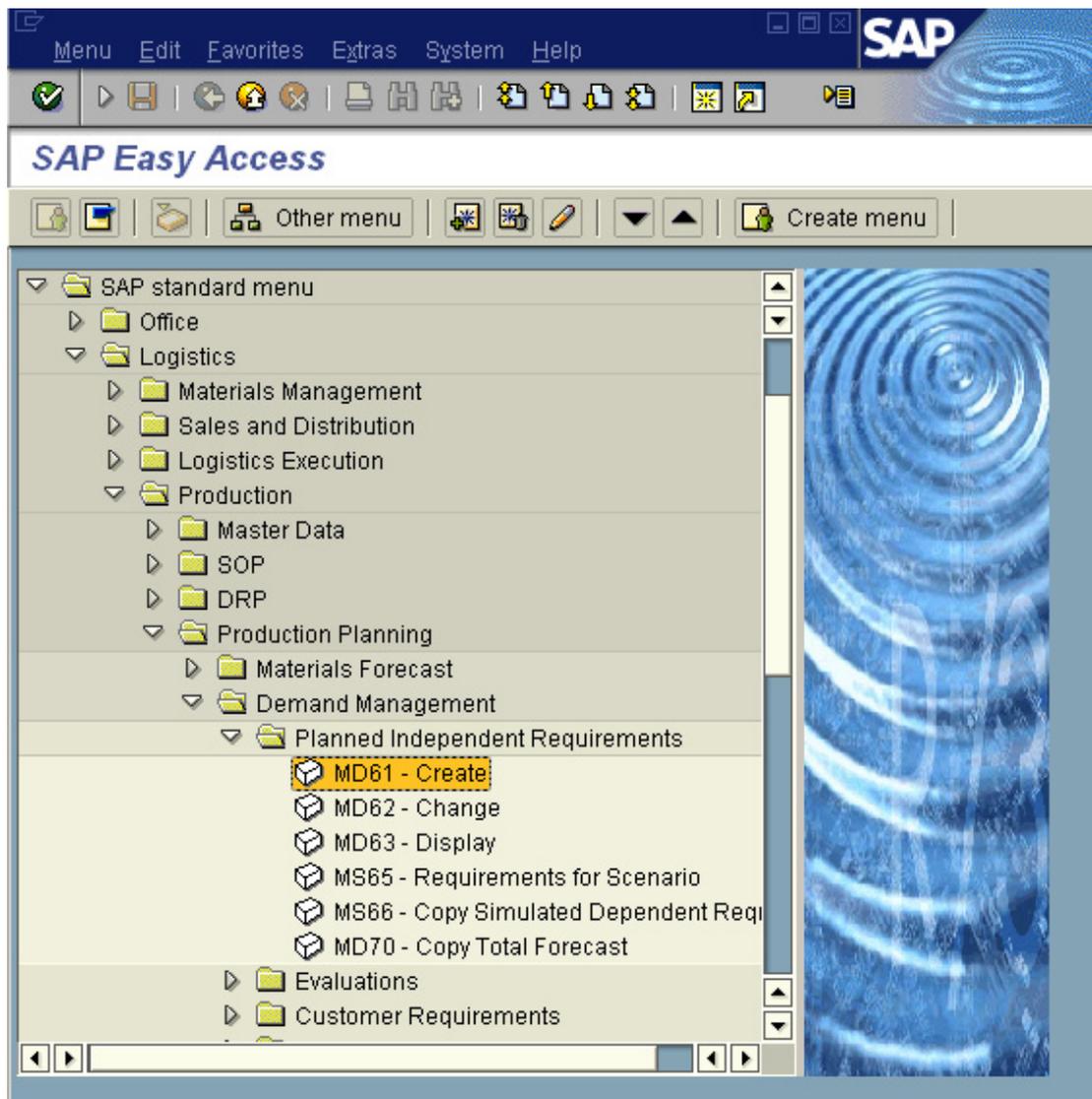
To approve forecast start *copy total forecast*. Input at least Plant, Material and Selection Period. After inputting the data pushing F8 or , SAP makes the forecast. The result is approved Total Forecast. The created MPS can be found in Display. Choosing Display Planned Independent Requirements: Initial Screen and pressing Enter will show the MPS (Planned Independent Requirements Display: Planning Table).

### 9.1 MPS

Production planning will be inputted using PP-module. Following information is required when inputting plan:

- material
- product group
- Required plan number

Path to Planned Independent Requirements → MD61 - Create



The screenshot shows the SAP 'Create Planned Independent Requirements: Initial Sc...' dialog box. The window title is 'Planned indep.reqmts' and the SAP logo is visible in the top right corner. The menu bar includes 'Edit', 'Goto', 'Settings', 'System', and 'Help'. The toolbar contains various icons for navigation and actions. Below the title bar, there is a tab labeled 'Reqmts parameters...'. The main content area is divided into three sections: 'Planned independent requirements for', 'Define version', and 'Planning horizon'. In the 'Planned independent requirements for' section, the 'Material' radio button is selected, with the value 'M181' entered in the adjacent field. The 'Plant' field is set to '4100'. In the 'Define version' section, the 'Version' field is set to '00' and the 'Requirements plan' field is empty. In the 'Planning horizon' section, the 'From' date is '18.03.2003', the 'To' date is '21.04.2004', and the 'Planning period' is set to 'M' (Month).

Planned independent requirements for	
<input checked="" type="radio"/> Material	M181
<input type="radio"/> Product group	
<input type="radio"/> Req.plan number	
Plant	4100

Define version	
Version	00
Requirements plan	

Planning horizon			
From	18.03.2003	To	21.04.2004
Planning period	M	Month	

Input at least Material and Plant

Planned indep.reqmts Edit Goto Settings Environment

**Plnd ind. reqmts Create: Planning Table**

Planning start 03.03.2003 Plng. finish 21.04.2004

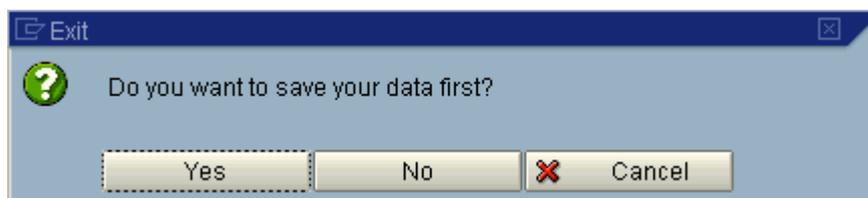
Table Items Sched. lines

Materi...	Plnt	DV	Ac	B...	M 03.2003	M 04.2003	M 05.2003	M 06.2003	M 07.2003
M101	4100	00	<input checked="" type="checkbox"/>	ST	69	72	85	41	87
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						
	4100	00	<input checked="" type="checkbox"/>						

Page 1 / 1

Input unit amounts to be manufactured.

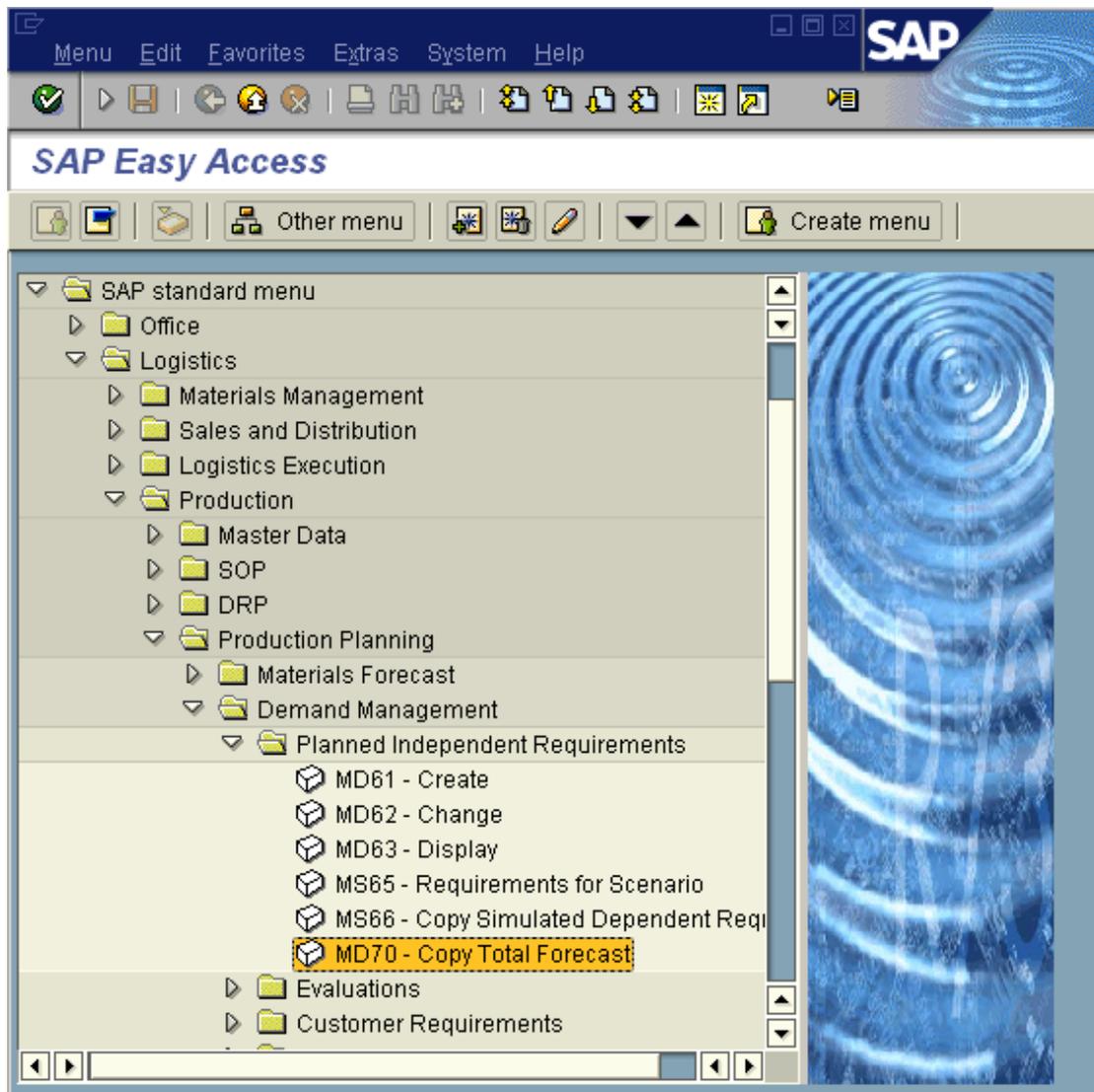
Choose Back



Choose Yes

## 9.2 Forecasting demand

Approve Total Forecast:

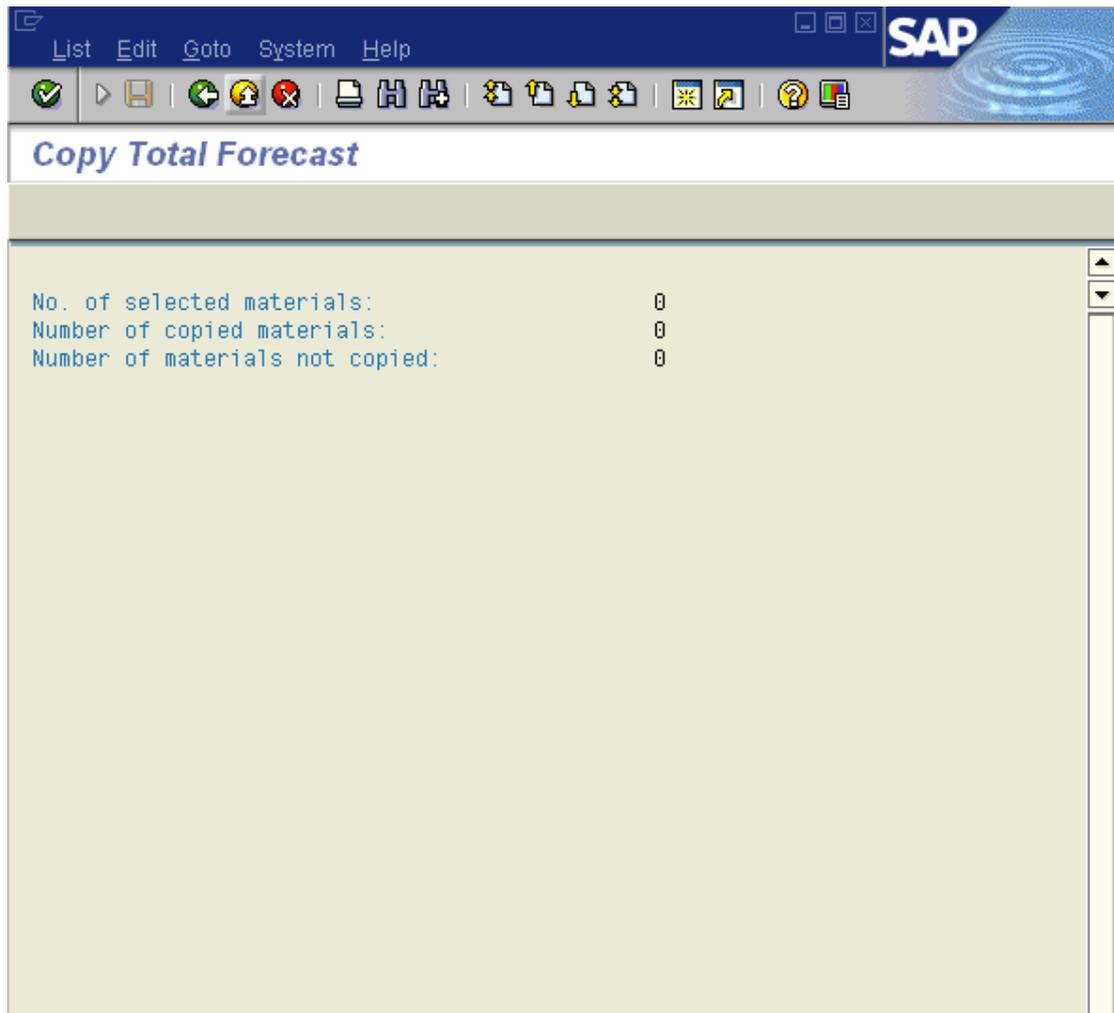


The screenshot shows the SAP 'Copy Total Forecast' dialog box. The window title is 'Copy Total Forecast'. The menu bar includes 'Program', 'Edit', 'Goto', 'System', and 'Help'. The toolbar contains various icons for navigation and execution. The dialog is divided into several sections:

- Selection:** A table with three rows: 'Plant' (value: 4100), 'MRP controller' (empty), and 'Material' (value: m101). Each row has a 'to' field and a right-pointing arrow icon.
- Selection period:** A section with 'Date' fields. The first field contains '18.03.2003' and the second field contains '18.09.2003' with a calendar icon.
- Reqmts parameters:** A section with three rows: 'Reqmts plan', 'Reqmt type', and 'Version', each with an empty input field.
- Options:** A list of checkboxes: 'Reqmt active' (checked), 'History' (checked), 'Create list of results' (unchecked), and 'No database changes (simulation)' (checked).

Input at least Plant, Material and Selection Period.

Choose  to Execute (F8)



Result is an approved Total Forecast.



The screenshot shows the SAP interface for 'Display Planned Independent Requirements: Initial Screen'. The window title is 'Planned indep.reqmts' and the SAP logo is visible in the top right corner. The main content area is divided into three sections:

- Reqmts parameters...**: This section contains the following fields:
  - Planned independent requirements for**:
    - Material: M101
    - Product group: [Empty]
    - Req.plan number: [Empty]
  - Plant**: 4100
- Selection parameters**: This section contains the following fields:
  - Requirements type**: [Empty]
  - Selected version: 00 Requirements plan
  - All active versions
  - All active/inactive versions
- Planning horizon**: This section contains the following fields:
  - From**: 18.03.2003
  - To**: 21.04.2004

Display Planned Independent Requirements: Initial Screen.





The screenshot shows the SAP 'Create Planned Independent Requirements: Initial Screen'. The window title is 'Planned indep. reqmts' and the language is set to 'Finnish'. The SAP logo is visible in the top right corner. The main title of the screen is 'Create Planned Independent Requirements: Initial Screen'. Below the title bar, there is a 'Reqmts parameters...' button. The main content area is divided into three sections:

- Planned independent requirements for:** This section contains three radio buttons: 'Material' (selected), 'Product group', and 'Req. plan number'. The 'Material' field is filled with 'VY03-PENCIL'. Below this, the 'Plant' field is filled with '4100'.
- Define version:** This section contains a 'Version' field filled with 'AB' and a 'Sales plan' field.
- Planning horizon:** This section contains 'From' and 'To' date fields. 'From' is filled with '09.04.2003' and 'To' is filled with '13.05.2004'. The 'Planning period' is set to 'M' (Month).

At the bottom of the screen, there is a status bar that says 'Requirement saved'.

For making the MPS you have to fill the form. Most important thing is to choose the product which is in our case VY03-pencil. Then you have to choose where to do those products: PLANT. You also have to DEFINE VERSION – VERSION and choose there which one of them is most likely what you are doing. We chose AB – Sales plan. You can also define the planning horizon and planning period.

For survive successfully from making MPS you have to select from left upper part of the screen REQMTS PARAMETERS... After you have selected previous link you will see following screen.

Settings: Requirements Parameters

Reqmts parameters

User name VYTU0303

Default values

Plant 4100

Requirements type BSF

Version AB

Period ind.

Planning start

Overview

Planning table

Item screen

Consumption

Consumption ind.

Display

Period split

Period total

Original qty ind.

Active

History indicator

Reference

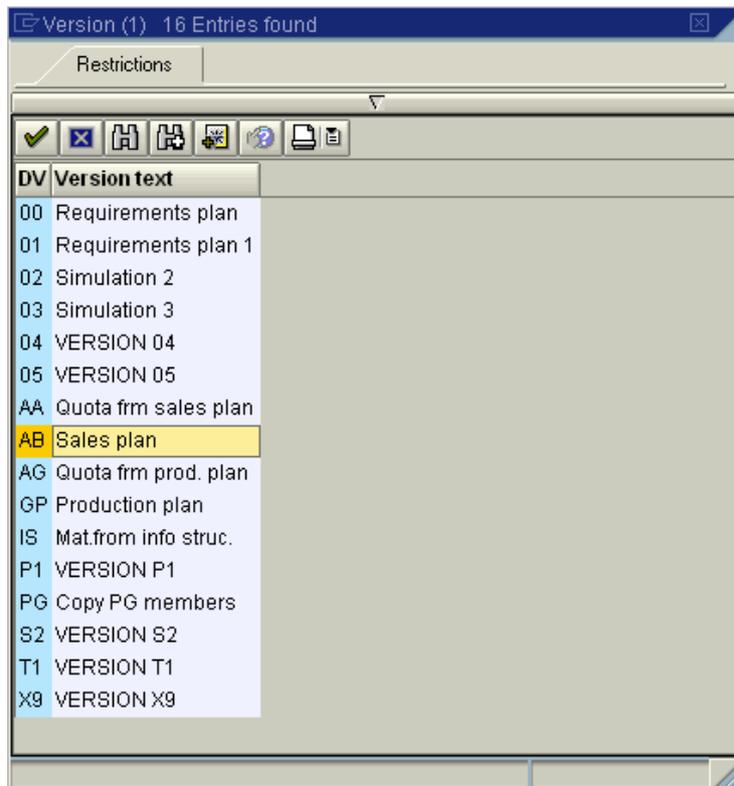
Reference

In this form you have to define REQUIREMENTS TYPE and VERSION. Options for the requirements type and version you can see in two following pictures.

Requirements type (1) 8 Entries found

Restrictions

RqTy	Requirements type description
BSF	Gross planned indep. reqmts
LSF	Make-to-stock production
VSE	Planning w/o final assembly
VSEB	Planning; phantom assemblies
VSEM	Plan assemblies w/o final ass.
VSEV	Planning the planning material
VSF	Planning with final assembly
VSFB	Planning for assemblies



After you have managed to fill previous forms you have to fill following the MPS-Planning Table.



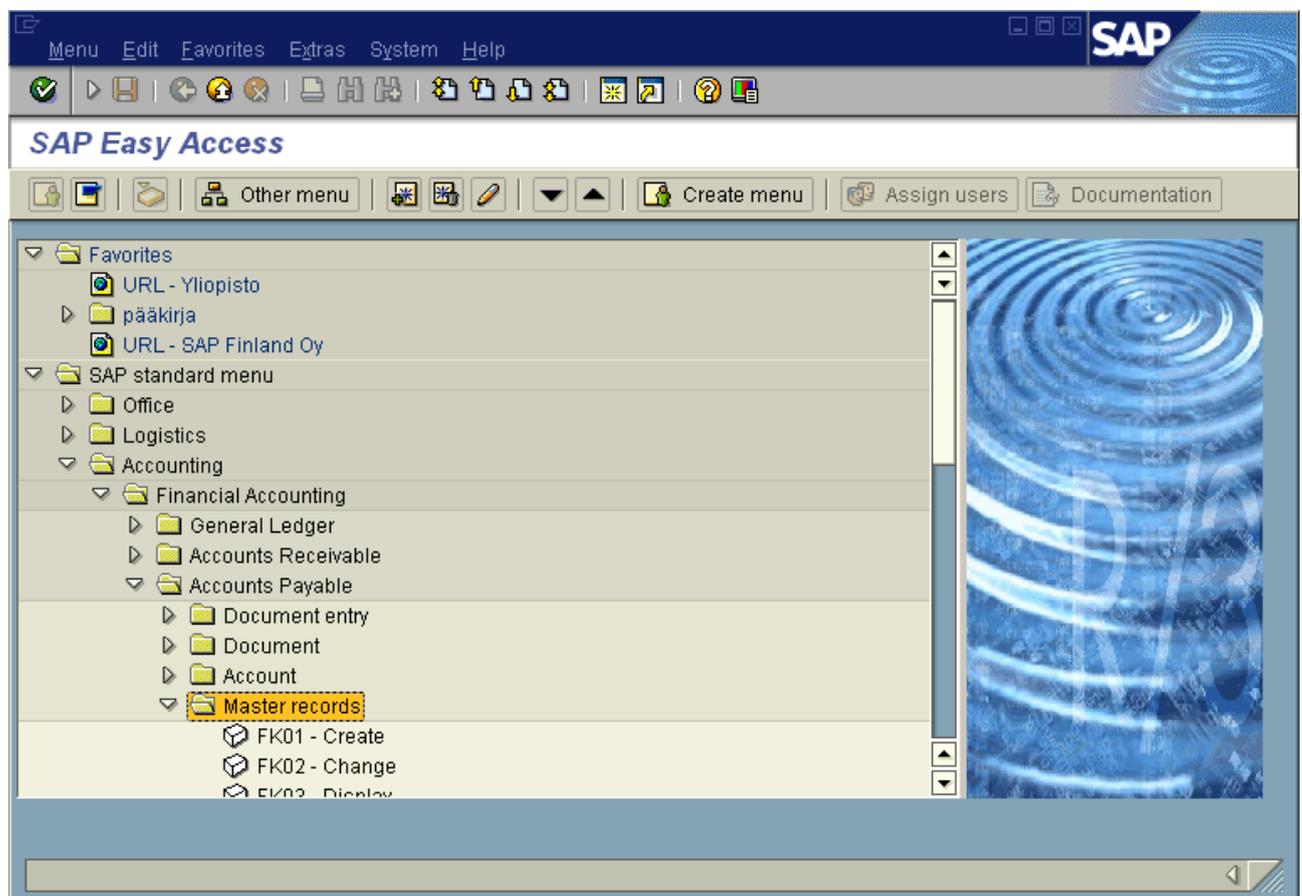
## 11 PP – MATERIAL REQUIREMENTS PLANNING (MRP)

### 11.1 Creating/Maintaining supplier's master records

The first step in ordering material for the production is to look for suppliers (=vendor, accounts payable). Supplier's records are gathered and created at the master record.

The path from main menu to the screen where vendor is created:

Accounting > Financial Accounting > Accounts Payable > Master records > Create



In the first screen the vendor number is created. You choose the number and you can check from the list behind the block if the number is available (In companies it is usually a running number). You also have to select an account group. Now you can move on to the next slide by pressing enter.

(Our choices:

4000 = Instant SAP R/3 Finland / Helsinki / FIM

LIEF = Vendor (ext.number assgnmnt)

Vendor 12345

Company code 4000 Instant SAP R/3 Finland

Account group LIEF

Reference

Vendor

Company code

The next step is to create basic info of the vendor, e.g. name, address. Required information fields are marked with square and V-mark. (Name, Search term1/2, country are required.)

Vendor 12345

Preview

**Name**

Title Company

Name Ink Solution Ltd.

**Search terms**

Search term 1/2 Ink Solution Ltd.

**Street address**

Street/House number Inkstreet 603 B 29

Postal code/City 12345 Incity

Country EE Region

**PO box address**

P.O. Box

Postal code

Company postal code

**Communication**

Language English Other communication...

Telephone -

Fax -

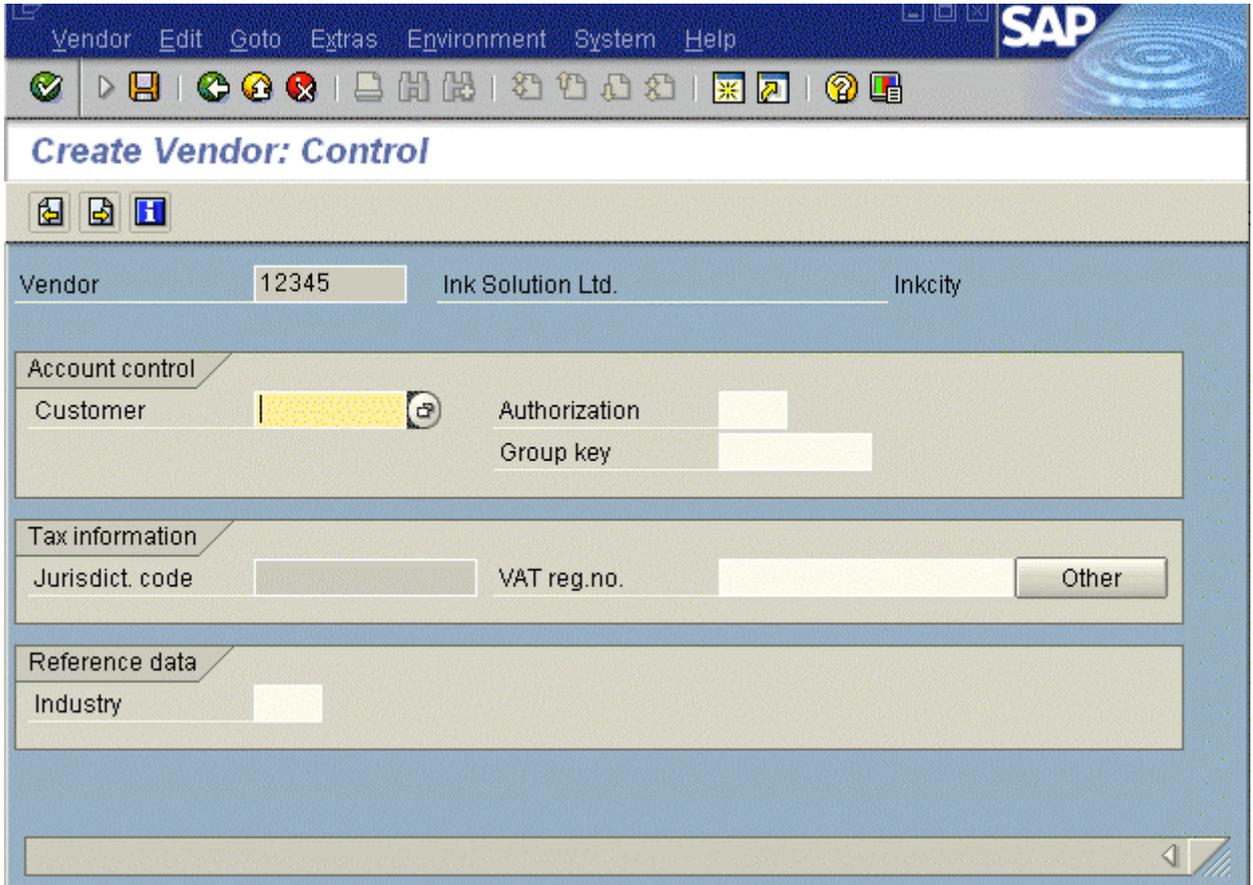
Standard comm.type

Data line

Telebox

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

If the vendor is also a customer, here you can link his customer information with the vendor data. Just put the vendor's customer number to the Customer square.



The screenshot shows the SAP 'Create Vendor: Control' dialog box. The title bar includes 'Vendor Edit Goto Extras Environment System Help' and the SAP logo. The main area is divided into several sections:

- Vendor:** Vendor ID: 12345, Name: Ink Solution Ltd., City: Inkcit
- Account control:** Customer: [Yellow square with cursor] (linked to a customer), Authorization: [Yellow square], Group key: [Yellow square]
- Tax information:** Jurisdict. code: [Yellow square], VAT reg.no.: [Yellow square], Other: [Button]
- Reference data:** Industry: [Yellow square]

A yellow arrow icon is visible in the bottom right corner of the dialog box.

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

Payment transaction data can be listed here including e.g. bank data.

Vendor

**Bank details**

Ctry	Bank key	Bank account	Acct holder	C..	BnkT	Reference d

Bank data... Del. bk detail

**Payment transactions**

Alternative payee

DME indicator

Instruction key

**Alternative payee in document**

Individual spec.

Spec. per reference

Permitted payee

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

The account information is defined in this screen. You have to put reconciliation account and cash management group info before moving on

(Our choices:

- 244020=Accounts payable-foreign
- A2=Foreign vendor).

The screenshot shows the SAP 'Create Vendor: Accounting information Accounting' screen. The interface includes a menu bar (Vendor, Edit, Goto, Extras, Environment, System, Help) and a toolbar with various icons. The main content area is divided into several sections:

- Vendor Information:** Vendor: 12345, Ink Solution Ltd., Inkcity; Company code: 4000, Instant SAP R/3 Finland.
- Accounting information:** Recon. account: 244020 (highlighted in yellow), Sort key: [empty]; Head office: [empty]; Authorization: [empty]; Cash mgmnt group: A2; Release group: [empty].
- Interest calculation:** Interest indic.: [empty], Last key date: [empty]; Int. cycle: [empty], Last interest run: [empty].
- Reference data:** Prev.acct no.: [empty], Personnel number: [empty].

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

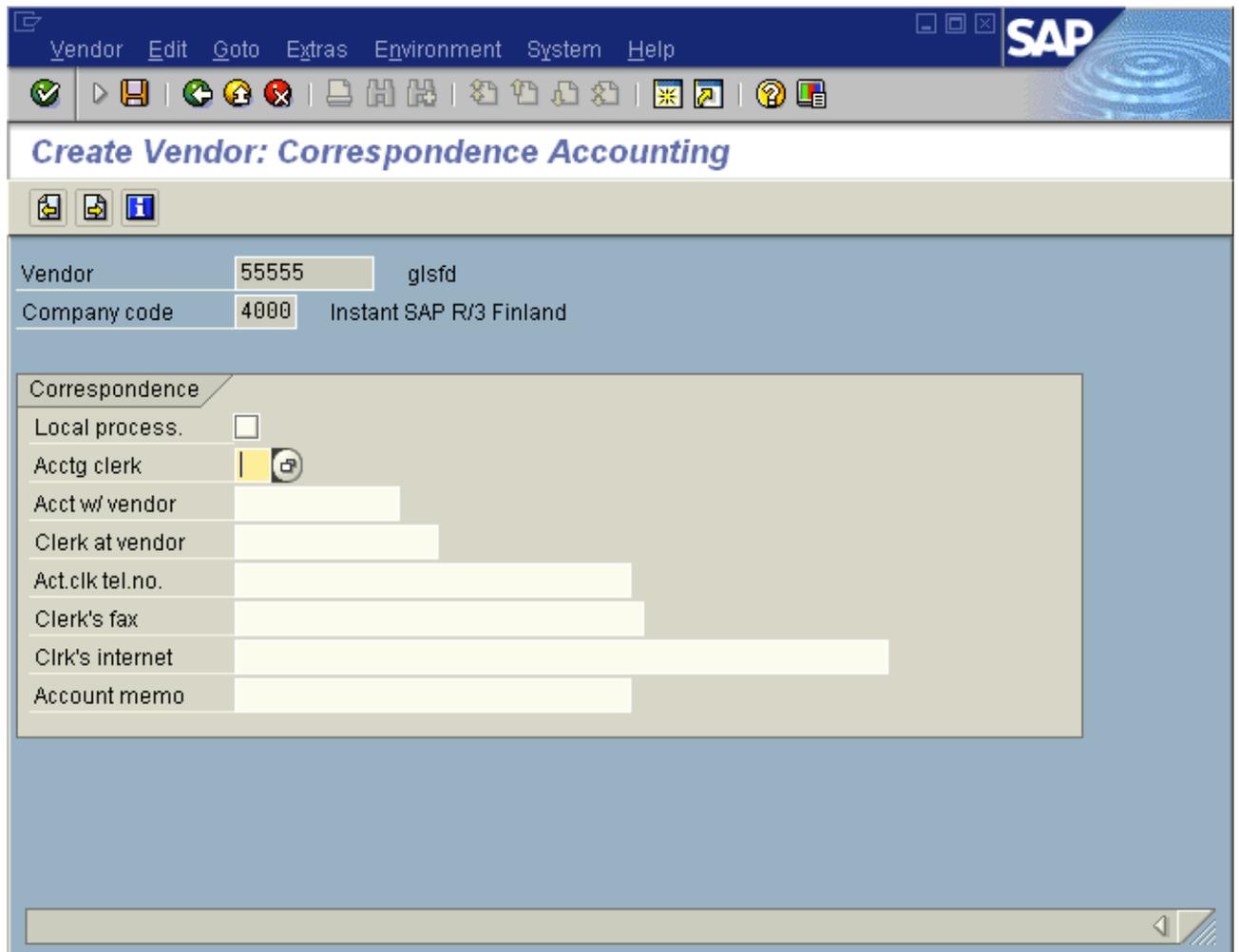
Here is the screen for payment transactions in accounting. Here you have to define the payment terms. (List for different terms with the explanations is given behind the answering square.)

The screenshot displays the SAP 'Create Vendor: Payment transactions Accounting' interface. The top menu bar includes 'Vendor', 'Edit', 'Goto', 'Extras', 'Environment', 'System', and 'Help'. The title bar shows 'SAP' and window control buttons. The main content area is divided into several sections:

- Vendor Information:** Vendor ID '12345', Name 'Ink Solution Ltd.', and City 'Inkcity'. Company code '4000' is associated with 'Instant SAP R/3 Finland'.
- Payment data:**
  - Payment terms: '0010' (with a help icon)
  - Tolerance group: [empty field]
  - Chk double inv.:
  - Chk cashng time: [empty field]
- Automatic payment transactions:**
  - Payment methods: [empty field]
  - Payment block:  Free for payment
  - Alternat.payee: [empty field]
  - House bank: [empty field]
  - Individual pmnt:
  - Grouping key: [empty field]
- Invoice verification:**
  - Tolerance group: [empty field]

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

Information about the vendors contact person with whom correspondence happens.



The screenshot shows the SAP 'Create Vendor: Correspondence Accounting' screen. The title bar includes 'Vendor', 'Edit', 'Goto', 'Extras', 'Environment', 'System', and 'Help'. The main content area displays the following information:

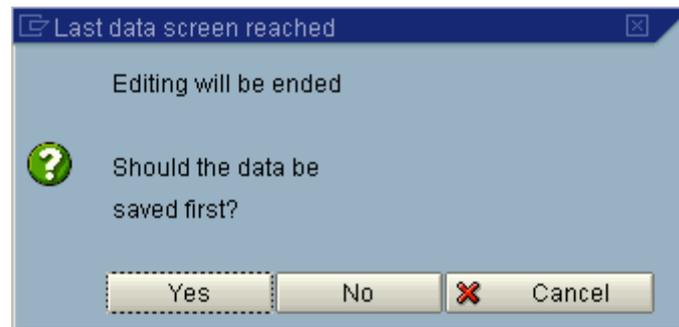
Vendor	55555	glsfd
Company code	4000	Instant SAP R/3 Finland

Below this, there is a 'Correspondence' section with the following fields:

Local process.	<input type="checkbox"/>
Acctg clerk	<input checked="" type="checkbox"/>
Acct w/ vendor	<input type="checkbox"/>
Clerk at vendor	<input type="checkbox"/>
Act.clk tel.no.	<input type="text"/>
Clerk's fax	<input type="text"/>
Clrk's internet	<input type="text"/>
Account memo	<input type="text"/>

Now you can move on to the next slide by pressing F8 or the yellow arrow on the paper showing to the right.

After you have put all the information on the vendor, you should save it.

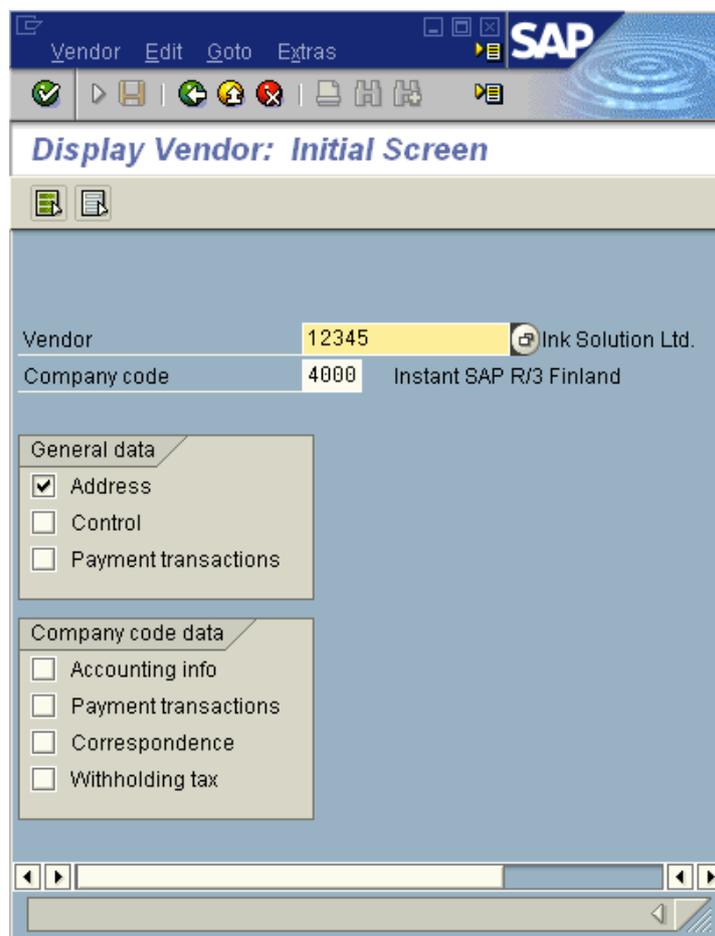


## 11.2 How to view vendor's info

The path from main menu to the screen where vendor's information can be seen:

Accounting > Financial Accounting > Accounts Payable > Master records > Display

This path opens the Initial Screen where you can choose the vendor and the information which you wish to see.





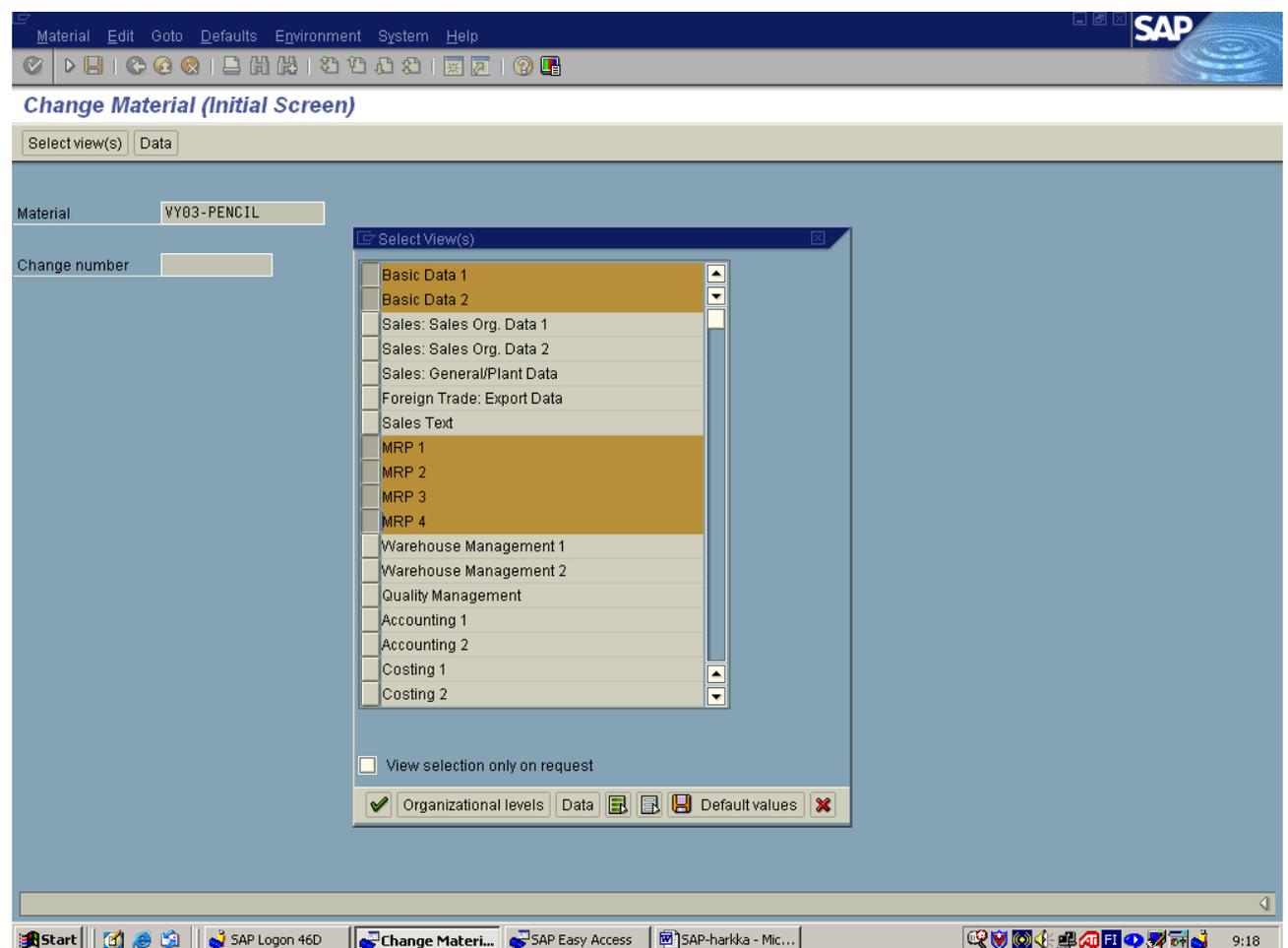
Go to the material block and click the circle after it. A list opens and you can choose the material which you want to rework.

Now press enter and a list of possible views you can remold comes up. Choose the views you need by clicking them with the mouse.

(Our choices:

-Basic Data 1 and 2

- MRP 1,2,3 and 4)



Now you can move on by pressing enter or the green V-mark.

A new window will open but you can move on without filling any of the blocks. So press enter or the green V-mark. In these windows you can move by pressing the slides name or the little arrow in upper right corner. In the front of these slides names there is a circle which indicates changeable slides. The circle is white with black center until you check it for the first time. The circle will change to green with white V-mark after you have left the slide.

In Basic data 1 you see the basics of the material. The Sales org 1 sheet is reachable only when you have filled the “organizational levels” window before.

The screenshot shows the SAP 'Change Material' window for material VY03-PENCIL. The window title is 'Change Material VY03-PENCIL (Finished product)'. The menu bar includes Material, Edit, Goto, Environment, System, and Help. The toolbar contains various icons for navigation and actions. The main content area is divided into several sections:

- Material:** VY03-PENCIL, Pencil for the scandinavian taste
- General data:**
  - Base unit of measure: PC, Pcs
  - Material group: [ ]
  - Old material number: [ ]
  - Ext. matl group: [ ]
  - Division: 01
  - Lab./office: [ ]
  - Product allocation: [ ]
  - Prod.hierarchy: [ ]
  - X-plant matl status: [ ]
  - Valid from: [ ]
  - GenItemCatGroup: 0001 Make to order
- Material authorization group:**
  - Authorization group: [ ]
- Dimensions/EANs:**
  - Gross weight: 0,100
  - Weight unit: KG
  - Net weight: 0,100
  - Volume: 0,200
  - Volume unit: L
  - Size/dimensions: [ ]
  - EAN/UPC: [ ]
  - EAN category: [ ]
- Packaging material data:**
  - Matl grp ship. matls: [ ]
- Basic data texts:** [ ]

The window also shows a taskbar at the bottom with the following open applications: SAP Logon 46D, tuo303, Change Materi..., and SAP-harkka - Mic...

In this basic data 2 slide there is more basics about the material e.g. information about design documents of the material.

The screenshot shows the SAP Change Material interface for material VY03-PENCIL. The title bar indicates the material is a finished product. The main window is titled "Change Material VY03-PENCIL (Finished product)". The interface is divided into several sections:

- Material:** VY03-PENCIL, Description: Pencil for the scandinavian taste.
- Other data:**
  - Prod./insp. memo: [Blank]
  - Ind. std desc.: [Blank]
  - Page format: [Blank]
  - CAD indicator:
  - Basic material: [Blank]
- Environment:**
  - DG indicator profile: [Blank]
  - Highly viscous:
  - Environmentally rlvt:
  - In bulk/liquid:
- Design documents assigned:**
  - No link:
- Drawing:**
  - Document: [Blank]
  - Document type: [Blank]
  - Doc.vers.: [Blank]
  - Page number: [Blank]
  - Doc.ch.no.: [Blank]
  - Page format: [Blank]
  - No. sheets: [Blank]
- Client-specific configuration:**
  - Cross-plant CM: [Blank]
  - Material is configurable:
  - Variant:
  - Configure variant: [Button]

In these slides you can find the lists of alternatives behind the blocks as specified before.

To the block after purchasing group you can choose the key for the buyer who is responsible for purchasing to material (our choice 401)

MRP type is also required, give manual value by selecting V1. (The other option is to use VM, which means automatic reorder point planning procedure: with automatic calculation of the reorder level and safety stock. You also have to determine the reorder point to this type, for main product 40 and parts 30.)

For the field after MRP controller you must enter a key for the controller who is responsible for the planning.

In ABC indicator field you can classify the material according to its consumption value.

Material Edit Goto Environment System Help SAP

**Change Material VY03-PENCIL (Finished product)**

Additional data Organizational levels Check screen data

Sales text **MRP 1** MRP 2 MRP 3 MRP 4 Forecasting

Material   

Plant



**General data**

Base unit of measure	<input type="text" value="PC"/>	Pcs	MRP group	<input type="text"/>
Purchasing group	<input type="text" value="401"/>		ABC indicator	<input type="text"/>
Plant-sp.matl status	<input type="text"/>		Valid from	<input type="text"/>

**MRP procedure**

MRP type	<input type="text" value="VM"/>	Automatic reorder point plng	
Reorder point	<input type="text" value="40"/>	Planning time fence	<input type="text"/>
Planning cycle	<input type="text"/>	MRP controller	<input type="text" value="001"/>

**Lot size data**

Lot size	<input type="text" value="WB"/>	Weekly lot size	
Minimum lot size	<input type="text" value="1"/>	Maximum lot size	<input type="text" value="100"/>
Fixed lot size	<input type="text"/>	Maximum stock level	<input type="text"/>
Ordering costs	<input type="text"/>	Storage costs ind.	<input type="text"/>
Assembly scrap (%)	<input type="text"/>	Takt time	<input type="text"/>
Rounding profile	<input type="text"/>	Rounding value	<input type="text"/>
Unit of measure grp	<input type="text"/>		

In **procurement type** you can define whether the material is produced in-house, externally or both. (x, because the part are from vendors and they are assembled in house. To **planned delivery time** we don't have to put anything because it only has to be filled when material or service is procured externally).

The screenshot shows the SAP 'Change Material' interface for material VY03-PENCIL. The title bar indicates 'Change Material VY03-PENCIL (Finished product)'. The main content area is divided into three sections: Procurement, Scheduling, and Net requirements calculation.

**Material:** VY03-PENCIL  
**Plant:** 4100  
**Description:** Pencil for the scandinavian taste

**Procurement**

Procurement type	X	Batch entry	
Special procurement		Issue stor. location	
Quota arr. usage		Default supply area	
Backflush		Storage loc. for EP	
JIT delivery sched.		Stock determ. group	
<input type="checkbox"/> Co-product		Joint production	
<input type="checkbox"/> Bulk material			

**Scheduling**

In-house production	1	days	PInd delivery time		days
GR processing time		days	Planning calendar		
SchedMargin key	000				

**Net requirements calculation**

Safety stock	40	Service level (%)	
Min safety stock		Coverage profile	
Safety time ind.		Safety time/act.cov.	

When you put the parameters for the part of actual item, it is mainly the same, but there can be differences. For example one exception was at this slide - procurement type was given and we could not change it.

Because the elements of the main product are coming from vendor, you have to determine **plan delivery time** in days.

Material Edit Goto Environment System Help SAP

Change Material VY30-MAINCAP (Raw material)

Additional data Organizational levels Check screen data

MRP 1 MRP 2 MRP 3 MRP 4 Forecasting Plant data ...

Material VY30-MAINCAP pencil main cap i

Plant 4100 Komponenttituotanto FI

**Procurement**

Procurement type	F	Batch entry	<input type="checkbox"/>
Special procurement	<input type="checkbox"/>	Issue stor. location	<input type="checkbox"/>
Quota arr. usage	<input type="checkbox"/>	Default supply area	<input type="checkbox"/>
Backflush	<input type="checkbox"/>	Storage loc. for EP	<input type="checkbox"/>
JIT delivery sched.	<input type="checkbox"/>	Stock determ. group	<input type="checkbox"/>
<input type="checkbox"/> Bulk material			

**Scheduling**

GR processing time	<input type="checkbox"/> days	Plnd delivery time	7 days
SchedMargin key	<input type="checkbox"/>	Planning calendar	<input type="checkbox"/>

**Net requirements calculation**

Safety stock	<input type="checkbox"/>	Service level (%)	<input type="checkbox"/>
Min safety stock	<input type="checkbox"/>	Coverage profile	<input type="checkbox"/>
Safety time ind.	<input type="checkbox"/>	Safety time/act.cov.	<input type="checkbox"/> days
STime period profile	<input type="checkbox"/>		

In the availability check field you must determine whether sales orders result in individual (02) or collective requirements for requirements planning and also how the availability check for a material is carried out by the system.

In the total replenishment lead time you tell the time that is needed for the complete production and procurement of a finished product or an assembly. This value is an estimate value and is used for the availability check.

Material Edit Goto Environment System Help SAP

Change Material VY03-PENCIL (Finished product)

Additional data Organizational levels Check screen data

MRP 2 MRP 3 MRP 4 Forecasting Work scheduling Pla...

Material VY03-PENCIL Pencil for the scandinavian taste

Plant 4100 Komponenttituotanto FI

Forecast requirements

Period indicator M Fiscal year variant Splitting indicator

Planning

Strategy group Consumption mode Fwd consumption per. Planning material Png conv. factor Bwd consumption per. Mixed MRP Planning plant Planning matl BUnit

Availability check

Availability check 02 Tot. repl. lead time days

Cross-project

Plant-specific configuration

ConfigurableMaterial

Variant  Planning variant

Configure variant

Configure planning variant

Material Edit Goto Environment System Help SAP

Change Material VY03-PENCIL (Finished product)

Additional data Organizational levels Check screen data

MRP 3 MRP 4 Forecasting Work scheduling Plant data / stor. 1

Material VY03-PENCIL Pencil for the scandinavian taste

Plant 4100 Komponenttittuotanto FI

Stor. loc. 4100 Varasto 4100

**BOM explosion/dependent requirements**

Selection method  Component scrap (%)

Individual/coll.  Requirements group

Version indicator MRP dep.requirements

**Discontinued parts**

Discontin. ind.  Eff.-out  Follow-up matl

**Repetitive manufacturing / assembly / deployment strategy**

Repetitive mfg REM profile  Action control

Fair share rule  Push distribution  Deployment horizon

Average plant stock Material memo  Material memo exists

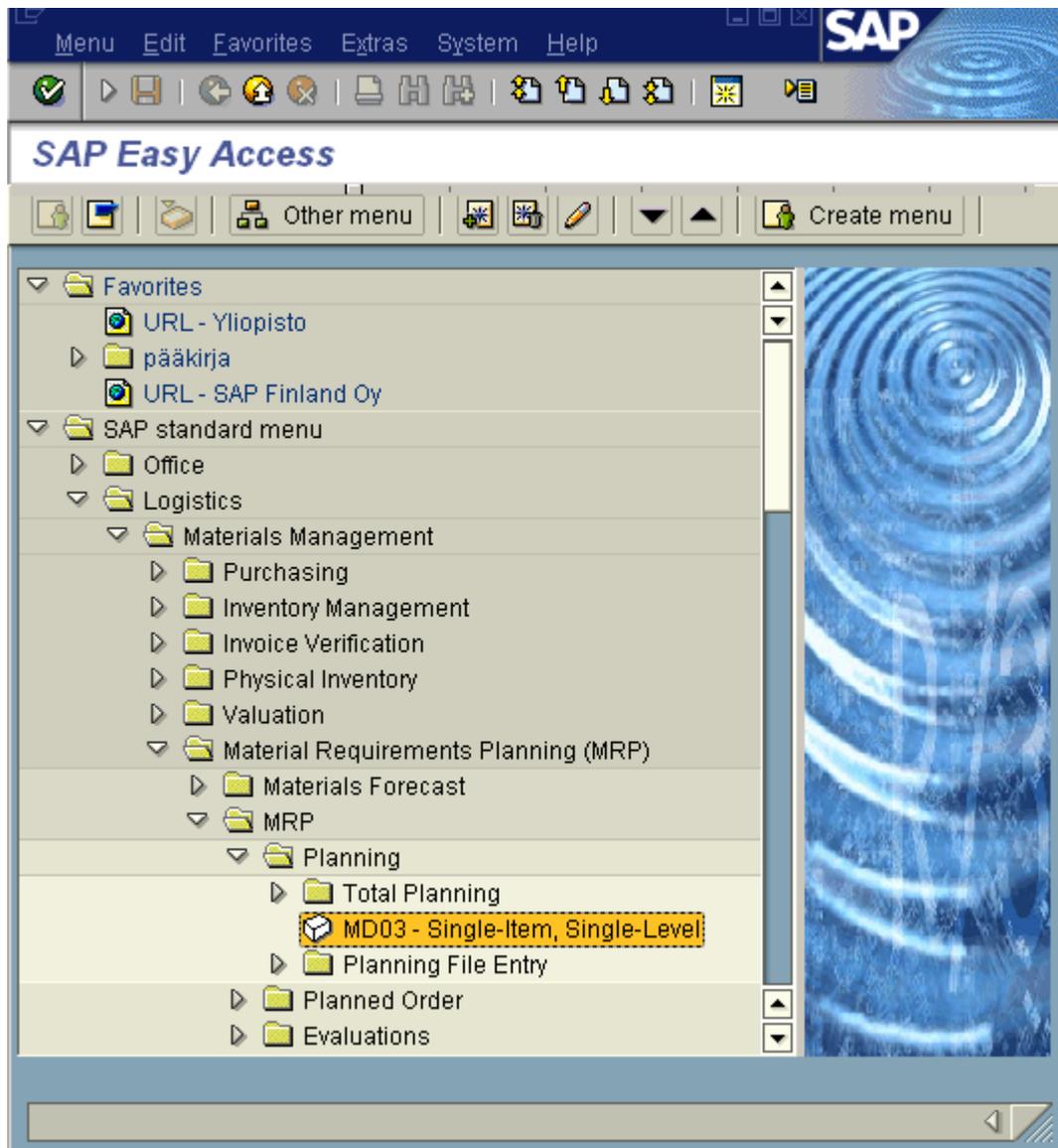
**Storage location MRP**

SLoc MRP indicator  Spec.proc.type: SLoc

Reorder point  Replenishment qty

## 11.4 MRP run

Here is the path from the main menu to the screen where the MRP can be done



For running an MRP is needed to fill parameters data. **Plant** is required because it involves in MPS run. **Processing Key** is typically NETCH, this means that it leaves previously scheduled items unchanged unless a change is necessary. **Create Purchase Requisition** is typically number 1, which means that value determines whether or not purchase requisitions will automatically be created as appropriate for externally procured items. **Delivery Schedules** is usually number 3 which mean whether or not delivery schedules will be created for externally procured items. **Create MRP list** mean whether or not an MRP list will be generated and saved following the scheduling run and it is usually number 1. **Planning Mode** tells whether or not exiting planning dates will be maintained or deleted and then rescheduled. Typically this value is number 1(reactivate planning dates). **Scheduling** specifies whether scheduling will be performed per basic dates or per lead time scheduling. Typically this value is 2 (lead time scheduling)

Remember also to a cross to **display result before they are saved** so that you will receive the Planning Result table.

When you have filled the information, press enter. You will get the yellow warning sign telling you to check the input parameters. Don't worry about it, just press enter again and the MRP run is done.

Planning Edit Goto Settings Extras System Help

SAP

**Single-Item, Single-Level**

Material **VY03-PENCIL** pencil for the scandinavian taste  
 Plant **4100** Komponentituotanto FI

**MRP control parameters**

Processing key	<b>NETCH</b>	Net change for total horizon
Create pur.req.	<b>2</b>	Purchase requisitions in opening period
Schedule lines	<b>3</b>	Schedule lines
Create MRP list	<b>1</b>	MRP list
Planning mode	<b>1</b>	Adapt planning data (normal mode)
Scheduling	<b>1</b>	Basic dates will be determined for plann
Planning date	<b>09.04.2003</b>	

**Process control parameters**

Display results before they are saved

Please check input parameters

Here is the result of MRP run. In this Planning Result screen you will see your stock, safety stock, orders for production and sales order.

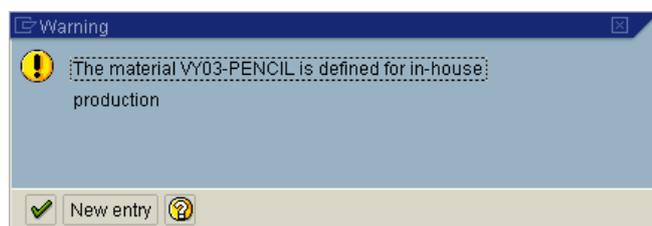
When you have sales orders and production orders you need to make a purchase order to get required material. Click **order proposal**.

The screenshot displays the SAP 'Planning Result: Individual Lines' window for material VY03-PENCIL. The material description is 'Pencil for the scandinavian taste'. The plant is 4100, MRP type is VM, material type is FERT, and base unit is PC. The table below shows the MRP results:

Date	MRP ...	MRP element data	Res...	E..	Rec./reqd qty	Avail. quantity	Material memo
09.04.2003	Stock			96			0
09.04.2003	SafeSt	Safety stock				40-	40-
02.04.2003	Order	0005999997/000010/0001			100-		140-
09.04.2003	PrdOrd	000100000140/PP01/Re			100		40-
09.04.2003	PrdOrd	000100000141/PP01/Re		20	40		0
09.04.2003	PrdOrd	000100000142/PP01/Re		20	40		40
09.04.2003	----->	Gross requirements plann...					
02.05.2003	IndReq	B5F			1 000-		

The 'Order proposal' button is highlighted in the top toolbar. The status bar at the bottom indicates 'MRP carried out for VY03-PENCIL 4100'.

Pick your chosen alternative. We needed purchase requisition.



Select Order Proposal

Planned order      LA      Pinned order profile

Purchase requisition      NB      Purch.requisition key

Delivery schedule

✓ ✗

Purchase requisition **quantity** is compulsory to fill. We calculated that we need for 140 pcs and since our lot size is 30 pcs we have to purchase material for 150 pcs. Also we determined **Release date** and **Delivery date**. After you have done so you will see that the purchase order has appeared in the Order table (in blue).

Planning  Edit  Goto  Settings  Extras  System  Help

---

**Process Order Proposal**

---

Material  Pencil for the scandinavian taste  
 Plant  MRP type  Material type  Base unit

Date	MRP ...	MRP element data	Reschedul...	E...	Rec./reqd qty	Avail. quantity
22.04.2003	Stock			96		0
22.04.2003	SafeSt	Safety stock			40-	40-
02.04.2003	Order	0005999997/000010/0001			100-	140-
09.04.2003	PrdOrd	000100000140/PP01/Re		07	100	40-
09.04.2003	PrdOrd	000100000141/PP01/Re		20	40	0
09.04.2003	PrdOrd	000100000142/PP01/Re		20	40	40
10.04.2003	PIOrd.	0000000506/Stck*		20	40	80
29.04.2003	PurRqs				150	230
22.04.2003	----->	Gross requirements plann...				
02.05.2003	IndReq	BSF			1 000-	
02.05.2003	IndReq	BSF			1 000-	

Page

Purchase requisition

Purchase requisition

Quantity  Deliv.date  AccAssgnTy

Item cat.  Release dt  GR pr.time

BOMexpl.no  Purch.org.  Stor. loc.

Fixed vend  Agreement   Firmed

Here you can see that the purchase order has been registered.

**Planning Result: Individual Lines**

Material: VY03-PENCIL Pencil for the scandinavian taste  
 Plant: 4100 MRP type: VM Material type: FERT Base unit: PC

Date	MRP ...	MRP element data	Reschedul...	E..	Rec./reqd qty	Avail. quantity
22.04.2003	Stock			96		0
22.04.2003	SafeSt	Safety stock			40-	40-
02.04.2003	Order	0005999997/000010/0001			100-	140-
09.04.2003	PrdOrd	000100000140/PP01/Re		07	100	40-
09.04.2003	PrdOrd	000100000141/PP01/Re		20	40	0
09.04.2003	PrdOrd	000100000142/PP01/Re		20	40	40
10.04.2003	PIOrd.	0000000506/Stck*		20	40	80
29.04.2003	PurRqs	0010000097/00010 *		46	150	230
22.04.2003	----->	Gross requirements plann...				
02.05.2003	IndReq	BSF			1 000-	
02.05.2003	IndReq	BSF			1 000-	
02.06.2003	IndReq	BSF			100-	
02.06.2003	IndReq	BSF			100-	

Order proposal was copied

When you press the mark before the order line, you will get more information about the order.

Purch.req.	0010000097	000010	Planned dates	29.04.2003	<input checked="" type="checkbox"/> Firmed
Quantity	150,000		Delivery date	29.04.2003	Doc. type NB
			Release date	25.04.2003	GR pr.time 0
Vendor					
Exception	46	=	Order proposal has been manually changed		

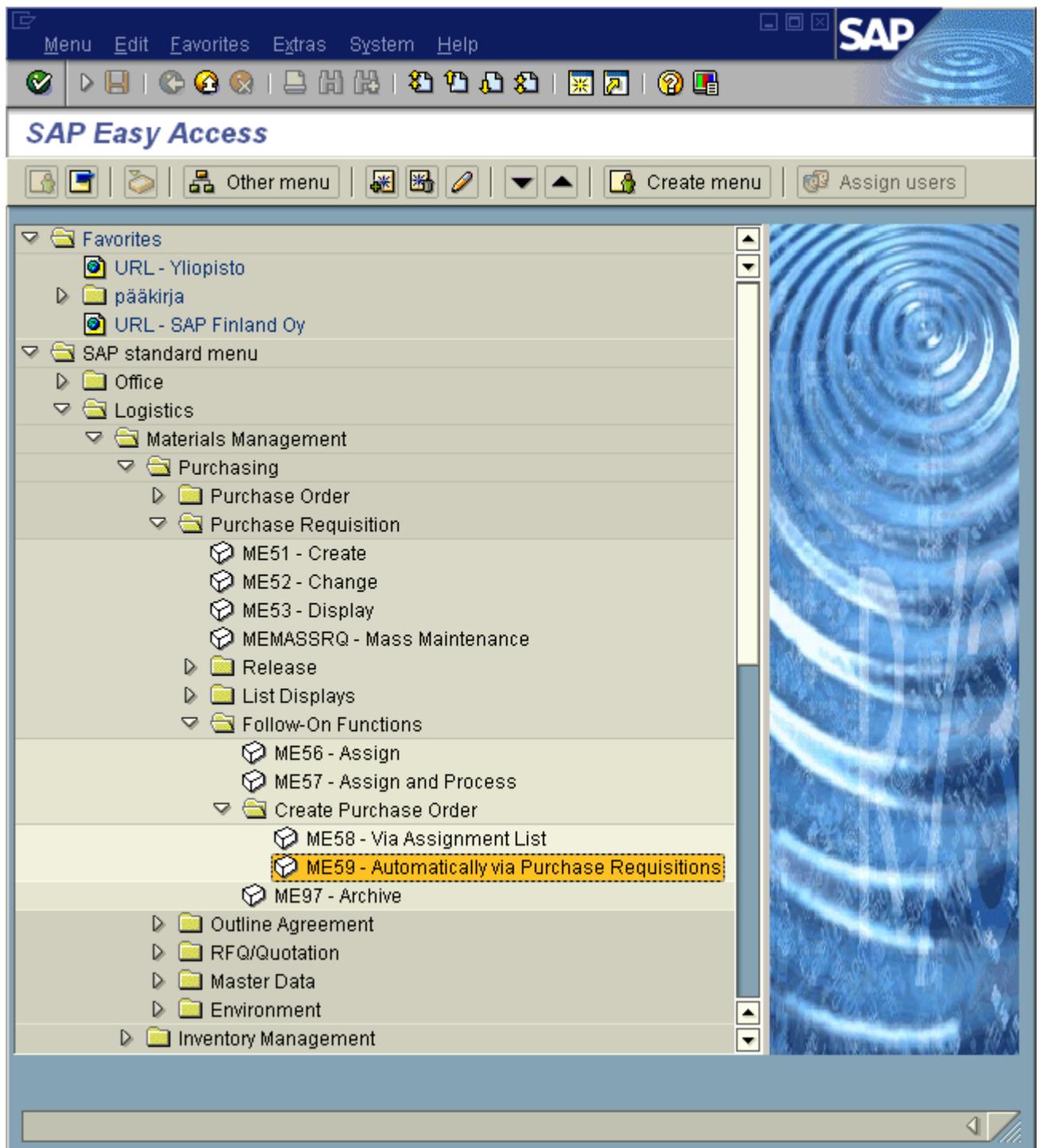
Press green V-mark.

Then save the information and the SAP will inform you that the **MRP carried out for...**

## 11.5 Creating a purchase order

The path from main menu to the slide where you can make the purchase order is:

Logistics -> Material Management-> Purchasing -> Purchase Requisition -> Follow-On Function -> Create Purchase Order -> ME59 – Automatically via Purchase Requisitions



In this window you define **purchasing group**, **purchasing organization** and **vendor** (Our choice is 12345, which is the vendor we created earlier). Remember to cross also the boxes **Per requisition** (you will get the new PO with **Per requisition**), **Omit faulty items** and **test run** (you will get the other parameters **Omit faulty items** and **Test run**).

The screenshot shows the SAP interface for 'Automatic Creation of Purchase Orders from Requisitions'. The window title is 'Automatic Creation of Purchase Orders from Requisitions'. The interface includes a menu bar (Program, Edit, Goto, System, Help) and a toolbar with various icons. The main area is divided into several sections:

- Field Selection:** A table-like structure with columns for field names, values, and 'to' values.
 

Purchasing group	401	to	401
Purchasing organization	4000	to	4000
Vendor	12345	to	12345
Contract		to	
Plant		to	
Supplying plant		to	
- New PO:** A section with checkboxes for selection criteria:
  - Per purchasing group
  - Per plant
  - Per storage loc.
  - Per item category
  - Per delivery date
  - Per vendor sub-range
  - Per requisition
- Other parameters:** A section with checkboxes and a dropdown:
  - Generate schedule lines
  - Omit faulty items
  - Detailed log
  - Test run
  - 1 Set reqs. to "closed"

This is the rest of the above window. Here you put the **purchase requisition** number, which is the same you get from MRP run (order proposal, last window).

Program Edit Goto System Help SAP

**Automatic Creation of Purchase Orders from Requisitions**

Material group \_\_\_\_\_ to \_\_\_\_\_

Release date \_\_\_\_\_ to \_\_\_\_\_

Delivery date \_\_\_\_\_ to \_\_\_\_\_

Materials planner/controller \_\_\_\_\_ to \_\_\_\_\_

Purchase requisition 10000097 to 10000097

Material \_\_\_\_\_ to \_\_\_\_\_

Requirement tracking number \_\_\_\_\_ to \_\_\_\_\_

Document type \_\_\_\_\_ to \_\_\_\_\_

Item category \_\_\_\_\_ to \_\_\_\_\_

Account assignment category \_\_\_\_\_ to \_\_\_\_\_

Processing status \_\_\_\_\_ to \_\_\_\_\_

Requisitioner \_\_\_\_\_

Short text \_\_\_\_\_

Contracts

Cost center \_\_\_\_\_ to \_\_\_\_\_

WBS element \_\_\_\_\_ to \_\_\_\_\_

Order \_\_\_\_\_ to \_\_\_\_\_

Asset \_\_\_\_\_ to \_\_\_\_\_

Asset sub-number \_\_\_\_\_ to \_\_\_\_\_

Network \_\_\_\_\_ to \_\_\_\_\_

Operation number \_\_\_\_\_ to \_\_\_\_\_

Sales order \_\_\_\_\_ to \_\_\_\_\_

Sales order item \_\_\_\_\_ to \_\_\_\_\_

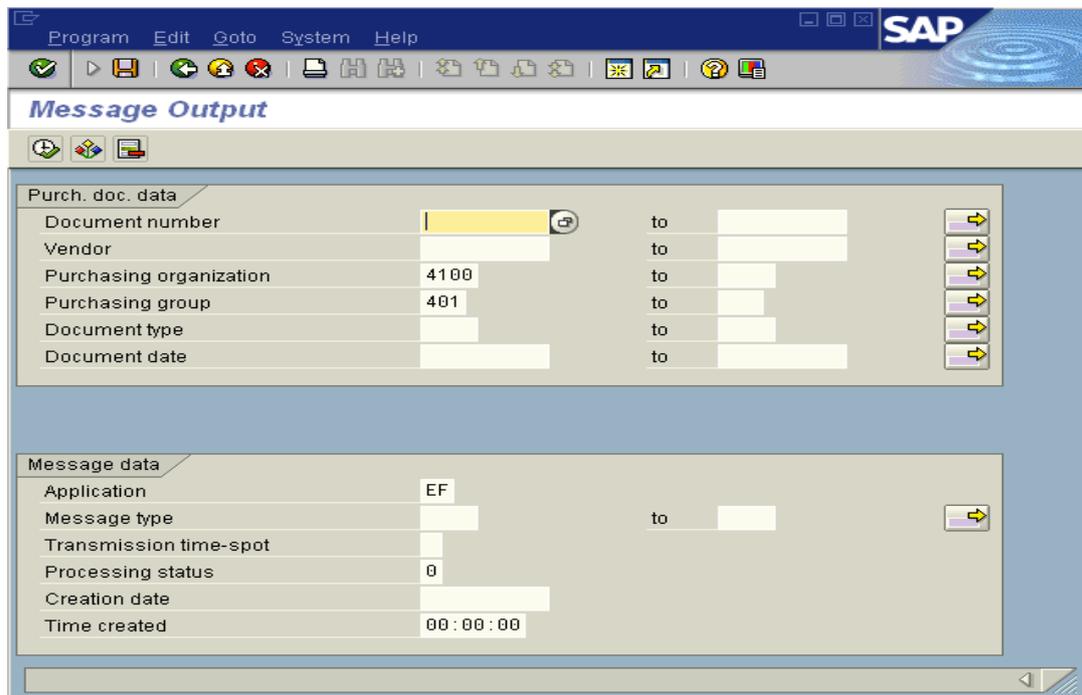


## 11.6 Printing Purchase a order

In the order to get a paper copy of the purchase order you must go to the follow path.

Logistic >Material management> Purchasing> Purchase order> Messages> ME9F-  
Print/Transmit

At this slide you put the information about the purchase order which you want to print out.



The screenshot shows the SAP Message Output dialog box. The title bar includes the SAP logo and menu options: Program, Edit, Goto, System, Help. Below the title bar is a toolbar with various icons. The main area is divided into two sections: 'Purch. doc. data' and 'Message data'.

**Purch. doc. data**

Document number		to		→
Vendor		to		→
Purchasing organization	4100	to		→
Purchasing group	401	to		→
Document type		to		→
Document date		to		→

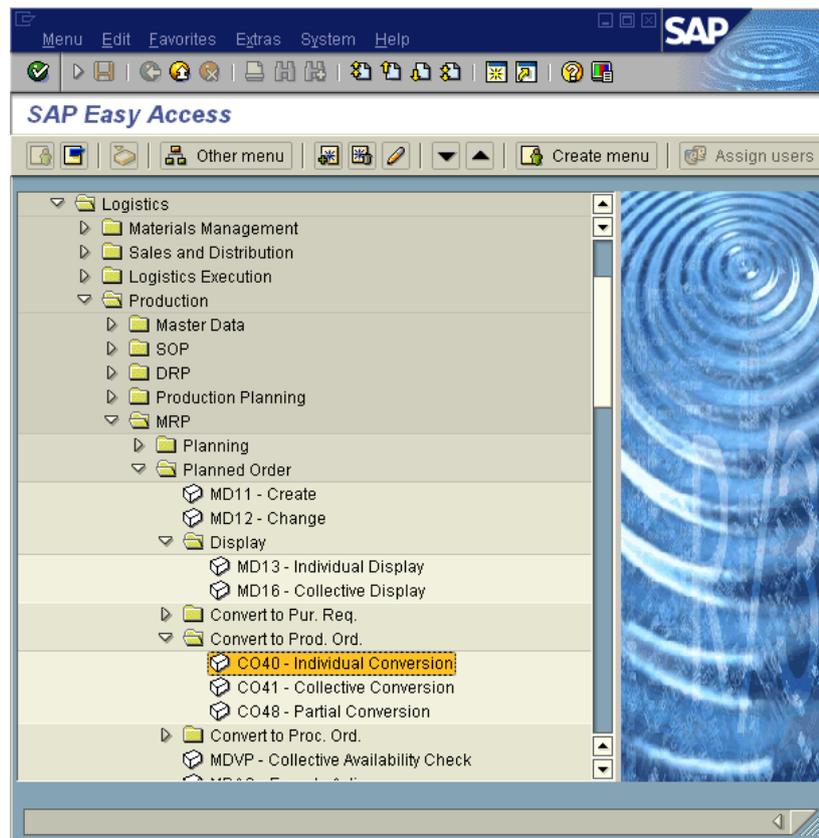
**Message data**

Application	EF			
Message type		to		→
Transmission time-spot				
Processing status	0			
Creation date				
Time created	00:00:00			

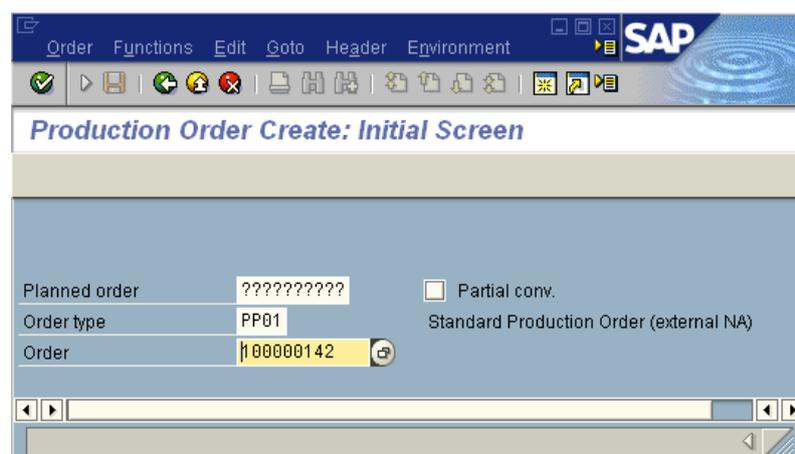
## 11.7 Creating a production order

This is the path from main menu to the slide in which you can define an individual conversion.

Logistics> Production> MRP> Planned order> Display> Convert to Prod. Ord.> CO40 Individual Conversion.

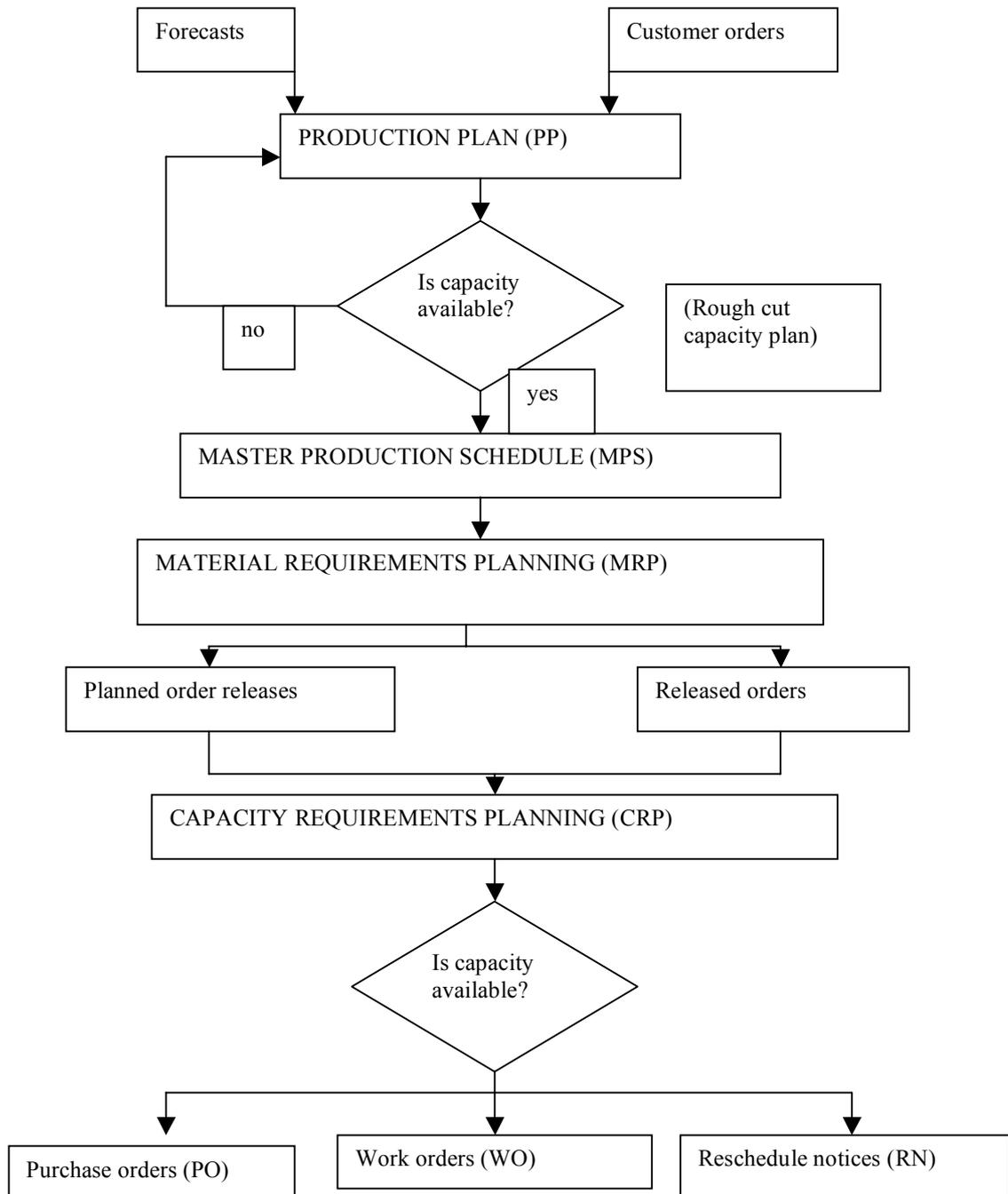


We do not have planned order number so we could not proceed (because we did not succeed in converting our purchase requisition into purchase order and from that to planned order).



## 12 PP - CRP

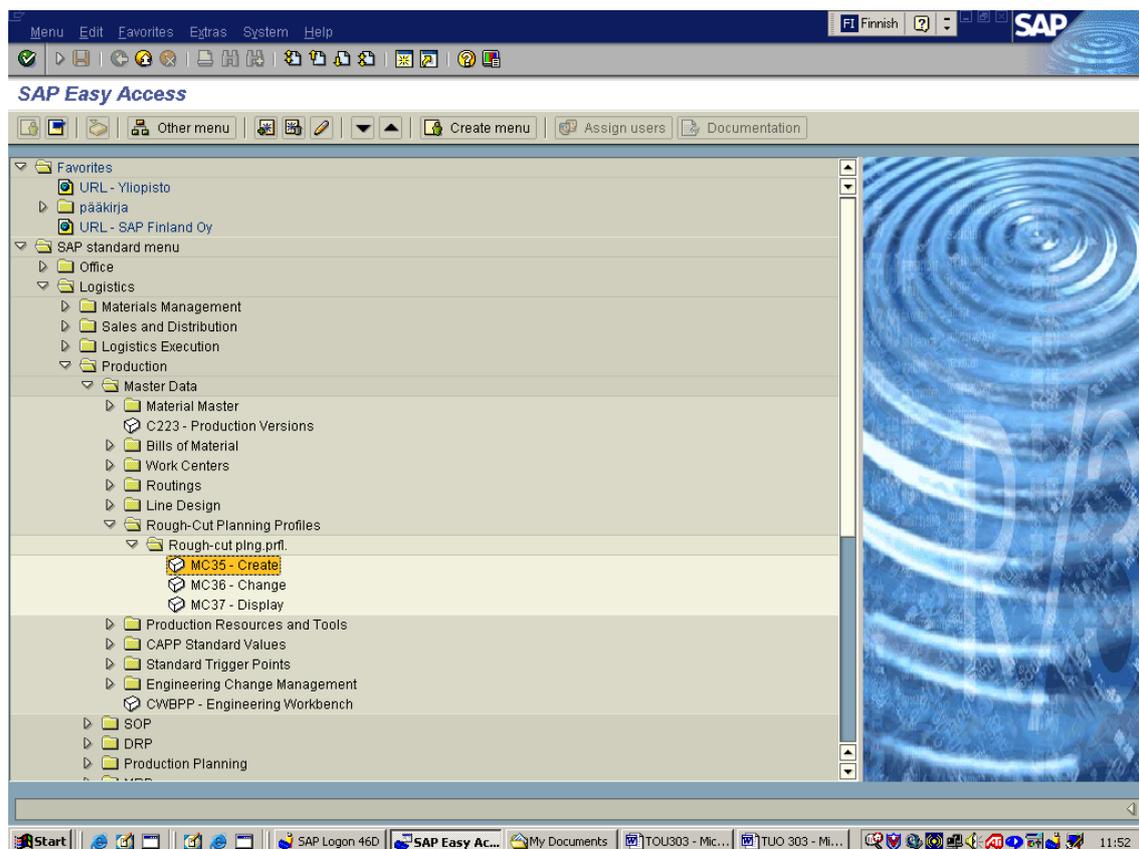
Capacity requirements planning (CRP) determines if MPS is capacity feasible in fine level. So a capacity assignment is a kind of relationship with another object.



(Tersine Richard 1985: Production/operations management page 521, figure 10)

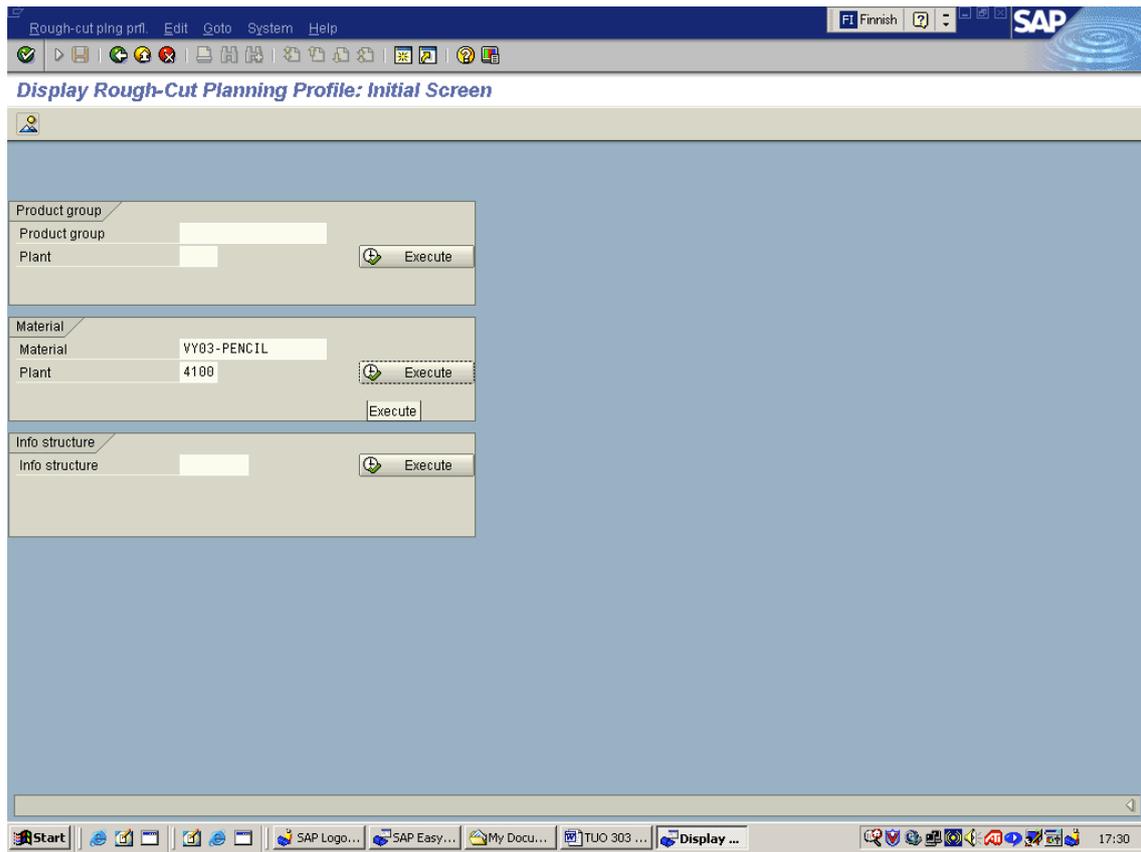
## Rough cut module implementation in Sap R/3

Before CRP (Capacity requirements planning) planning module implementation we notified to implement rough cut planning module. It is widely recognized to execute rough-cut planning before moving to MPS (Master production schedule). By doing this we are able to obtain a broader and more transparent view of the factory's capacity in a longer run and it prevents to do a schedule that is not feasible.



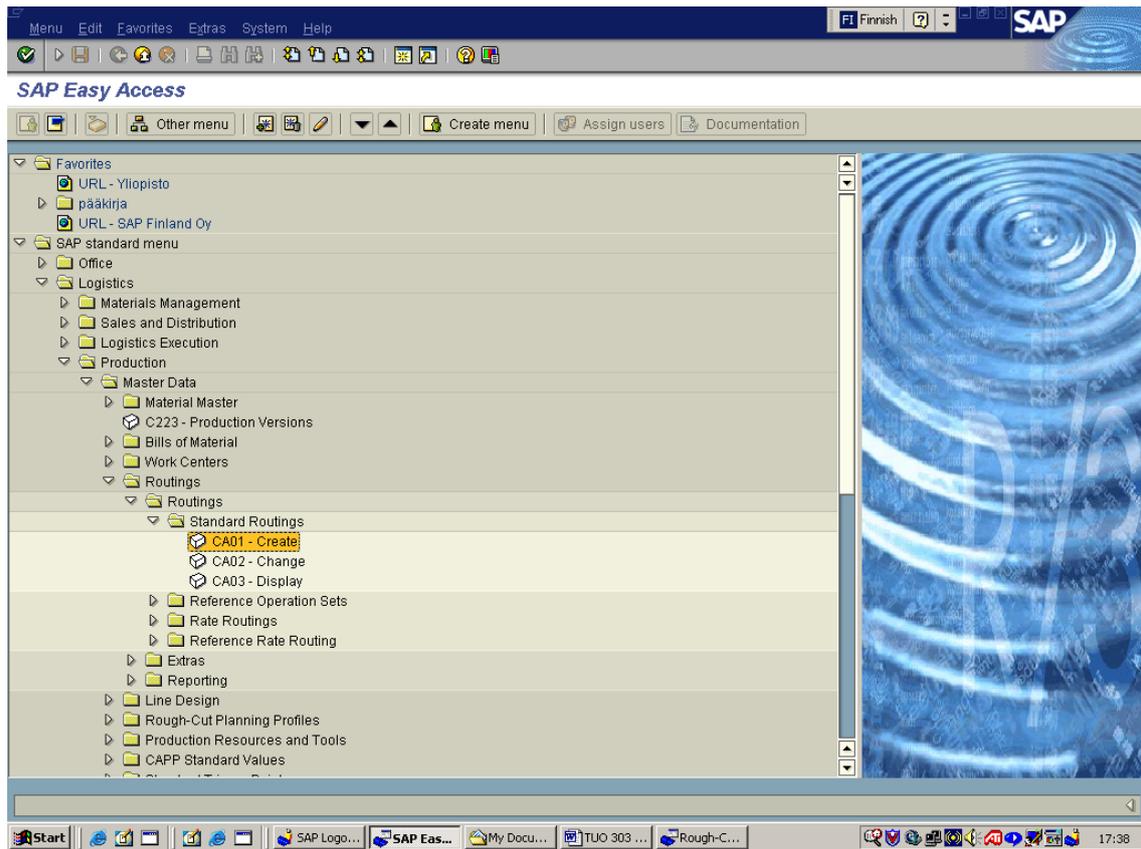
Sap standard menu ->Logistics->Production->Master Data->Rough-Cut Planning Profiles->Rough-cut plng prfl.->MC35-Create

In this path the rough-cut planning values can be defined.



First it is needed to define the material and the plant.





Sap standard menu ->Logistics->Production->Master Data->Routings->Standard Routings->CA01-Create

The screenshot displays the SAP 'Change Routing: Initial Screen' interface. The window title is 'Change Routing: Initial Screen' and the SAP logo is visible in the top right corner. The interface includes a menu bar with 'Routing', 'Edit', 'Goto', 'Details', 'Extras', 'Environment', 'System', and 'Help'. Below the menu bar, there are three tabs: 'Routings', 'Sequences', and 'Operations'. The main area contains several input fields and sections:

- Material:** Y03-PENCIL
- Plant:** 4100
- Sales document:** [Empty]
- Sales document item:** [Empty]
- WBS element:** [Empty]
- Group:** [Empty]
- Validity:**
  - Change number:** [Empty]
  - Key date:** 28.04.2003
  - Revision level:** [Empty]
- Additional criteria for task list selection:**
  - Plant:** [Empty]
  - Group counter:** [Empty]
  - Task list status:** [Empty]
  - Planner group:** [Empty]
- Additional data:**
  - Profile:** [Empty]

The Windows taskbar at the bottom shows the Start button, several application icons, and the system tray with the time 17:50.

Next phase is to define material and plant for which work-centers are going to be routed.



Next phase is to press routings button and the following screen will appear.

The screenshot shows the SAP 'Change Routing: Header Details' window for material VY03-PENCIL. The window is divided into several sections:

- Task list:**
  - Group: 50000041
  - Group counter: 1
  - Plant: 4100
  - Long text exists:
- Production line:**
  - Line hierarchy: 4100: pencil productionline
- General data:**
  - Deletion flag:
  - Usage: 1 Production
  - Status: 1 Created
  - Planner group: 1 Suunnitteluryhmä 1
  - Planning work center: R4100 4100: pencil productionline
  - CAPP order: [empty]
  - From lot size: [empty] To lot size: 99 999 999 PC
  - Old task list no.: [empty]
- Parameters for dynamic modification/inspection points:**
  - Inspec. points: [empty]
  - Partial-lot assign.: Partial lot assignment according to plant default
  - Sample-drawing proc.: [empty]
  - Dynamic mod. level: [empty]
  - Modification rule: [empty]
- Further QM data:**
  - Ext. numbering: [empty]

The window title bar shows 'Change Routing: Header Details' and the SAP logo. The task list section is highlighted in yellow.

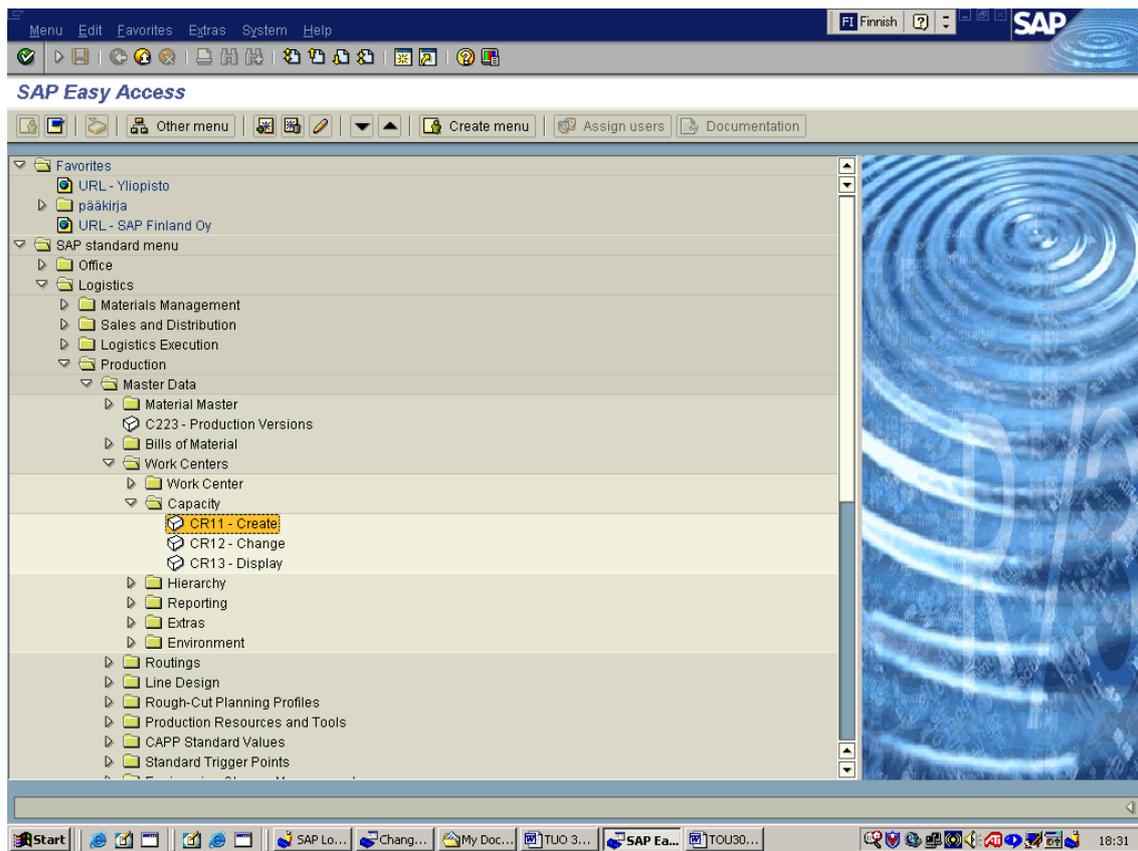
As operation details are defined the next phase is to define the desired routings. We can start this by introducing header values for VY03-PENCIL. As this is done press routings button and the following will appear.

The screenshot displays the SAP 'Change Routing: Overview' interface. The title bar includes 'Routing Edit Goto Details Extras Environment System Help' and the SAP logo. Below the title bar, there are tabs for 'Sequences', 'Operations', 'MatAssignment', and 'CompAlloc'. The main content area shows the material 'YY03-PENCIL' and a table of routing entries.

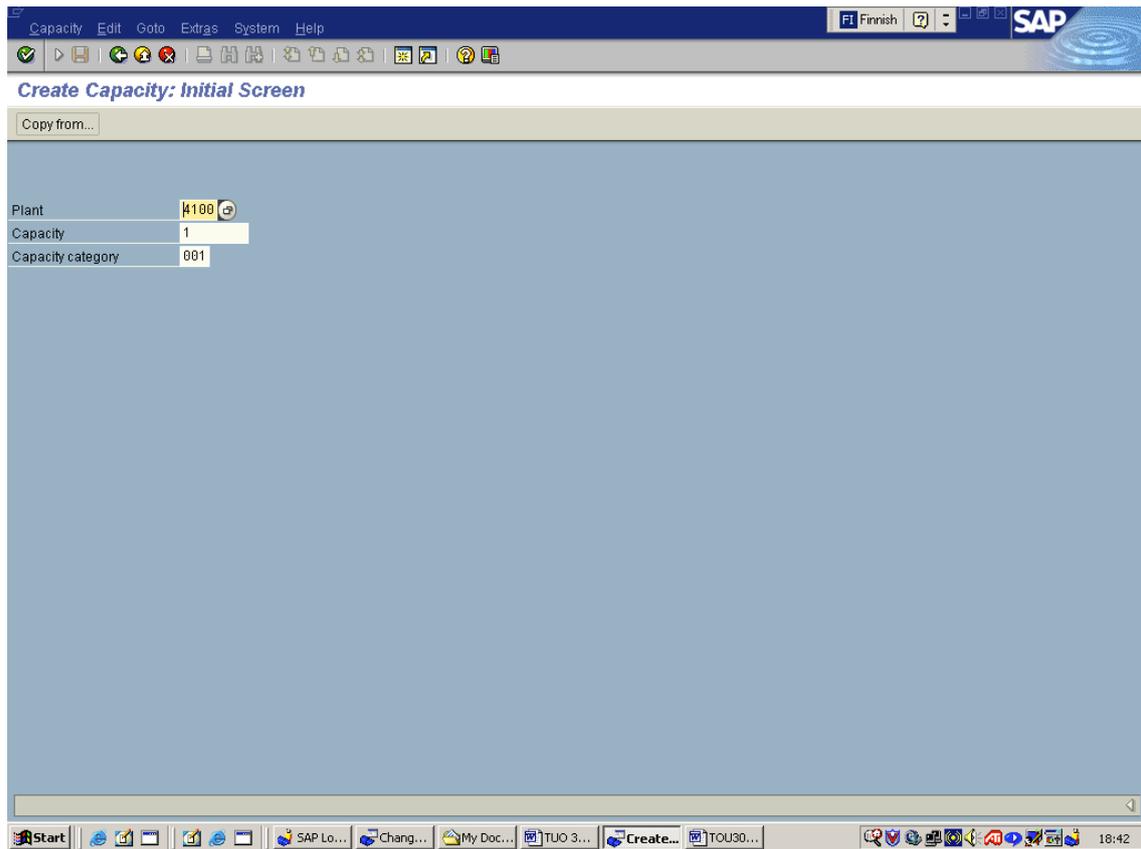
Header overv.															
G...	Task list description	Plant	U...	St...	Pl...	From lot size	To lot size	Unit	D...	Change num...	Valid from	Valid to	Created on	Created by	Chan
1	Pencil for the scandinavian taste	4100	1	1	1	0	99 999 999	PC			08.04.2003	31.12.9999	08.04.2003	YYTU0303	08.04

At the bottom of the window, there is an 'Entry' field showing '1 of 1'. The task list description is 'Pencil for the scandinavian taste'. The table has 16 columns and 1 data row.

In this phase all the required fields need to be entered with appropriate company data. In this example only one routing can be found. If production of a product requires using more than one work-center, it can be added to the next line just under the routing which we have defined. Now as the routings are completed we can move to capacity creation.



Sap standard menu ->Logistics->Production->Master Data->Work Centers->Capacity->CR11-Create



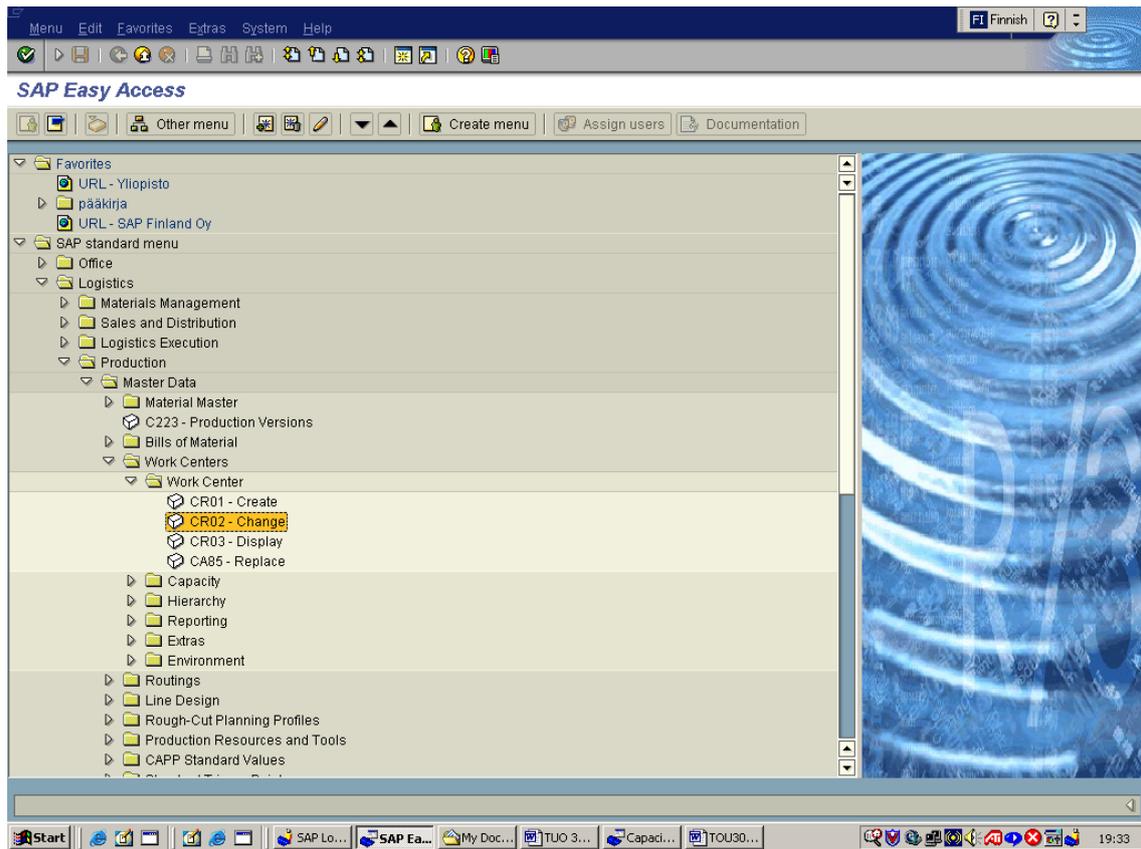
Press enter as you have defined required values (Plant number, Capacity number, Capacity category).

The screenshot displays the SAP 'Change Capacity: Header' screen. The window title is 'Capacity' and the language is set to 'Finnish'. The main content area is divided into several sections:

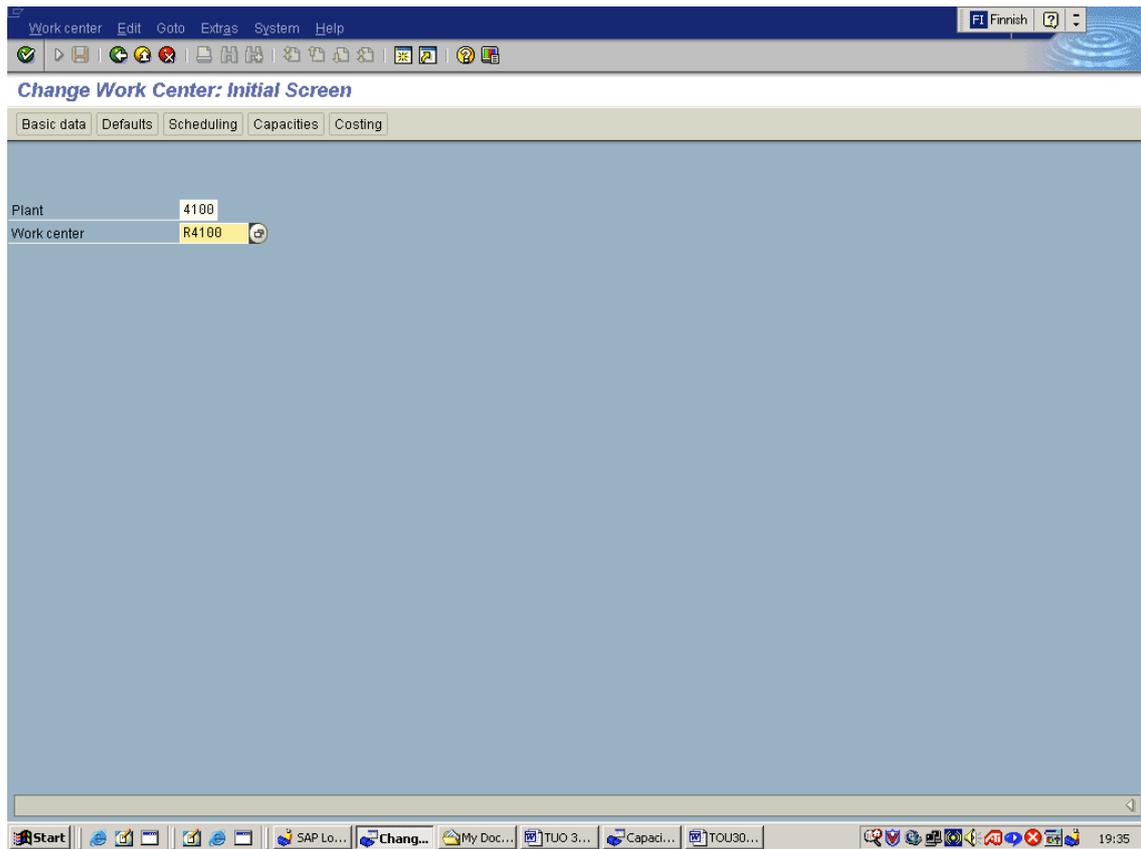
- Intervals and shifts:** Includes tabs for 'Interval avail. cap.', 'Avail. cap. profile', 'Reference avail cap', and 'Short texts'.
- Plant:** 4100
- Capacity:** 1
- Capacity category:** 001
- Component:** Komponenttituotanto FI
- Machine:** Kynäkapa
- General data:**
  - Capacity planner grp: 010
  - Pooled capacity
  - Grouping:
- Available capacity:**
  - Factory calendar ID:
  - Active version:
  - Base unit of measure: H
  - Hour:
- Standard available capacity:**
  - Start: 08:00:00
  - Finish: 16:00:00
  - Length of breaks: 00:00:00
  - Operating time: 8,00
  - Capacity utilization: 100
  - No. of indiv. cap.: 1
  - Capacity: 8,00
  - Unit: H
- Planning details:**
  - Relevant to finite scheduling
  - Can be used by several operations
  - Overload:  %
  - Long-term planning

The Windows taskbar at the bottom shows the Start button and several open applications, including SAP Lo..., Chang..., My Doc..., TUO 3..., and TOU30... The system clock indicates 18:43.

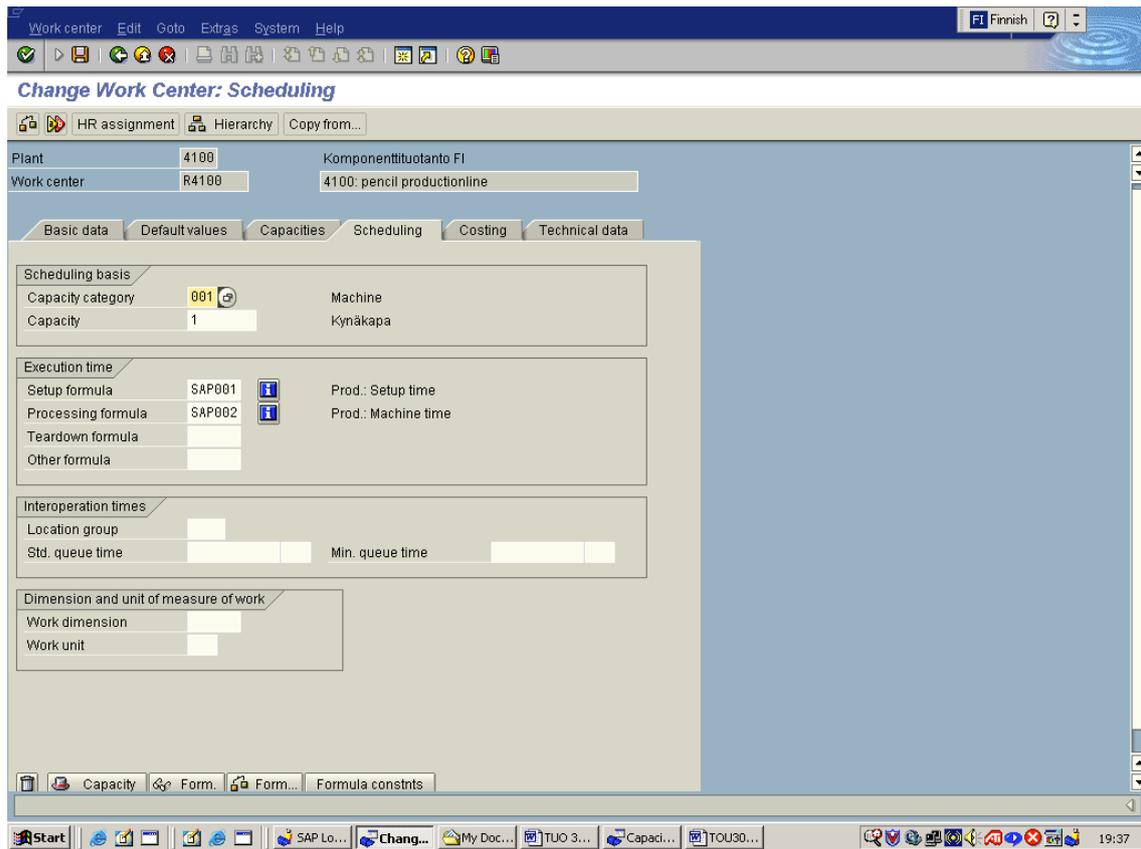
In this phase you can give a name for the capacity (kynäkapa). Next you have to define standard available capacity times, which we have used eight hours. You could also determine the break times between shifts or lunch breaks etc. You have to determine the capacity utilization, which we have defined as hundred percents. Previously we defined values that are required to produce one pencil. In this phase we define the hours that are available to produce pencils. As these are done the system is able to calculate the capacity usage for given production orders. However, before we can start evaluating the capacity one very important setting is to be made in to work-center view.



Sap standard menu ->Logistics->Production->Master Data->Work Centers->Work Center->CR02-Change.



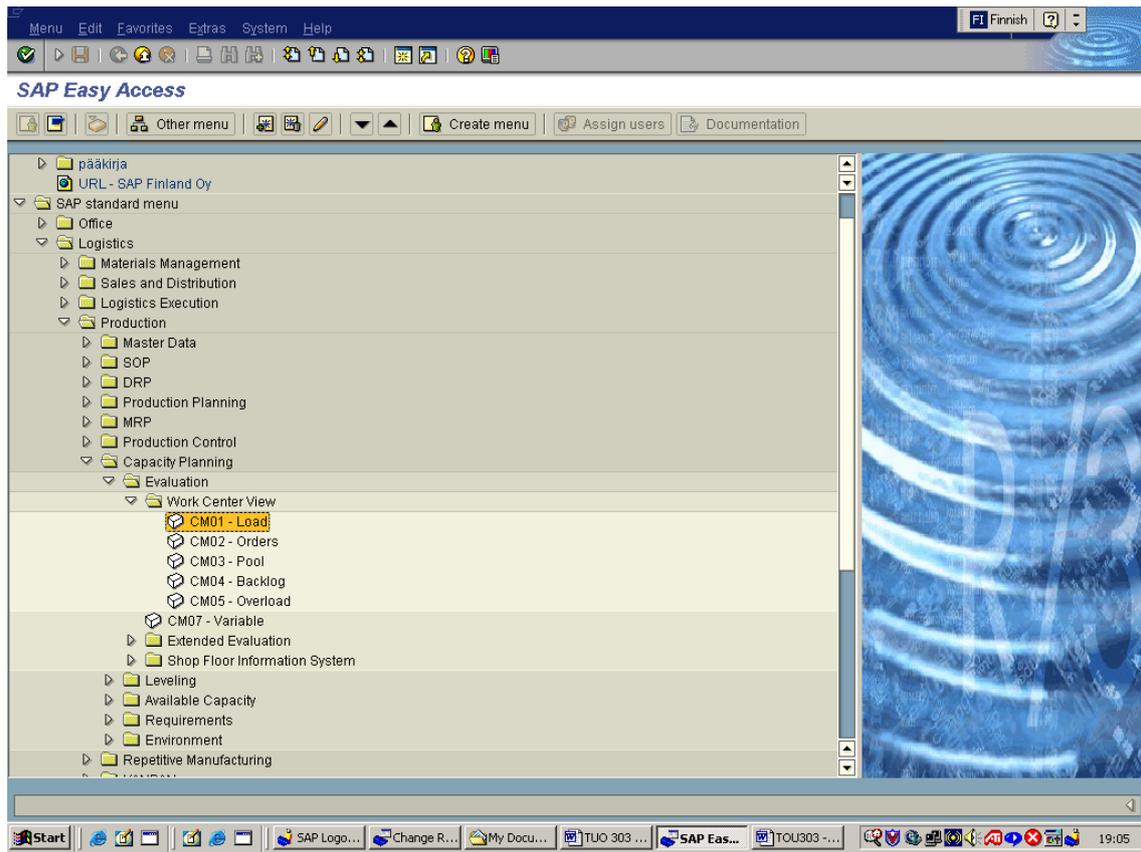
In this window enter plant and work center numbers and press scheduling.



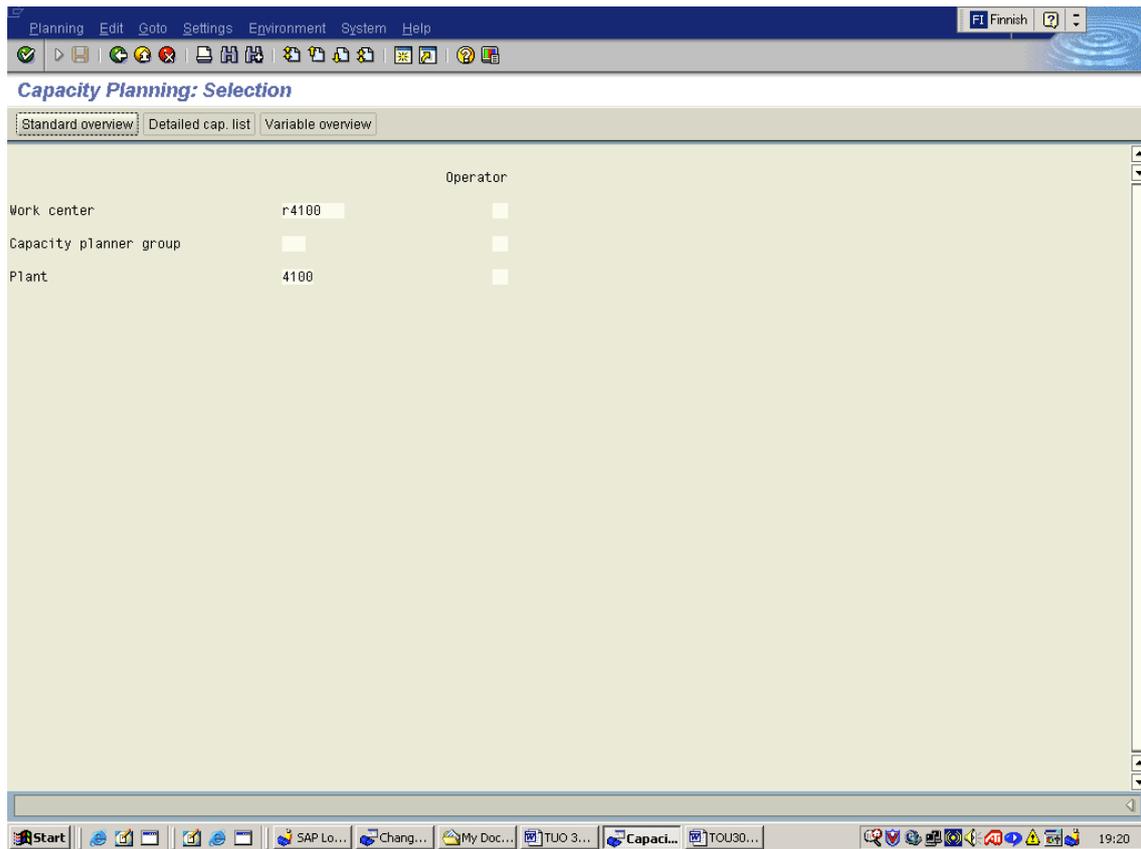
In this window you have to enter capacity category and capacity number, you have to use the numbers you have previously used when creating the capacity. Then press *save*.

Now you can move on to evaluate your capacity.

The best screen to monitor the capacity situation in your factory is to use following path: Sap standard menu ->Logistics->Production->Capacity Planning->Evaluation->Work Center View->CM01-Load



Press enter button.

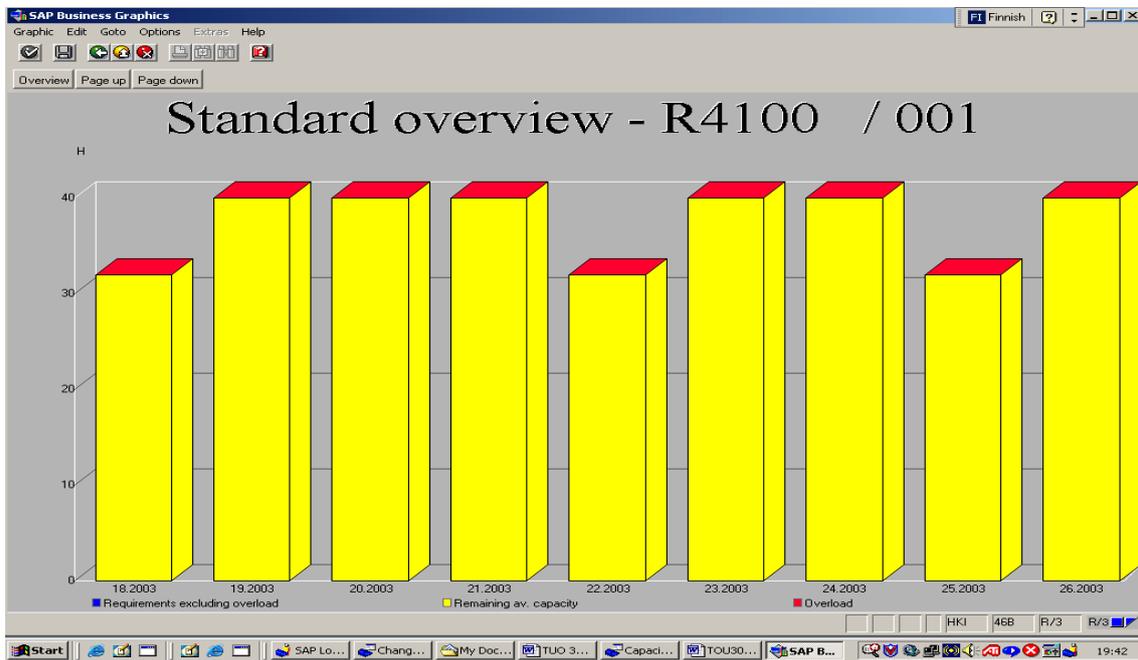


In this view you have to enter Work center number and the plant number (we have used r4100, which is a pencil production line in plant 4100).

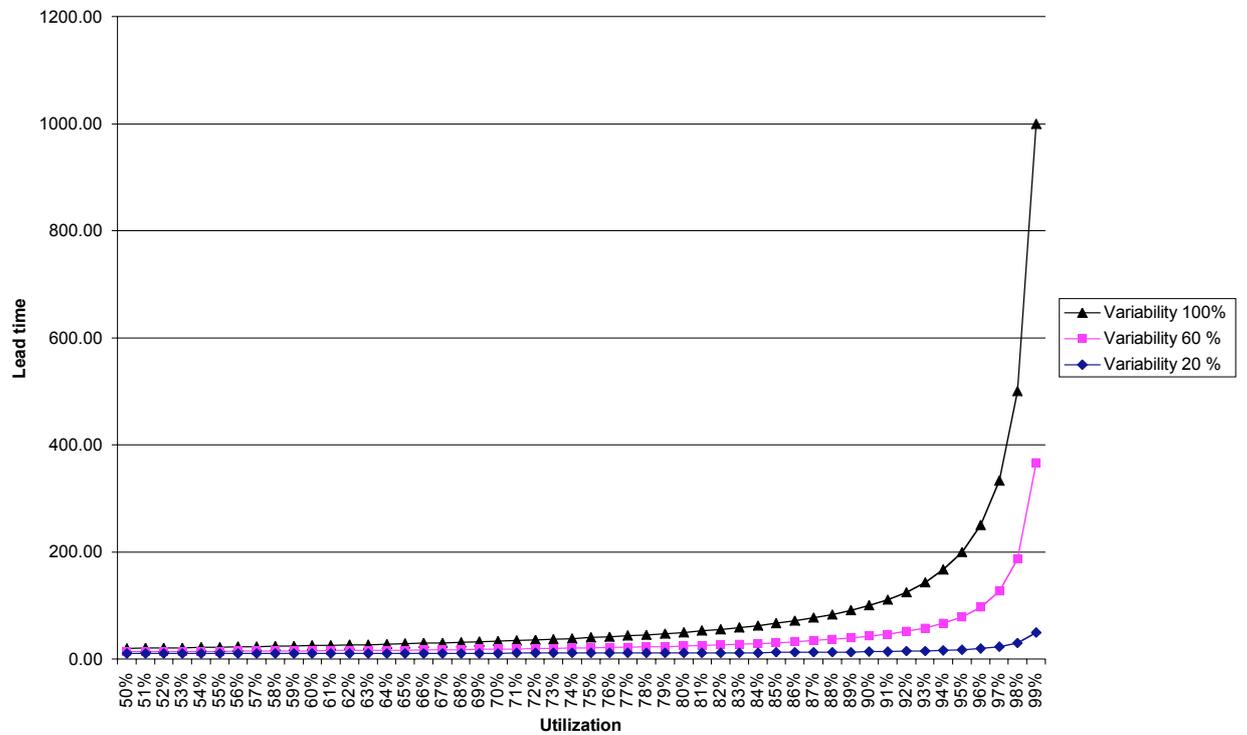
Capacity Planning: Standard Overview

Work center: R4100      4100: pencil production1i Plant 4100  
 Capacity cat.: 001      Machine

Week	Requirements	AvailCap	CapLoad	RemAvailCap	Unit
18.2003	0,00	32,00	0 %	32,00	H
19.2003	0,00	40,00	0 %	40,00	H
20.2003	0,00	40,00	0 %	40,00	H
21.2003	0,00	40,00	0 %	40,00	H
22.2003	0,00	32,00	0 %	32,00	H
23.2003	0,00	40,00	0 %	40,00	H
24.2003	0,00	40,00	0 %	40,00	H
25.2003	0,00	32,00	0 %	32,00	H
26.2003	0,00	40,00	0 %	40,00	H
<b>Total &gt;&gt;&gt;</b>	<b>0,00</b>	<b>336,00</b>	<b>0 %</b>	<b>336,00</b>	<b>H</b>



The relationship between lead-time and capacity utilisation is exponential. This results in a fact that the lead times given for a product to manufacture are not static, but depending on current utilisation.



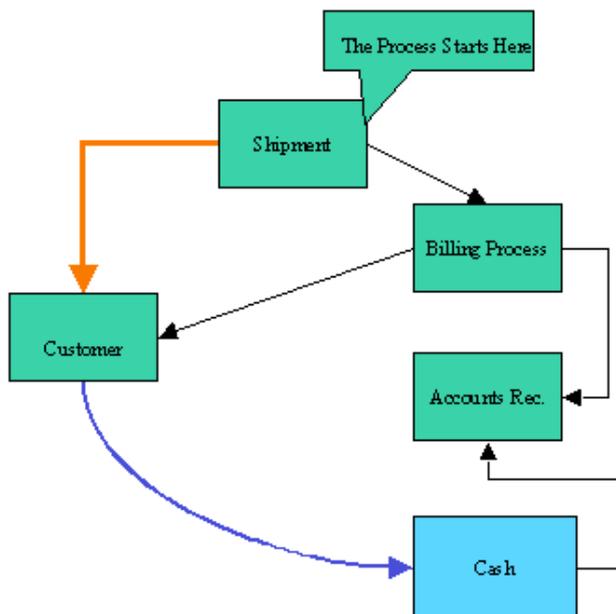
## 13 FI - ACCOUNTS RECEIVABLES

### 13.1 Accounts Receivable Process

The Accounts Receivable process starts with the shipment of the goods to the customer. When this occurs, the shipping department automatically causes SAP to send a bill to the customer by integrating customer master data with the shipment data. This transaction also posts to the Accounts Receivable subsidiary ledger and also to the reconciliation account. The billing to the customer may be on paper or by EDI for examples.

This entry into the accounts receivable system sets up the account for the terms of sale and also starts the clock running for the dunning procedure.

When the customer pays the bill, which may be by check or to a lockbox or by electronic transfer and EDI, the remittance advice applies the cash paid to the open items on the account.



Accounting Organizational Structure and Some important concepts:

- Customer → a self contained unit for technical purposes. Usually refers to the overall enterprise managed with SAP
- Chart of Accounts → the list of accounts that are posted to everyday.
- Legal Entity → a unit with external reporting requirements, usually a corporation.
- Business Area → a subdivision of a Company Code along the lines of the business, or a division. Used for internal reporting and profitability analysis

### **13.2 Maintaining customer's basic record**

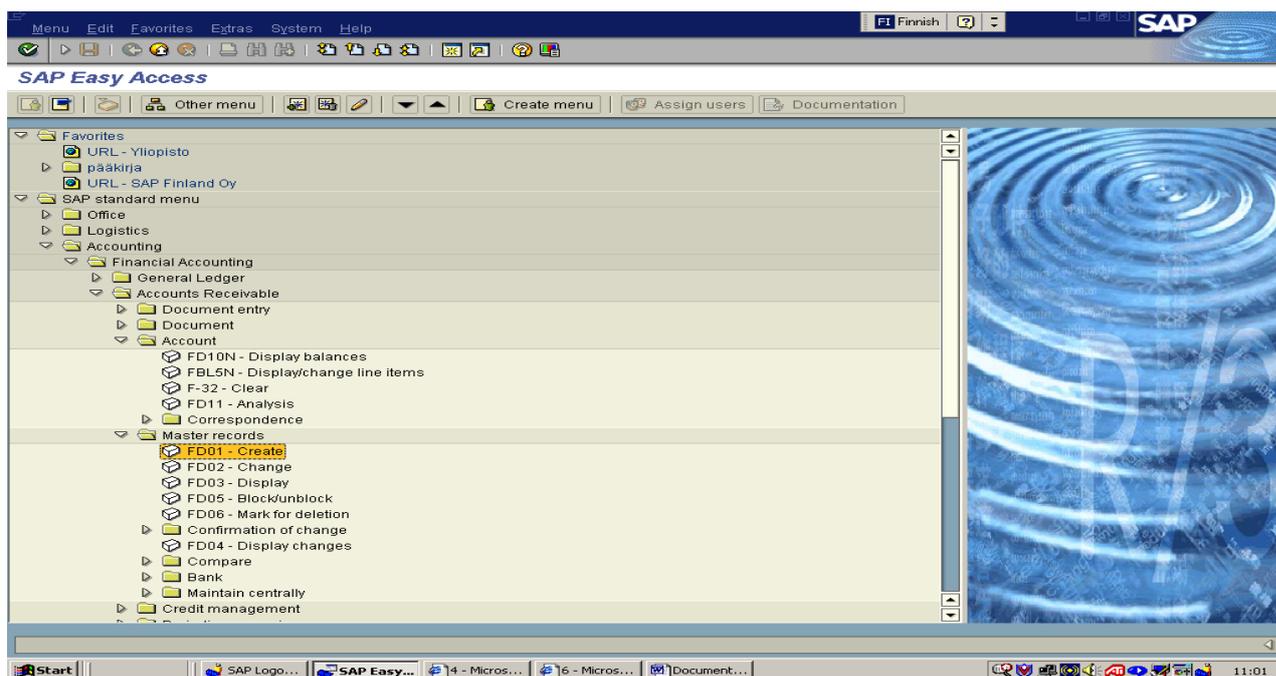
Customer's basic record includes information how data related to the customer is handled and by what means information related to these events is managed in the system. All the customer information must be entered into basic record. Records are used by accounting- and selling departments.

Customer's basic record can be divided into three stages. The highest stage includes basic information such as, contact information concerning all the companies. Next stage includes information about the company itself and the business relation with the customer, for example; information concerning terms of payment, general bank information. The lowest level includes information related to selling and distribution. This data focuses on certain selling organizations, distribution channels and sectors.

Following presentation shows how to create customer's two highest information stages related to external accounting: basic record and company information.

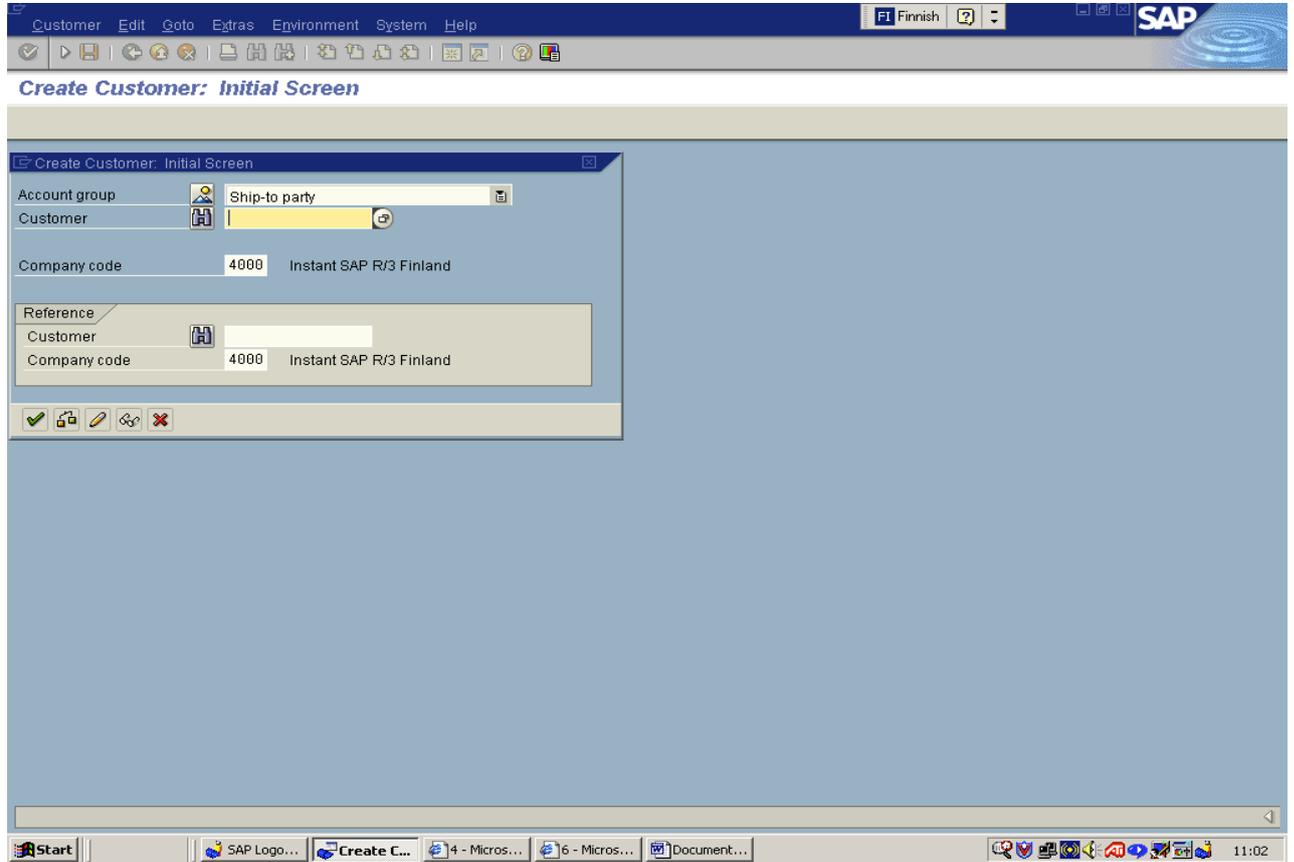
### Optional command paths in first stage:

<b>Menu command</b>	<p><b>Accounting → Financial accounting → Accounts receivable → Account → Master record → Create</b></p> <p>Accounting → Financial accounting → Accounts receivable → Account → Master record → Change</p> <p>Accounting → Financial accounting → Accounts receivable → Account → Master record → Display</p>
<b>Event Code</b>	Create: FD01; Change: FD02; Display: FD03



Field	Description	O/F	Value	Comment
account group	Customer rating- defines number area and the information maintained.	O	Chose one of these two: 0001 order customer 0002 delivery customer	
customer	Customer account number.	O	Account groups have an internal numbering. The number is given when the basic record is saved.	
company	The symbol of the company, which basic record is created.	O		
<b>Model</b>				
customer	New customer inherits information defined in this section apart from name and address.	F		
company	The company where the	F		

Field	Description	O/F	Value	Comment
	customer used as a model is.			
O = Obligatory, V = Facultative				



Press <Enter> or Click to move on next screen

On the screen” Create Customer: Address” feed information complying following instructions:

Field	Description	O/F	Value	Comment
Talking to	For example Mr.	O		
Name	Customer’s name	O		
Search parameter	Customer’s search parameter	O		
Street	Customer’s street address	F		
Post Box	Customer’s post Box	F		
Postal number	Customer’s postal number	O		
Country	Customer’s country	O		
Area	Customer’s area	F		
Telecommunications				
Language key	Language used	O		
Telephone	Number	F		

Fax	Fax number	<b>F</b>		
Email	Email address	<b>F</b>		
Way of communication	Telephone, fax, email	<b>F</b>		
Data line		<b>F</b>		

O = Obligatory, V = Facultative

Press "Control data"- interleaf or click to move on next screen:

Feed following information "Client Create: Control data":

Field	Description	O/F	Value	Comment
Vendor	If customer is also a vendor, write also the vendor's account number. This way deliverer's/customers open lots can be cross checked before other handlings.	<b>F</b>		Customer's account number can be defined in delivers basic record.
Authorization	If "authorization" is defined, use rights are given to those users which have the rights to change basic record.	<b>F</b>		
Group key	Freely optional group key to classify vendors. Useful for search purposes.	<b>F</b>		

Tax information				
VAT- receipt number	Customer's VAT register number	F	Country code must be before the VAT-number and DO NOT USE SPACE BETWEEN the country code and VAT-number.	
Reference information / area				
Industry	Can be used for grouping.	F		

Customer: 731, Pekka Pilvi, Vaasa

Account control

Vendor: [Yellow Highlighted] Authorization: [ ] Group key: [ ]

Reference data/area

Industry: [ ]

Tax information

VAT reg. no.: [ ] Other... Jurisdict. code: [ ]

Tax categories: [ ]

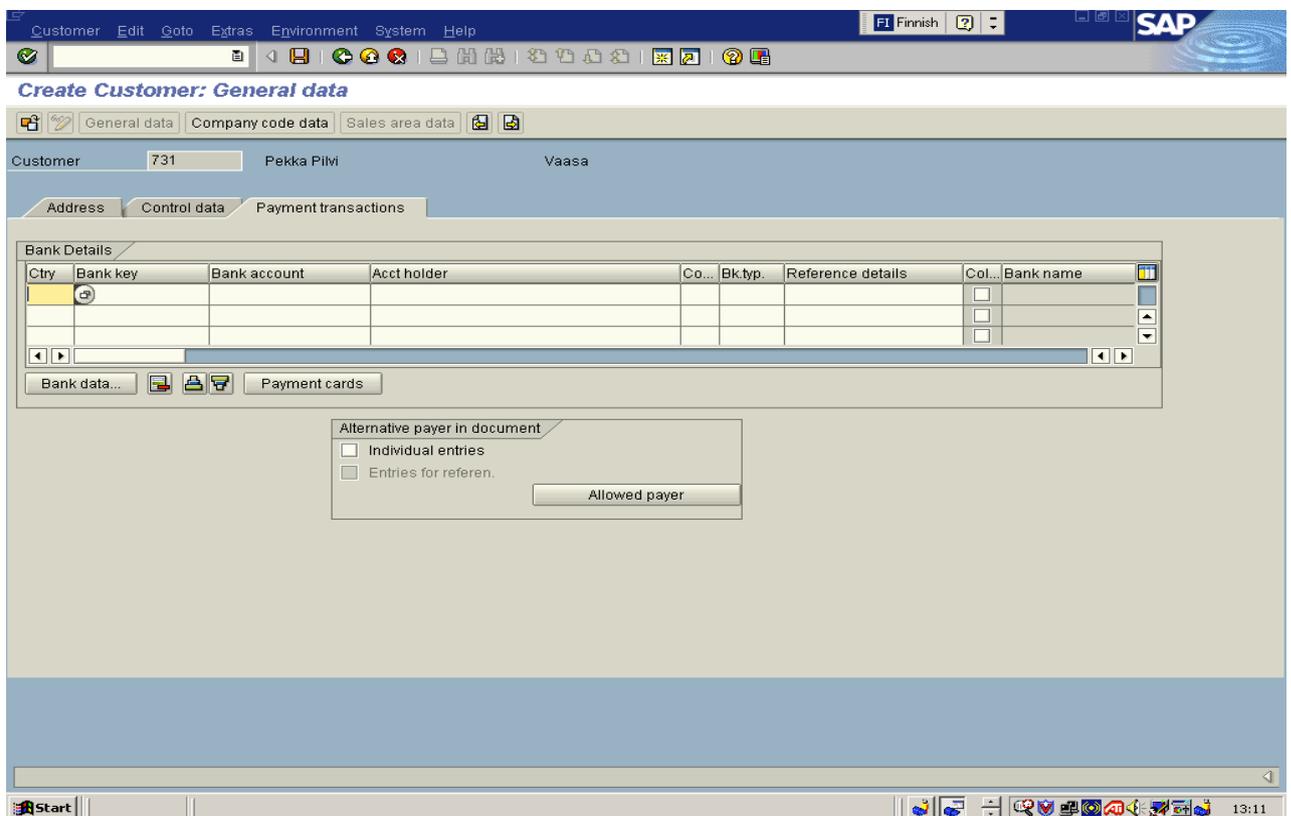
No time zone could be determined for country FI region

Press " Payments transactions"-interleaf or click to move on next screen:

On the screen " Customer Create: Payments Traffic" feed following information:

Field	Description	O/F	Value	Comment
Country	Country code	F		
Bank key	Bank symbol. Use the bank key 1199 for postal clearing accounts.	F	Bank must be known by the system. If not, it must be created. It is explained below.	In Finland the bank key includes the four first numbers of bank account.
Bank account	Bank- or postal clearing account number	F		
Holder of an account	Account number	F		

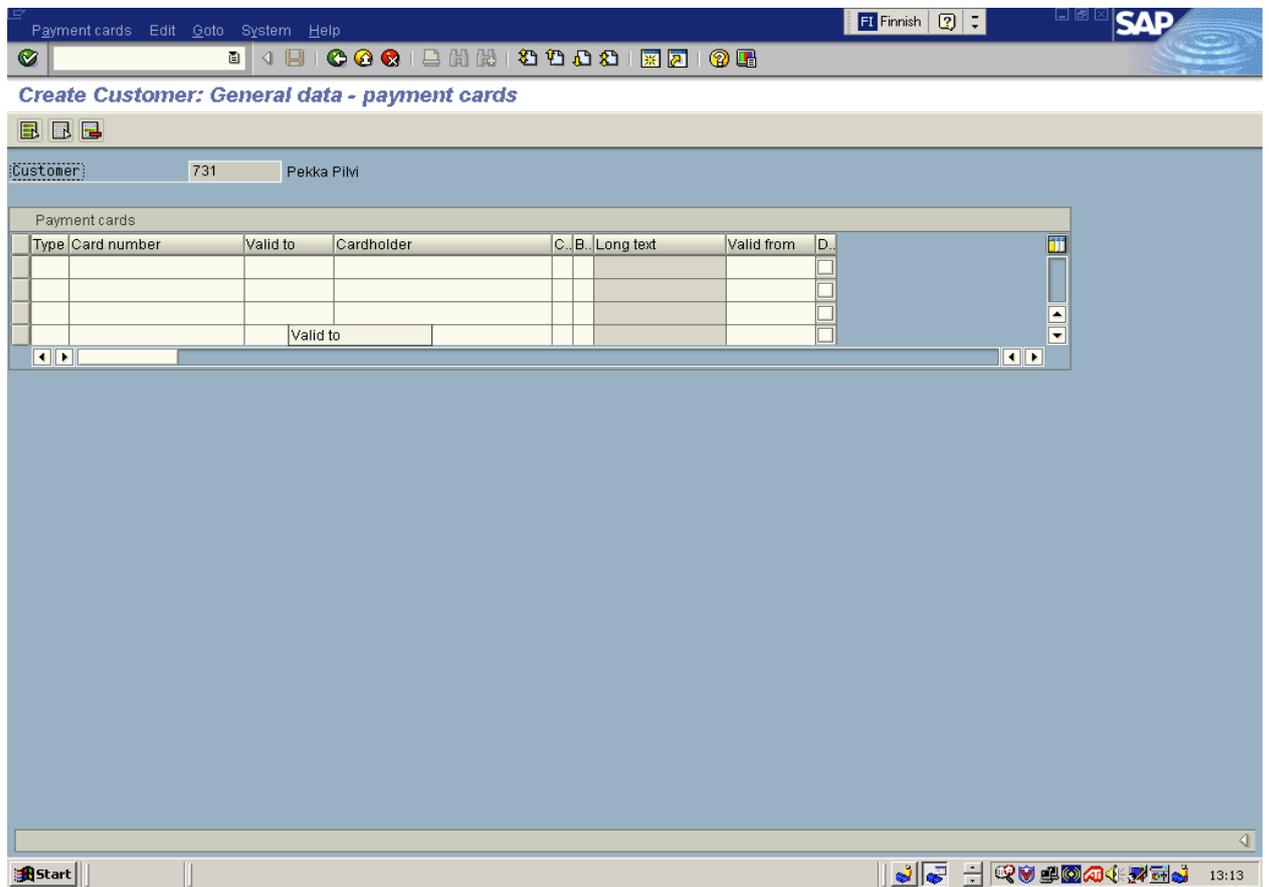
Check key	Check key: banks steering key by country.			Is not part of Instant SAP R/3
Bank type	Bank type. If customer's basic record includes several bank definitions, this sign have an impact on which accounts are used in paying program.	<b>F</b>		
Reference information	Reference information by country			Is not part of Instant SAP R/3
Authorization for collection	Authorization for collection			Is not part of Instant SAP R/3
<b>Different payer in receipt</b>				
Individual information	If chosen, in individual documents is possible to use different payer than defined in basic record.	<b>F</b>		Payers can be defined clicking the "approve payer" button.
<b>O = Obligatory, V = Facultative</b>				



System checks if the bank key defined in this window already exists. If the key isn't found the screen below will open up and it is now possible to feed the bank information into the system. It's also possible to open the same screen by clicking the button "bank information". Feed the address information using the method showed in the picture.

Some customers like to use credit cards as a means of payment. Needed credit card information can be created following the instructions below.

Field	Description	O/F	Value	Comment
Type		F		
Card number		F		
Period of validity	Period of validity ends	F		
Card holder		F		
Card type	Card type	F		
Lock	Locking	F		
Period of validity	Period of validity begins	F		
Definition	Mark	F		
O = Obligatory, V = Facultative				



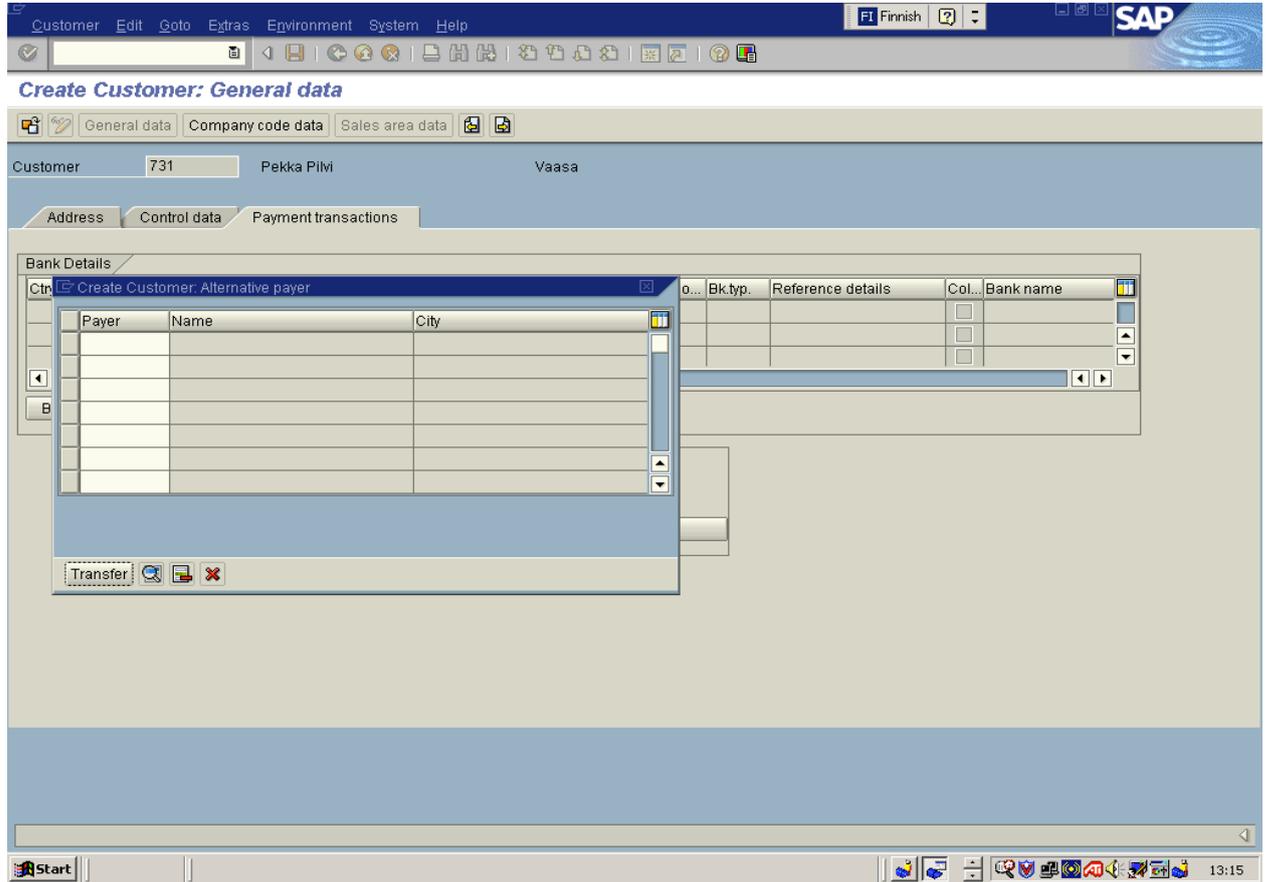
It's also possible to define alternative payers on the receipt level. This is done by clicking the button **“Accept payer”**, when the following window opens up.

Press: “Company Information” to move to a screen” Customer Create: Company Information”.

Following method is used:

Field	Description	O/F	Value	Comment
Synchronizing account	Customer’s synchronizing account	<b>O</b>		
Classifying key	Defines what kind of information is written to the check’s and credit note’s adjustment field for this customer. Adjustment field is also used as a key when evening up the blank lots.	<b>F</b>		
Head office	If the account belongs to branch office head office’s account number is possible to use. Then entries are automatically transferred from branch office’s account to head office’s account, but it must be available in the system. Both account numbers can be seen in the document.	<b>F</b>		Look also the field Group key above. These fields can be used separately or together.
Use rights	Defines who has the right to change customer’s basic record.	<b>F</b>		
Quittance group	Quittance group			Is not part of Instant SAP R/3
<b>Interest accounting</b>				
Interest sign	Defines, how the interest is accounted.	<b>F</b>	Use sign 01, if customer’s blank lots are taken along to the automatic interest accounting.	
Last due date	Tells, when the customer in question was a part of interest accounting in another words the final day of the last interest period.	<b>F</b>	System fills usually automatically	
Interest period	Time between interest accounting in months.	<b>F</b>		
The final day	Tells the last interest accounting date	<b>F</b>	System fills automatically	
<b>References</b>				
Previous account number	If customer receives new account numbers when implementing the Instant SAP R/3 previous account number can be saved into this field.	<b>F</b>		
Personal number	Personnel number (from HR-module), if customer is			Is not part of Instant SAP R/3

Field	Description	O/F	Value	Comment
	an employee.			
O = Obligatory, V = Facultative				



Press “Payment transactions”- interleaf and click to move to next screen:

Field	Description	O/F	Value	Comment
Terms of payment	Terms of payment for the customer	O		
Tolerance group	Tolerance group defines low- or over payment margins.	F	If empty, collective default value used.	
Payment history	If chosen, customer’s payment history is saved.	F	This field is chosen if using the customer’s credit management /control.	
Automatic payments transactions				
Customs of	Customer’s possible	F		Used if, document

payment	payment customs.			doesn't show any other terms.
Own bank	Own bank symbol	F		
O = Obligatory, V = Facultative				

Press "Correspondence" interleaf and click to move to following screen

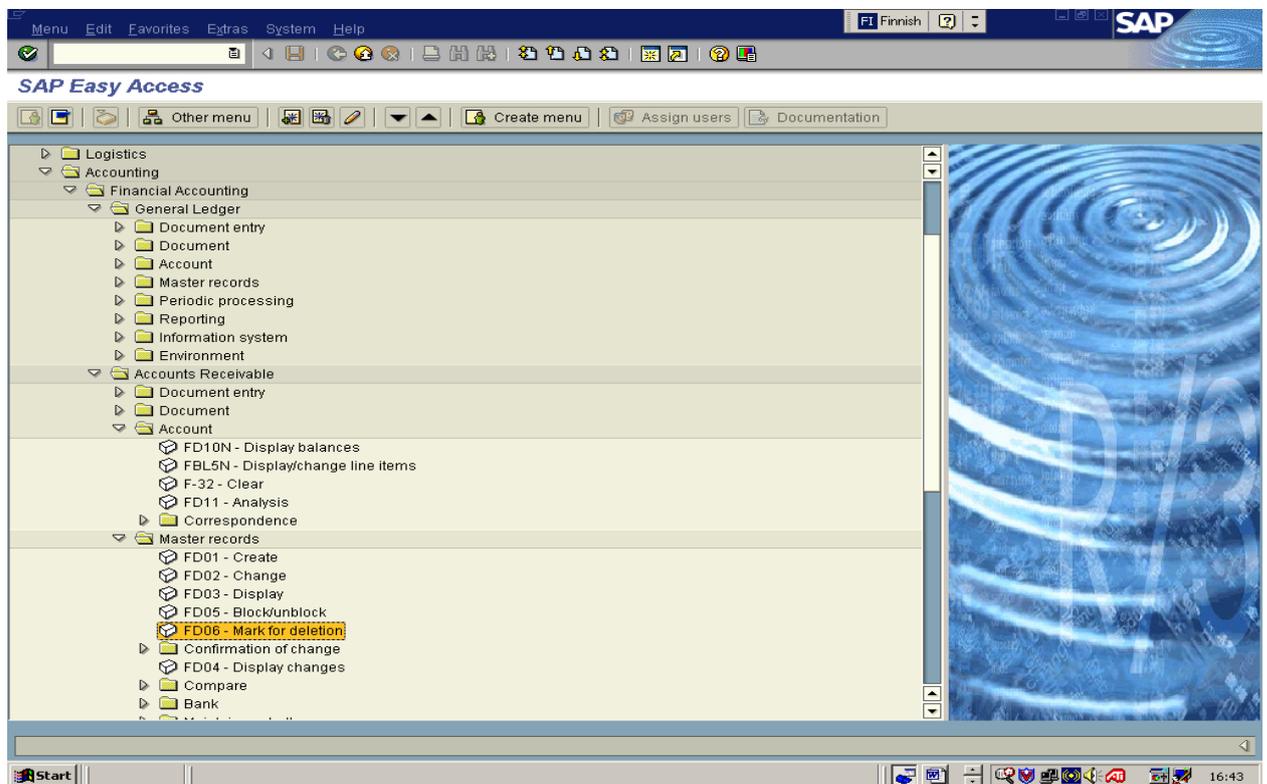
On the screen "Customer Create: "Correspondence" and fill in following information:

Field	Description	O/F	Value	Comment
Collection procedure	Symbol for used collection procedure	F		
Collection locking	Tells reason for locking	F		
The receiver of payment request	Optional receiver's account number.	F		
Juridical collection	The date of juridical collection.	F		
Last request to pay	The date of last request.	F	Updated automatically in context of request drive.	
Request level	Level of last request	F	Updated automatically in context of request drive.	
Handler of request	Handler of request			Is not part of SAP R/3
Grouping key	Grouping key for due falling payments			Is not part of SAP R/3
<b>Correspondence</b>				
Accounting person	Accounting person responsible for the customer	F		Is not part of SAP R/3
Decentralized handling	Payments are operated decentralized	F		
Company account customer has	Company account customer has	F		
Statement	Type of statement sent to customer	F		
Handler	Company's handler working for customer.	F		
Joint checks	Defines how customer's joint checks are made.			Is not part of SAP R/3
Fax – handler	Handler's internet-address that customer has.	F		
Internet - handler	Handler's internet-address that customer has.	F		
Account note	Text field related to account.	F		
<b>Payment report</b>				
Customer ( done lots)	If chosen, payment report is sent to the customer (done lots)			Is not part of SAP R/3
Sales	If chosen, payment report is sent to sales when during the registering.			Is not part of SAP R/3
Juridical department	If chosen, payment report is sent to juridical department when during the registering.			Is not part of SAP R/3

Field	Description	O/F	Value	Comment
Customer (blank lots)	If chosen, payment report is sent to the customer (blank lots)			Is not part of SAP R/3
Accounting	If chosen, payment report is sent to accounting department when during the registering.			Is not part of SAP R/3

### 13.3 Marking customer removable

<b>Menu command</b>	<b>Accounting → Financial accounting → General ledger → Accounts receivable → Account → Master records → Mark for deletion</b>
---------------------	--



Field	Description	O/F	Value	Comment
Customer	Customer number is marked removable.	O		
Company	Symbol of company where account is marked removable	O		
O = Obligatory, V = Facultative				

→ Click in order to move to screen “Customer mark for deletion: Foot notes to accounting”.

Field	Description	O/F	Value	Comment
All companies	If chosen, all the customers basic records are marked removable	F		
Chosen company	If chosen, only company level basic records are marked removable.	F		
<b>Removing locking</b>				
Basic record	If chosen, customer's basic records are not marked removable.	F		
Chosen company	If chosen, company level basic records are not marked removable.	F		
O = Obligatory, V = Facultative				

Customer Account Number (1)

Customers (general) Customers (by company code) Customers by country/compa...

Search term

Postal code

City

Name

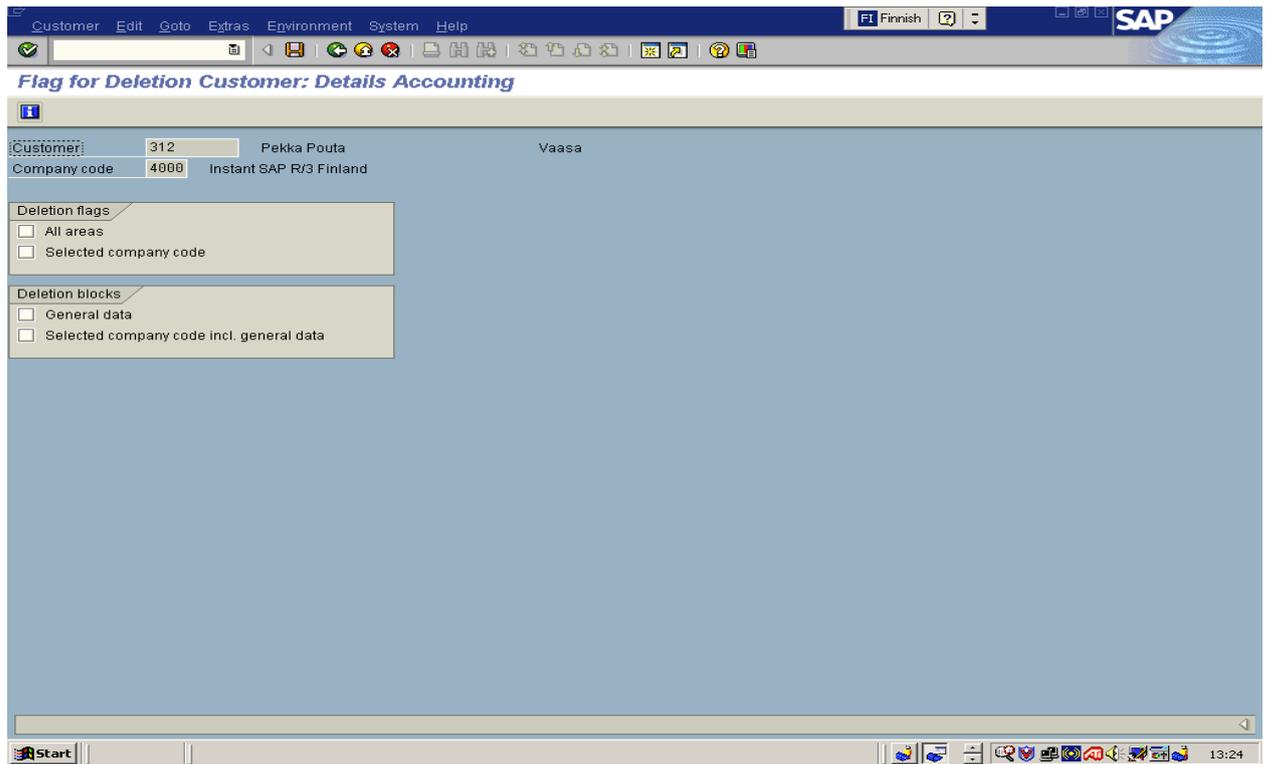
Customer

Maximum no. of hits

Customer

Company code  Instant SAP R/3 Finland

Start 16:42



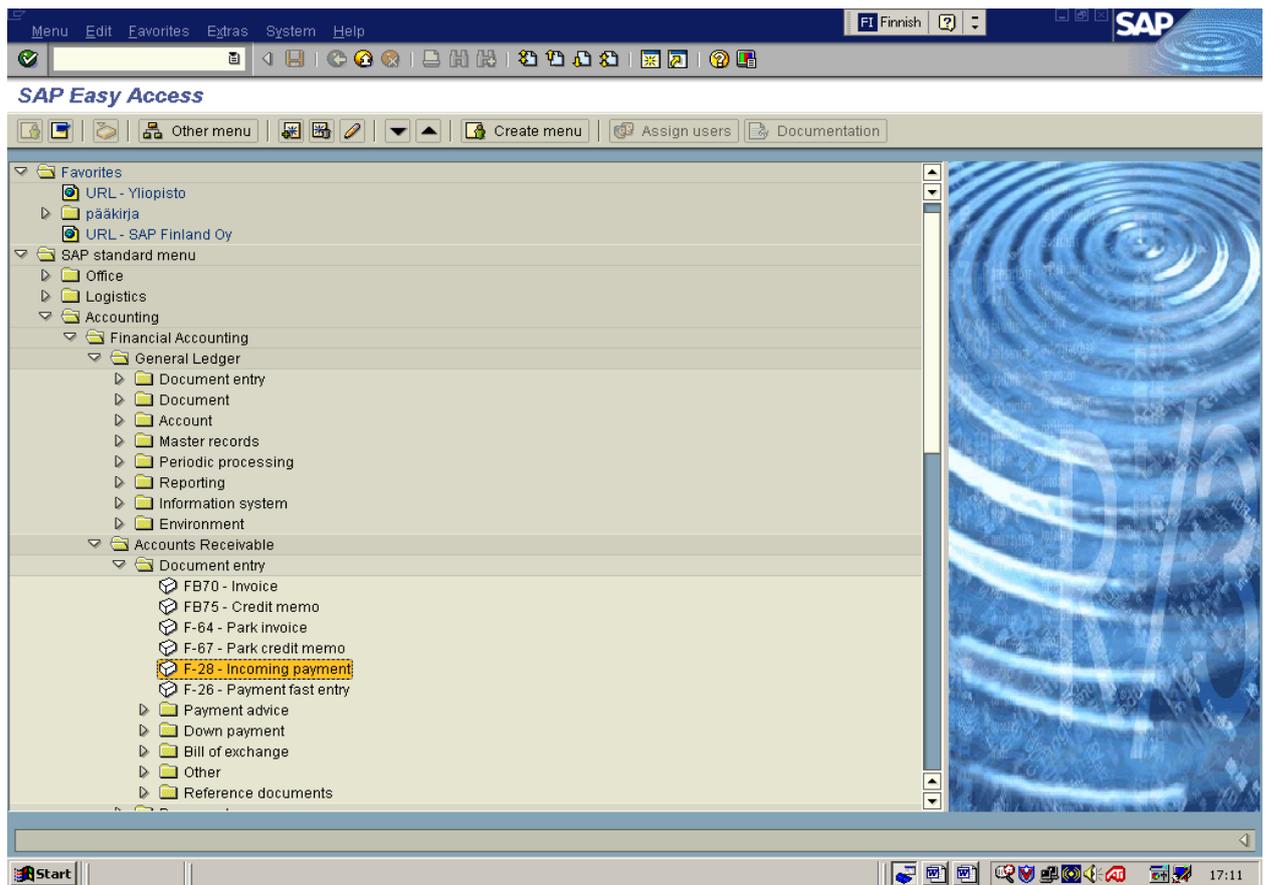
If removing marking needs to be canceled (before the customer is actually removed), it is possible by removing the marking from the choice box on this screen.

→ Press **Ctrl+S** or **Click** to make removing marking.

Customer's actual removing is made in adjustment using event **code OBR2**. Notice, this can be made only if zero entries are made and company is not in production.

### 13.4 The manual registering of incoming payments

Menu command	Accounting → Financial accounting → General ledger → Accounts receivable → Document entry → Incoming payments
Event Code	F-28



Feed following information to the screen: **“Register incoming payments: “Title information”**.

Field	Description	O/F	Value	Comment
Document date	Date, when original document (payment) is delivered	O		
Document type	Type of document defines where accounting entries are made, what can be done, from which number area the document's number is chosen. In addition it also defines possibilities to receive footnotes.	O	Pre-chosen	
Company	Identifier of that company where document entries.	O	Usually pre-chosen	
Registration date	Date when document is taken to the general ledger and entries are made.	O	Pre-chosen on going day. Can be changed.	

Accounting period	Accounting period when entries are done.	O	Lead automatically from entry date, but can be changed for post entries.	System includes four cycles for post entries. (13-16)
Currency/rate	Currency/rate	F	Pre-chosen FIM/EUR. If no other definitions in right choice box, entry date rate used.	Rates are shown in form FIM/ EUR 1:1 in relation to another currency. (5,61 FIM/ 1,06 EUR in relation to USD)
Receipt number	Document identifier, individual inside the company. Identifies from which number area document number is chosen.	F	Number is often chosen automatically.	
Change date	If identified, date's rate is used.	F		
Reference	Text field used as reference can be benefited as a search term.	F		
Reference title text	Size of text field for notices concerning the document.	F		
Adjustment text	Text which is copied to all adjusted lots.	F		
<b>Bank information</b>				
Account	Account, which is credited by the payment.	O		
Business sector	Business sector	F		Is not part of SAP R/3
Sum	Sum receiving payment	R		
Sum (home currency)	Sum as company's currency.	F		
Expenses	Bank expenses from appearing payment. The system moves expenses automatically to earnings account.	F		
Expenses (home currency)	Bank expenses as currency company uses.	F		
Value date	Day when payment is paid to account.	O	Pre-chosen on going day. Can be changed.	
Profit centre	Profit center identifier.	A	Profit center can not be directly defined. It is led from cost object.	
Text	Explaining text	F		
Setting right	Text field, used as a document line reference. Can be used for sorting.	F		
<b>Choosing blank lots</b>				
Account	Customer's account number	O		
Account type	Account type (customer, deliverer...)	O	Pre-chosen to customer account (type D)	
Other accounts	If chosen, several accounts or accounts in several companies can be evened out using one payment.	F		
Special general ledger identifier	If chosen, general ledger entries are taken aboard to blank lots.	F		
Normal blank lots	If chosen, only normal	F	Pre-chosen	

	blank lots are taken to account.			
Notice number	Notice, where blank lots can be included.			Is not part of SAP R/3
Divination by time	Blank lots are chosen for evening out automatically depending on due day.	F		
Automatic search	Blank lots correspond to payment's sum are automatically searched.	F		
O = Obligatory, V = Facultative				

If there are several blank lots it is possible to choose from various alternatives which lots are shown. By choosing one option from Other Choice it is possible to define more accurate terms on next screen. (Like entries over some determined sum or entries made during certain time period).

Document date | Type DZ Company code 4000  
Posting date 29.04.2003 Period 4 Currencyrate FIM  
Document number Translation dte  
Reference Cross-CC no.  
Doc.header text Trading part BA  
Clearing text

Bank data  
Account  Business area  
Amount Amt.in loc.cur.  
Bank charges LC bank charges  
Value date 29.04.2003 Profit center  
Text Assignment

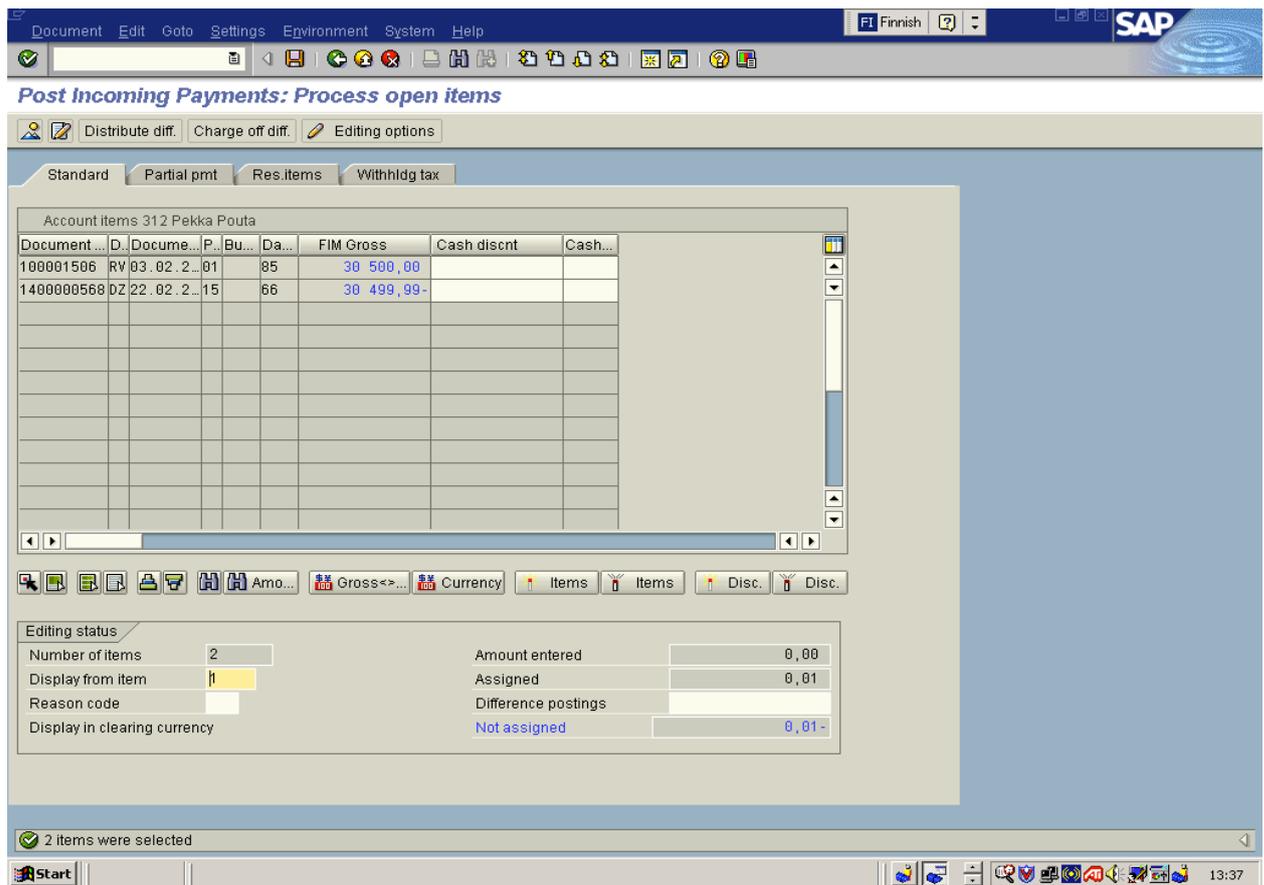
Open item selection  
Account  
Account type D  Other accounts  
Special G/L ind  Standard OIs  
Pmnt advice no.  
 Distribute by age  
 Automatic search

Additional selections  
 None  
 Amount  
 Document number  
 Posting date  
 Dunning area  
 Others

Press <Enter> or click to continue→

On the screen "Entry appearing payments: Blank lot handling" → chosen lots can be seen:

Field	Description	O/F	Value	Comment
Cash discount	Cash discount	F	Cash discount is calculated accordance in with the terms of payments.	The discount can be changed depending on user and certain limitations.
Cash discount %	Cash discount %	F	In accordance with the terms of payments. Can be changed.	If one of these fields is changed, system changes another automatically so that figures are accurate.
<b>Handling state</b>				
Line summary	Amount of chosen blank rows.			
Entered sum,	Appearing payment. It's an out evened sum from previous screen.			
Pointed	Rows out evened up to this moment. Is filled automatically.			
Reason for difference	Reason for difference			Is not part of SAP R/3
Difference entries	Sum, which system moves to an account of payment differences.	F	Possible only, if difference is inside the defined margins.	
Unallocated	Margin of evened sum and chosen blank lots.			
O = Obligatory, V = Facultative				



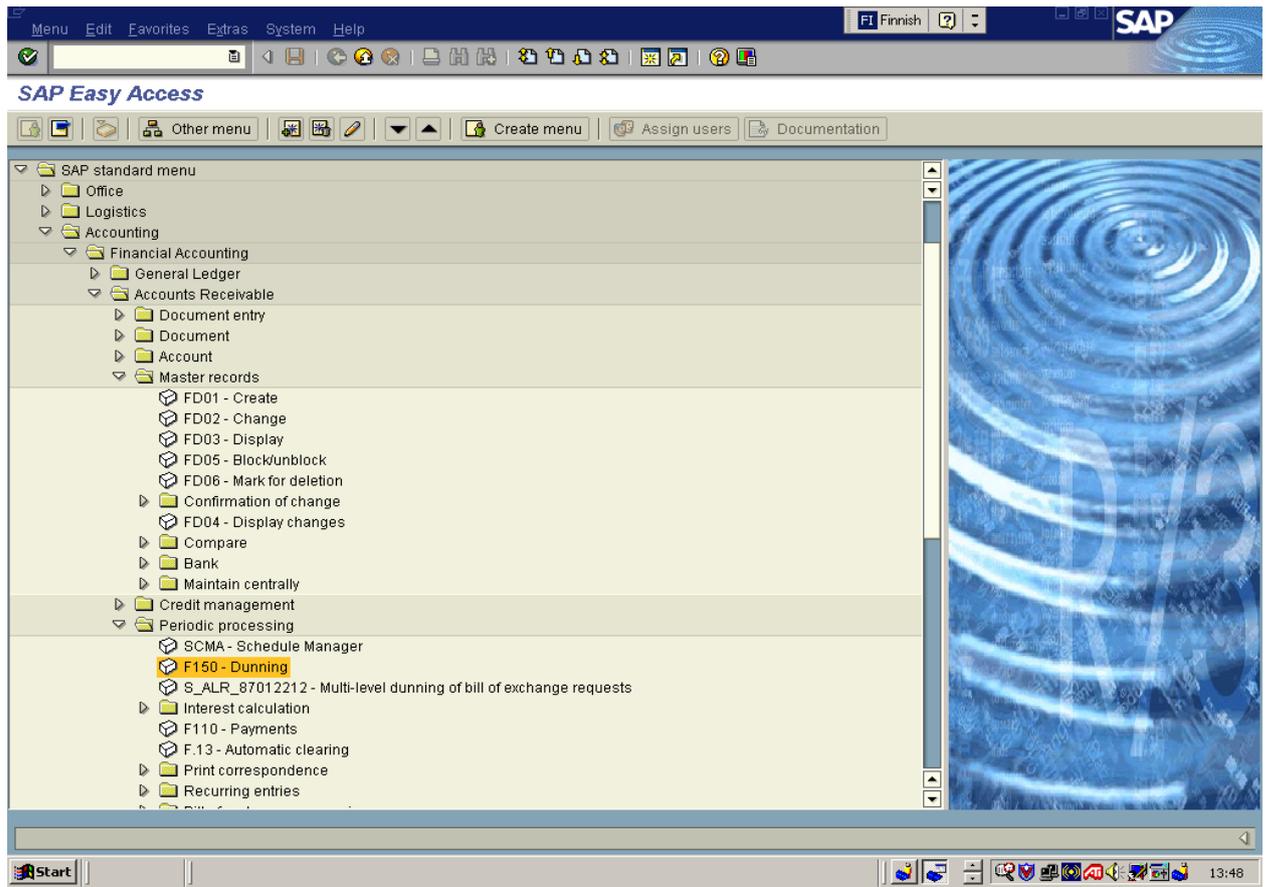
Choose the out evened lots by **double clicking the SUM**. The color of the line changes from black to blue and fields - adjusted and unadjusted are dated automatically.

If double clicking the document line; receipt opens up on the screen and its entry information.

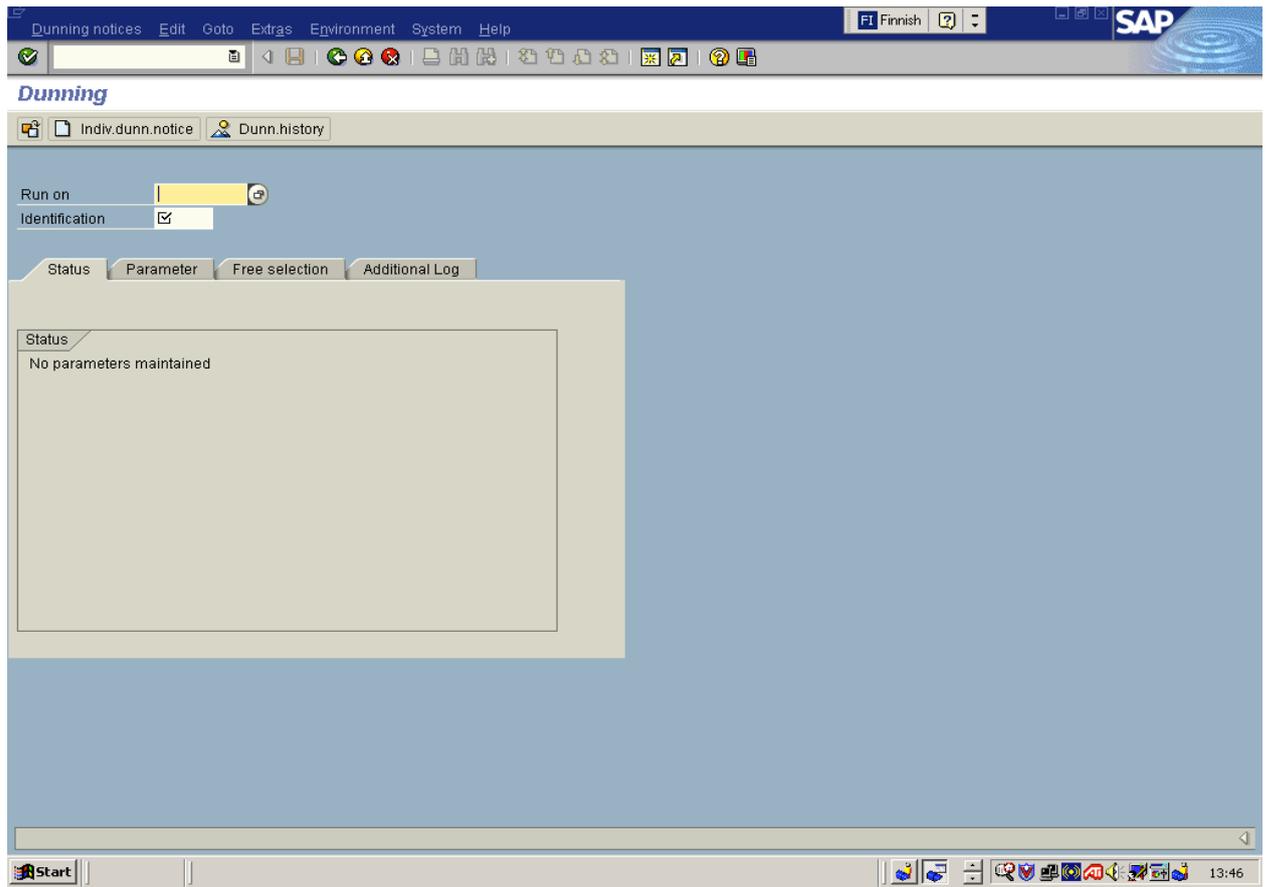
Entry appearing payment by **pressing Ctrl+S or clicking**

### 13.5 Dunning drive

Menu command	Accounting → Financial accounting → Accounts receivable → Master records → Period processing → Dunning
--------------	--



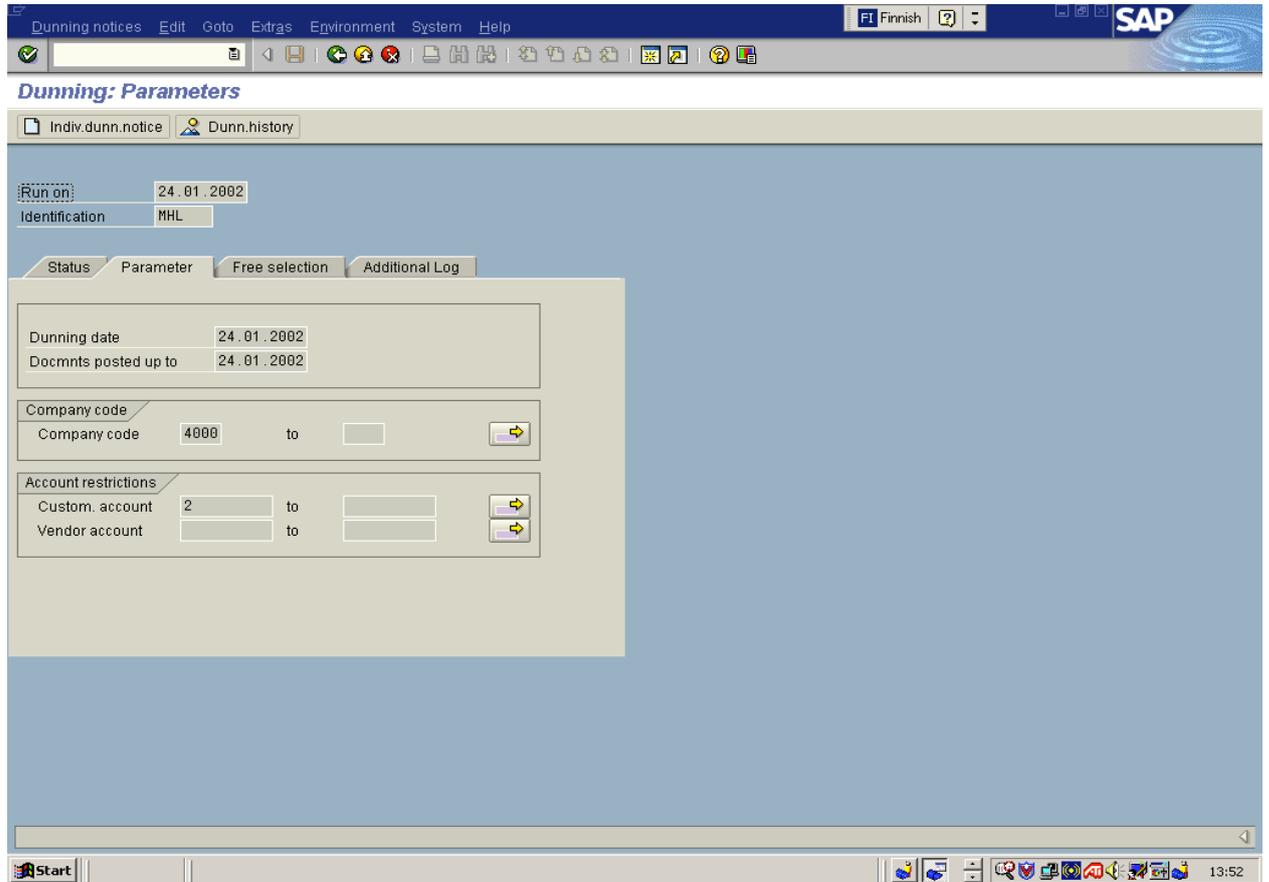
Field	Description	O/F	Value	Comment
Execution date	Dunning drive execution date	O		
Identifier	Accurate identifier which makes the difference between the drives during the same day.	O		
O = Obligatory, V = Facultative				



At this stage dunning drive is not yet specified. Therefore the following move is to choose between the one customer in relation to several customers. (One customer: button **Single** request of payment, several: interleaf **Parameter**). In both cases information content is same.

Click interleaf **Parameter** and feed following information: “**Dunning: Parameter**”.

Field	Description	O/F	Value	Comment
Dunning date	Dating of payment claim. Penalty interest is based on this date.	O		
The last entry date of document	Last date when entered receipts are taken along to collection drive.	O		
Company	Identifier of the company where dunning drive is executed.	O		
Customer account	Customers which are taken along to dunning drive.	F		
Deliverer account	Vendors which are taken along to dunning drive.	F		When merchandise is paid, but returned to the vendor
O = Obligatory, V = Facultative				



**Press Ctrl+S or Click** to save parameters.

Notice that program stage has changed. Dunning drive & generation of dunning suggestion can be planned and preset. **Return with F3 and F7 to preset the dunning drive.**

Field	Description	O/F	Value	Comment
Beginning date	Date when dunning drive is executed.	O	Pre-chosen, on going day. Can be changed.	
Beginning time	Starting time.	O	Pre-chosen, midnight. If irrelevant, choose Start Now.	
Begin now	If chosen, drive starts immediately.	F		
Target computer	Driving computer	F		
Request to pay & Printing	If chosen, requests to pay are printed after drive. Suggestions are added to printing queue.	F	If chosen, revising or canceling the request to pay is not possible.	

Printer	Used printer.	<b>F</b>	
O = Obligatory, V = Facultative			

Click when “**Plan**” is ready. Return to start screen where is possible to follow the situation during the drive by pressing “**Status**” button. When dunning drive is ready; it is also ready to be checked. It is ready for driving if no changes are necessary.

### 13.6 Click to prepare the dunning suggestion

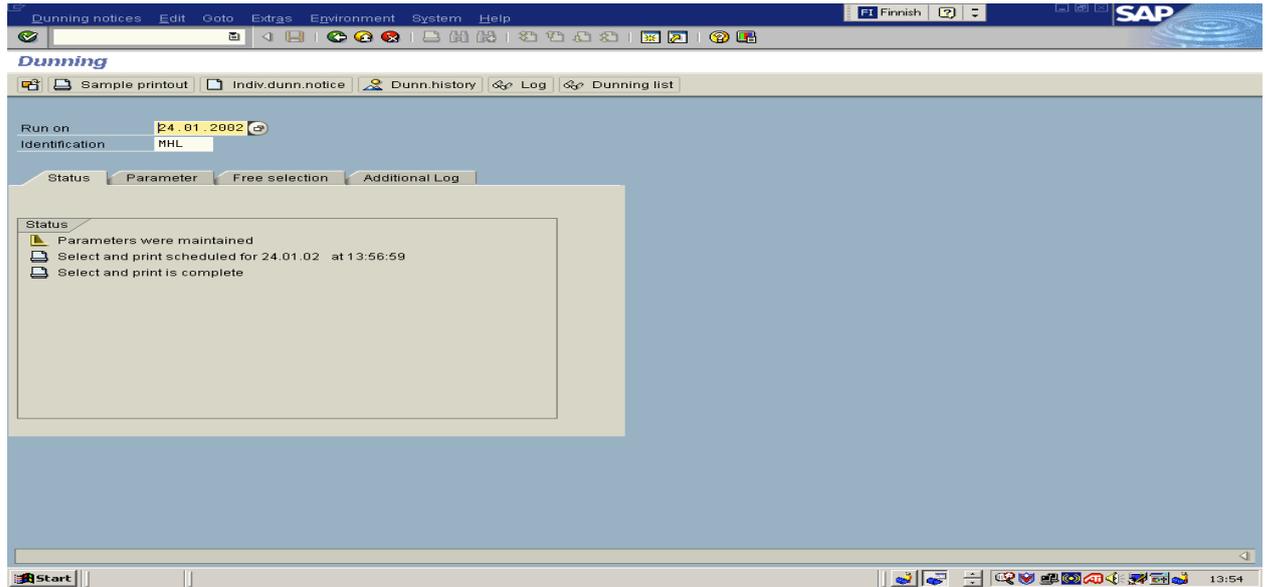
On this screen is possible to choose what kinds of requirement of payments are under observation. Choosing must be done between certain customers or all the requirements. **Click to see all the requirements.** The screen shows register classified basis of accounts and dunning level. **Click to see individual lots.** Each row can cover various lots.

On this screen is possible to see individual lots that are affected by requirements to pay.

Field	Description	O/F	Value	Comment
Company	Company symbol			
Document number	Document number for collection.			External accounting document number. Not showing check number for the customer.
Accounting period	Accounting period when document is registered.			
Line	Document's line			
Net due date	Due date			
Net delay	Delay time (days)			
Time development level	Dunning level before current happening.			
Suggestion level	Dunning level current happening.		Automatic. Can be changed.	
Dun locking	Marked if, justice to charge customer's account automatically.			Is not part of Instant SAP R/3
Sum	Collected sum			
Currency	Document's currency			
O = Obligatory, V = Facultative				

Press *Ctrl+S* or click to save suggestion when all the necessary changes are made. Start screen stage has ones again changed. Now it is possible to plan the actual dunning drive by pressing button “**Planning**”. Actual drive plan is done exactly same way as the dunning suggestion planning. **Click to start printing**

Field	Description	O/F	Value	Comment
Beginning date	Beginning date	O	Pre-choice is on going day. Can be changed.	
Beginning time	Beginning time	O	Pre-choice is midnight. Can be changed	
Begin now	If chosen drives are started immediately.	F		
Target computer	Computer used in driving	F		
Printer	Printed information source.	F		
O = Obligatory, V = Facultative				



### PART III – ASSIGNMENTS



## 14 ASSIGNMENT

In addition to fulfilling the theory part and labs, there are two options to complete the assignment for marks. The first option is about planning an SAP project for a phone manufacturer and the second one is programming SAP.

### 14.1 ERP project

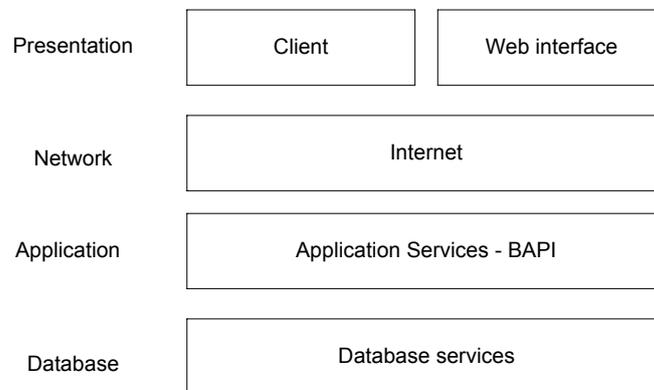
Your task is to plan an ERP project for multinational mobile phone manufacturer that has several production plants and market areas in four continents. You should present:

1. *Project plan document*
  - Purpose, scope and objectives
2. *Schedule of the project*
  - List of task
  - Durations
  - Structure of overall roll-out
3. *Description of how to parameter SAP R/3 for this kind of environment*
  - Organisation for sales, manufacturing, purchasing. Pay attention on this. Use graphics.
  - Production planning philosophy – MTS, MTO, ETO etc.
  - Lot sizing – purchasing
4. Budget (based on workload, required number of licenses and hardware)
5. Risk analysis for potential gaps and how to avoid these pitfalls

The delivery should be a Word file attached with schedule, budget and other supporting materials.

## 14.2 BAPI – interface for programmers

SAP System is a client-server type of application that runs on several computer platforms. The figure below illustrates an example of configuration.



There are several ways to access R/3 system with external systems. The following Java programme uses BAPI interface to connect the SAP R/3 server. Running the programme requires:

librfc32.dll to be copied into \winnt\system32 directory and

sapjco.jar in the classpath. e.g.

```
set CLASSPATH=%CLASSPATH%;C:\sap\sapjco.jar;
```

Compile the programme and run:

```
import com.sap.mw.jco.*;
/**
 * @author Thomas G. Schuessler, ARAsoft GmbH
 * http://www.arasoft.de
 */
public class TutorialConnect1 extends Object {
    JCO.Client mConnection;
    public TutorialConnect1() {
        try {
```

```

// Change the logon information to your own system/user
mConnection =
    JCO.createClient("550", // SAP client
        "teku2",           // userid
        "sappi",           // password
        "en",              // language
        "sapinsta.helia.fi", // application server host name
        "00");             // system number
mConnection.connect();
System.out.println(mConnection.getAttributes());
mConnection.disconnect();
}
catch (Exception ex) {
    ex.printStackTrace();
    System.exit(1);
}
}
public static void main (String args[]) {
    TutorialConnect1 app = new TutorialConnect1();
}
}

```

## Task

Test the programme above first. If you are able to run it and feel comfortable with programming, learn more about how to programme against SAP BAPI interface. Create a simple application that retrieves information from the ERP system and plots it as a report. For further information, refer to SAP BAPI.

Links:

- <http://www.sappro.com/download99.html>

- 

Delivery should be an executable programme with short description what the programme does and how it has been implemented.

**Abbreviations**

- MRP – Material Resource Planning
- MRP-II – Material Requirements Planning
- MPS – Master Production Schedule
- ERP- Enterprise Resource Planning
- PCB – Printed Circuit Board
- MTS – Make-to-stock
- MTO – Make-to-order
- ATO – Assembly-to-order
- ETO – Engineering-to-order
- CS – Capacity selling
- JIT – Just in time
- DTF – Demand time fence
- PTF – Planning time fence