

Production Planning

Lesson 8: Production Planning Overview – Process Industries

Lesson Objectives

- Objectives -On successful completion of this training module, you should have:
- Understood the basics of Production Planning for Process Industries
- Definition and Function of Process Order
- Process Management



Training Agenda

- Production Planning Overview - Process Industries
- Introduction- Production Planning for Process Industries
- Terminology – Process Industry
- Process Flow- Production Planning for Process Industries
- Definition and Function of Process Order
- Process Order Activities/structure/cycle
- Ways of Creating a Process Order

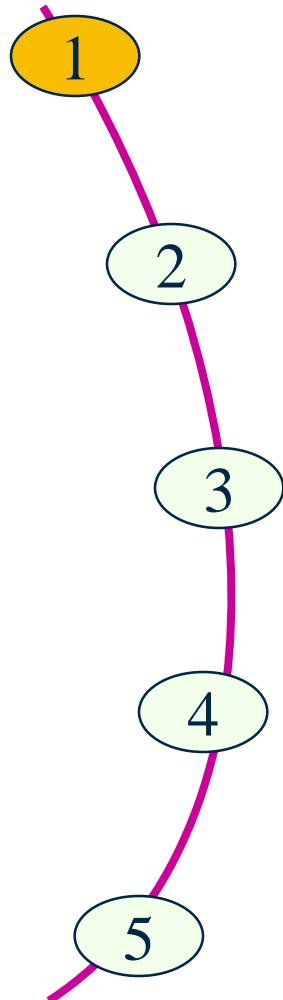


Training Agenda

- Configuration of process industries
- Master Data
- Material type and Industry sector
- Master Data-Bill Of material
- Master data – Master Recipe
- Process Management
- Integration with other modules



Production Planning Overview - Process Industries



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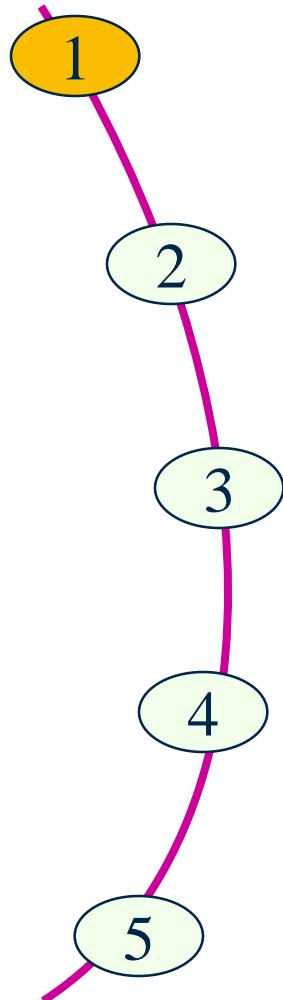
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Production Planning Overview - Process Industries



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Introduction

- Production planning is combination of planning and manufacturing activity management for products, in manufacturing organization, to meet sales requirements.
- The manufacturing industries are classified as follows, by considering the production volume.
 - Discrete manufacturing – where production lot size is small and will account the
 - production based on lot size. Ex Customized product manufacturing unit (Pumps).
 - Repetitive manufacturing – Where production is measured by rate like qty per day
 - and volume of production is higher than above type and production period also
 - larger than above type. Ex Automotive Industries.
- Process industries – Where production is taken place in dedicated process line for continuous production over entire period. Ex Chemical Industries.



Introduction- Production Planning for Process Industries

- With the component SAP R/3 PP-PI (Production Planning for Process Industries), SAP provides an integrated planning tool for batch-oriented process manufacturing.
- It is primarily designed for the chemical, pharmaceutical, food and beverage industries as well as the batch-oriented electronics industry.

PP-PI supports:

- The integrated planning of production, waste disposal, and transport activities within a plant
- The integration of plants within the company:
- Vertically by means of an information flow, ranging from central business applications down to process control
- Horizontally by the coordination of planning between production plants, recycling and waste disposal facilities, and production laboratories.

Purpose

- Plan for production of right quantity of right material at right time to satisfy the sales requirement with in the customer requested date.
- To meet purchasing requirements (Ex Lot size, lead time).
- To optimize the capacity utilization.

Terminology – Process Industry

- Terminology explained here is applicable to process industry and certain elements are generic in nature which are applicable for all kind of production environments.

Material master – Contains all information about materials like drawing, planning data, costing data etc..

Resources - In this area, you manage the capacities, the production resources, and the personnel you need for production.

Bill Of Materials – List of components required to produce finished products.

Alternate BOM - Another version of BOM used to produce the same finished product.

Master Recipe – Where you describe the processes to be used for producing materials in your plant as well as the resources and ingredients required for production.

Production Resource tools – All auxiliary tools used to carry out production like Jigs % Fixtures, Inspection tools etc.

Terminology - Process Industry

Planned Order – Planning work sheet which contains BOM and scheduled date and quantity, to be converted into Production Order.

Process Order – In a process order, you copy the process described in a master recipe and adjust it to the actual production run.

Control Recipe- Using control recipes, we transfer control data from the process order to process control. The information contained in a control recipe and the destination to which it is sent are user-defined

Order release – Releasing the Order to shop floor to start production.

Confirmation – Declaring the completion of Production activities.

Terminology - Process Industry

Goods Receipt – Moving goods into Quality stock/Unrestricted stock.

Goods Issue – Issue of components to Process Order.

Reservation - Document which contains quantity of materials, reserved for particular process Order or Individual requirement. This is created once Process Order is created.

Back flush – Automatic issues of components to Process order when Order is confirmed.

Settlement – Passing the process cost to next receiving object like sales Order.

Terminology - Process Industry

MRP Run :

MRP run is complete estimation of items in terms of quantity, by considering stock and requirements w. r. t. demand. Also it generates the Purchase requisitions or planned orders w. r. t. procurement type.

Procurement :

All procurement proposals are subject to lot size and date of requirements.

Capacity Planning:

Capacity leveling provision is available to get exact available date by considering all existing process orders

Terminology - Process Industry

Production Versions

A production version determines which alternative BOM is used together with which task list/master recipe to produce a material or create a master production schedule.

For one material, you can have several production versions for various validity periods and lot-size ranges.

Scheduling

Scheduling is useful for planning person to estimate the start date and end date for production.

Terminology – Process Industry

Process Message:

Communication structure that is used to transfer actual process data from process control to one or several destinations of the following types:

- User-defined ABAP tables
- Users of the SAP office mail system:
- Other R/3 components
- External function modules

Process Instruction

In the process instructions we can define processing steps, which:

- A process operator to execute manually at a production line
- A process control system to execute automatically

We define the process instructions in the master recipe and in the process order

Terminology – Process Management

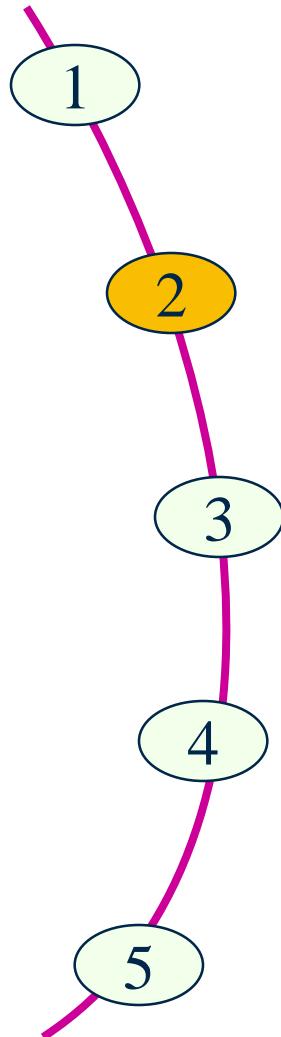
Control Recipes

Using control recipes, we transfer control data from the process order to process control. The information contained in a control recipe and the destination to which it is sent are user-defined

Process Instruction Sheet

We can use PI sheets to exchange data between the partially or completely manually operated production level and the R/3 System (PP-PI). In manually operated production lines, this usually involves a process operator who uses the PI sheet to transfer production-relevant actual data to the R/3 system and receives data from the R/3 System

Production Planning Overview –Process Industries



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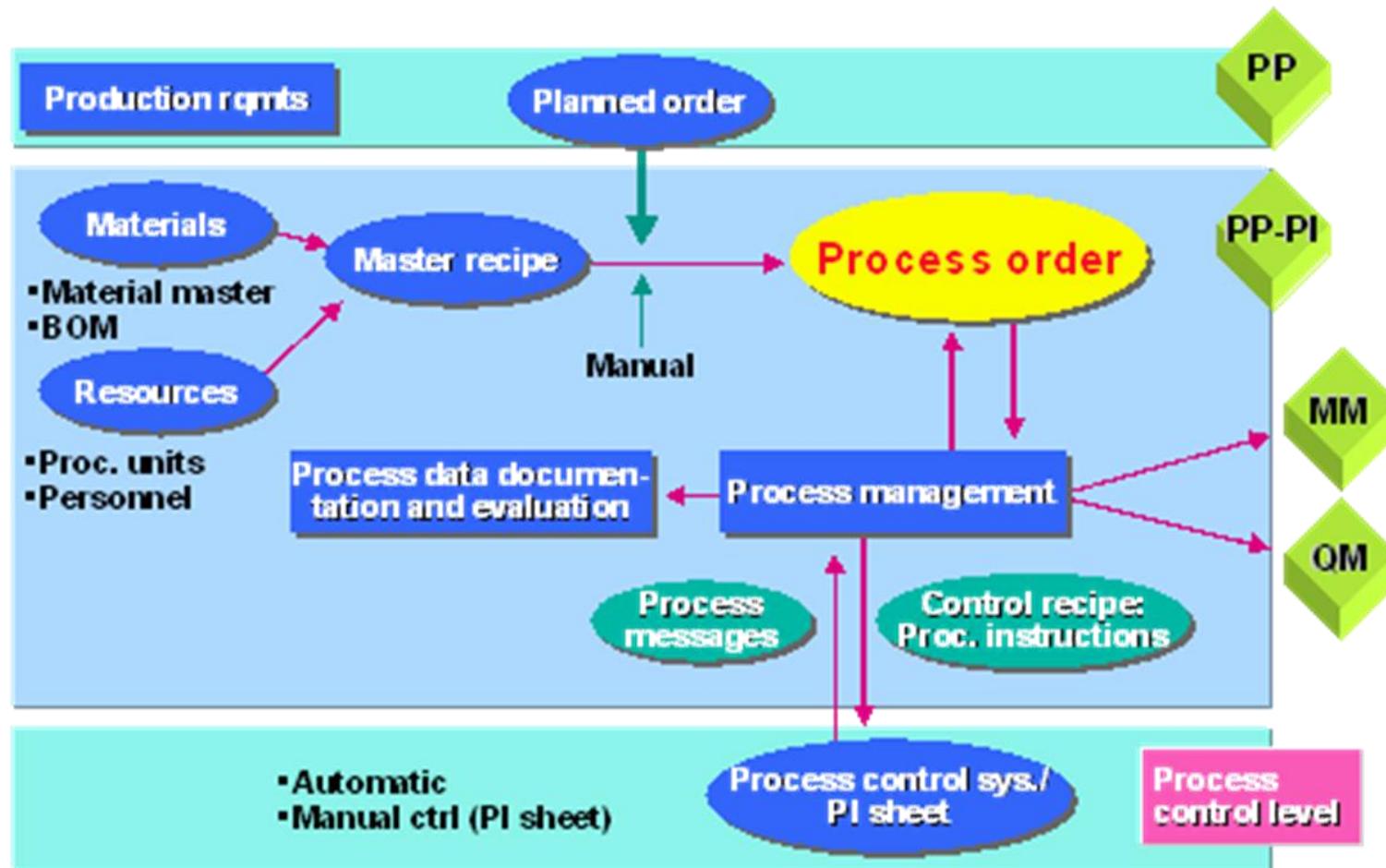
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Process Flow



Definition and Function of Process Order

Definition

A process order describes the actual production of one or more materials or batches in a production run. A process order is usually created using a master recipe. It contains all the information specified during production

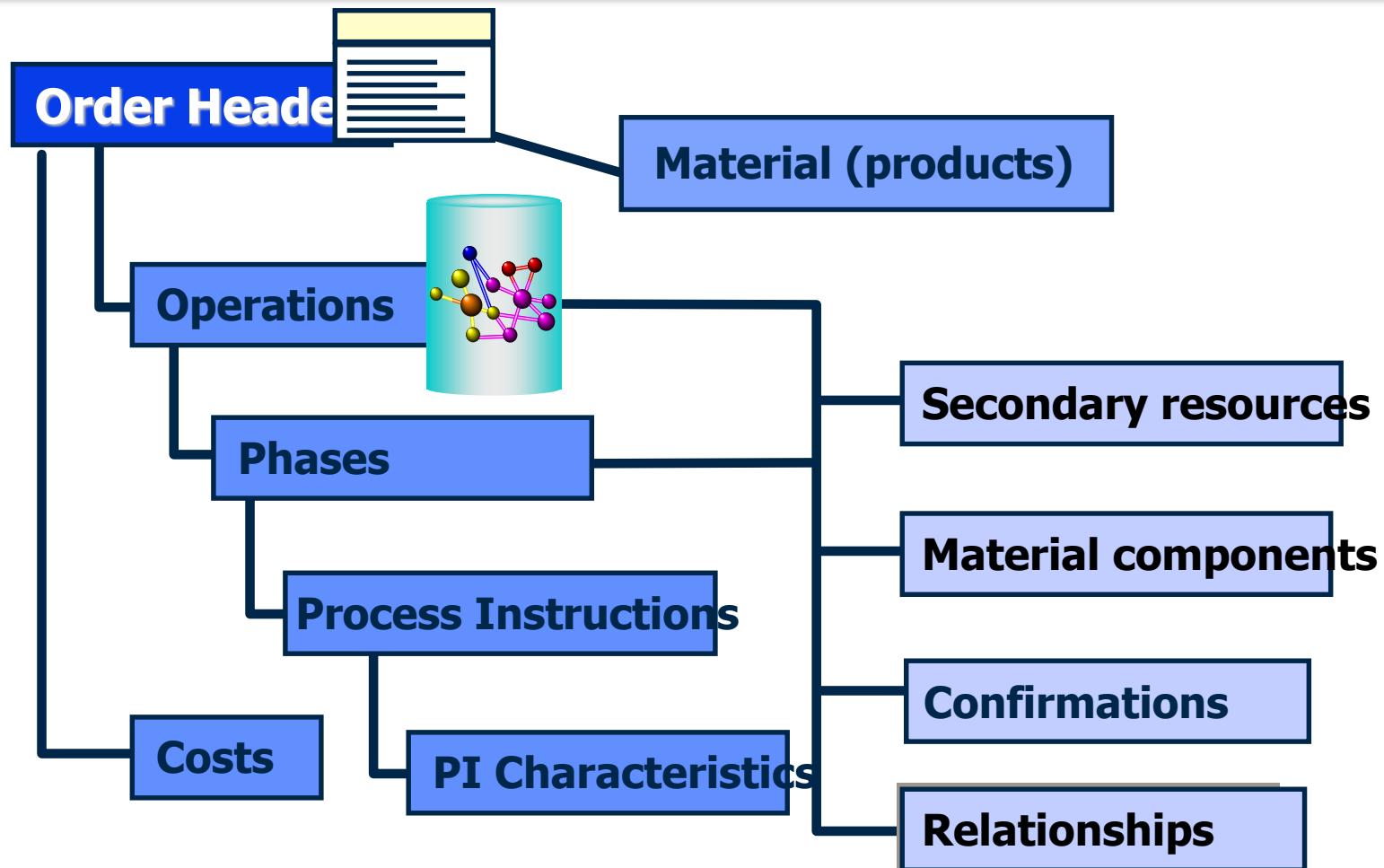
Function

The process order is the main control instrument in production, describing and monitoring all production - relevant planned and actual data.

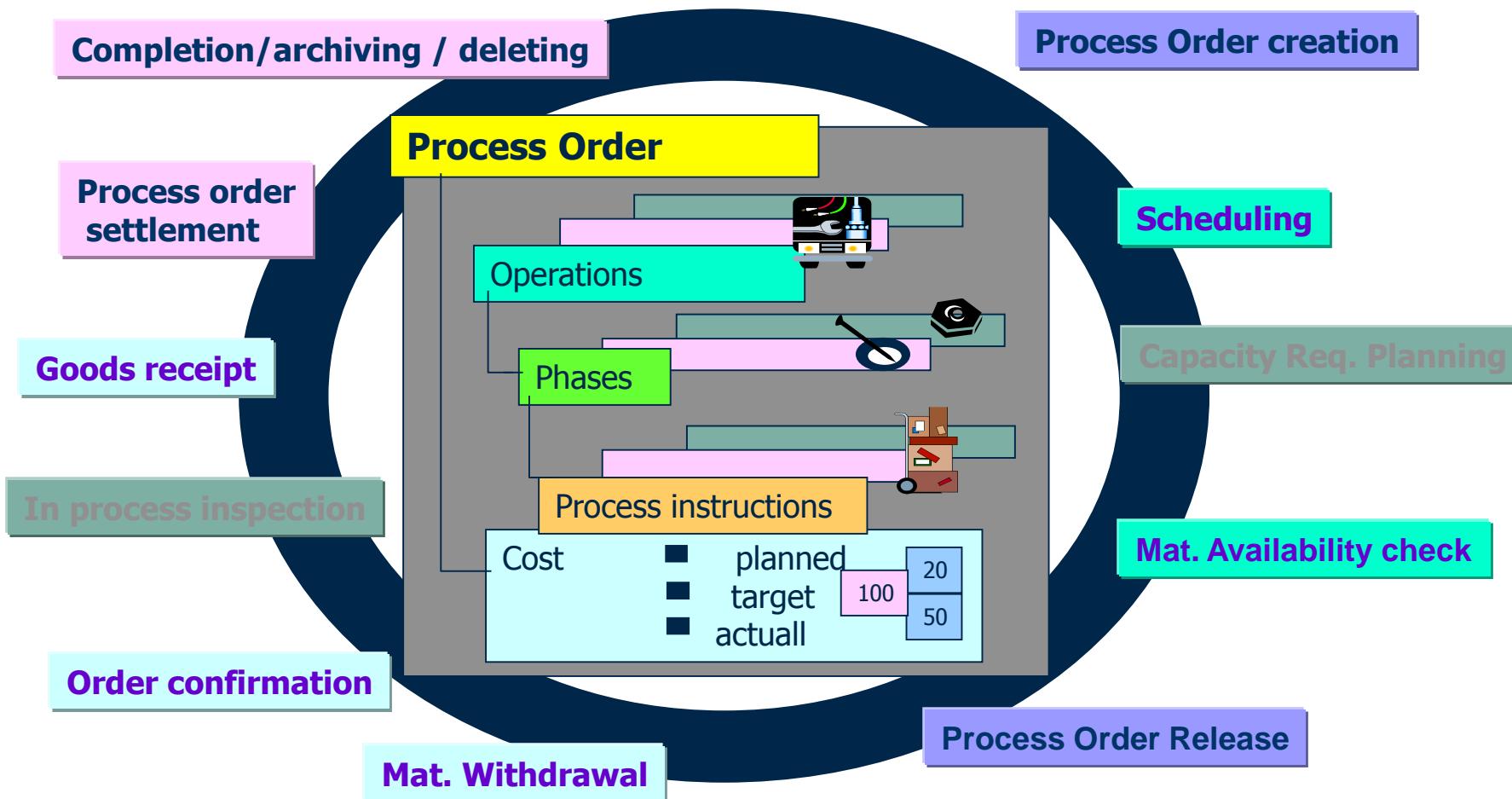
Process Order Activities

What is Produced?	- Products - Activities
For what Dates?	- Basic Order Dates - Scheduled Dates - Confirmed Dates - Release dates
Which Quantities do you want to produce?	- Process Order Quantity - Confirmed Quantity
For Whom do you produce(Cost Object)?	- Material (Stock) - Cost Center - Sales Order
Which Resources and Methods do you use?	- Ingredients - Resources and capacities - Inspections data
What Costs are Involved in Production?	- Planned Costs - Actual Costs

Process Order Structure



Process Order Cycle



Ways of Creating a Process Order

Creation with Material

Master Recipe  Process Order

Manually Create Without Material

OR

Creation with Planned Order

One Planned  Order Process Order

Creation with Several Planned Orders

Several Planned  Orders Process Orders

Activities involved in Process Order Creation

Process Order Creation

Copying data from planned order

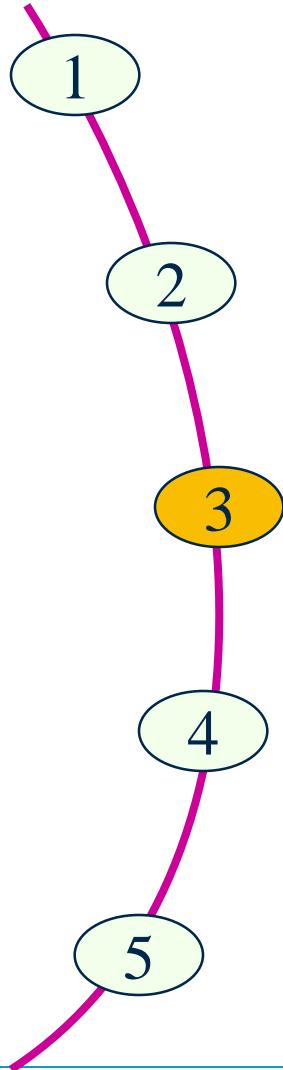
Selecting master recipe

Scheduling

Determining Capacity Requirement

Calculating Planned cost

Production Planning Overview –Process Industries



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Essentials

In this followings are explained in details

- Environment
- Prerequisites
- Master Data

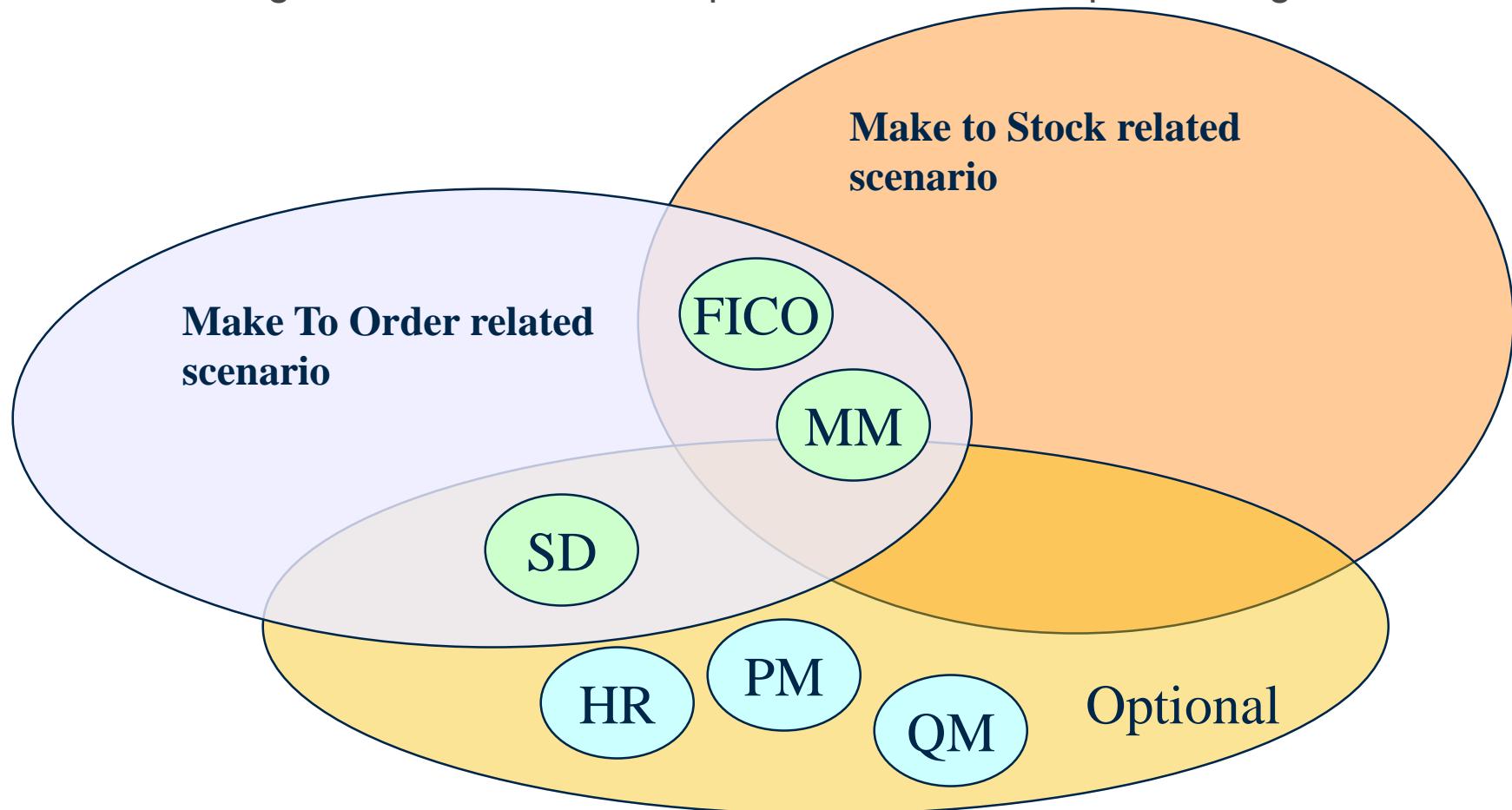
Environment

The environment in which PP PI works
is

SAP R/3

Prerequisites

The following modules should be implemented before implementing PP-PI



Configuration

Configuration is, setting up of the options to suit the application without modifying the software

The following are the some important Configurations.

- Basic data
 - All Master data.
- Production Planning.
 - Demand management.
- Capacity planning.
 - Capacity related data for master data.
 - Operations.
 - Evaluations.
- Materials requirement Planning.
 - Plant Parameters
 - Control key.

Configuration

- Process Order
 - Order type
 - Order type dependent parameters
 - Availability Check
 - Scheduling Parameters
 - Confirmation Parameters

Master Data

The following are the Master data used in PP-PI (Details given in next slides)

- Material master
 - MRP data
 - Work Scheduling data
- Bill Of materials
- Resources
 - Basic data
 - Default Values
 - Capacity
 - Scheduling
- Master Recipe
- Production Resource Tools

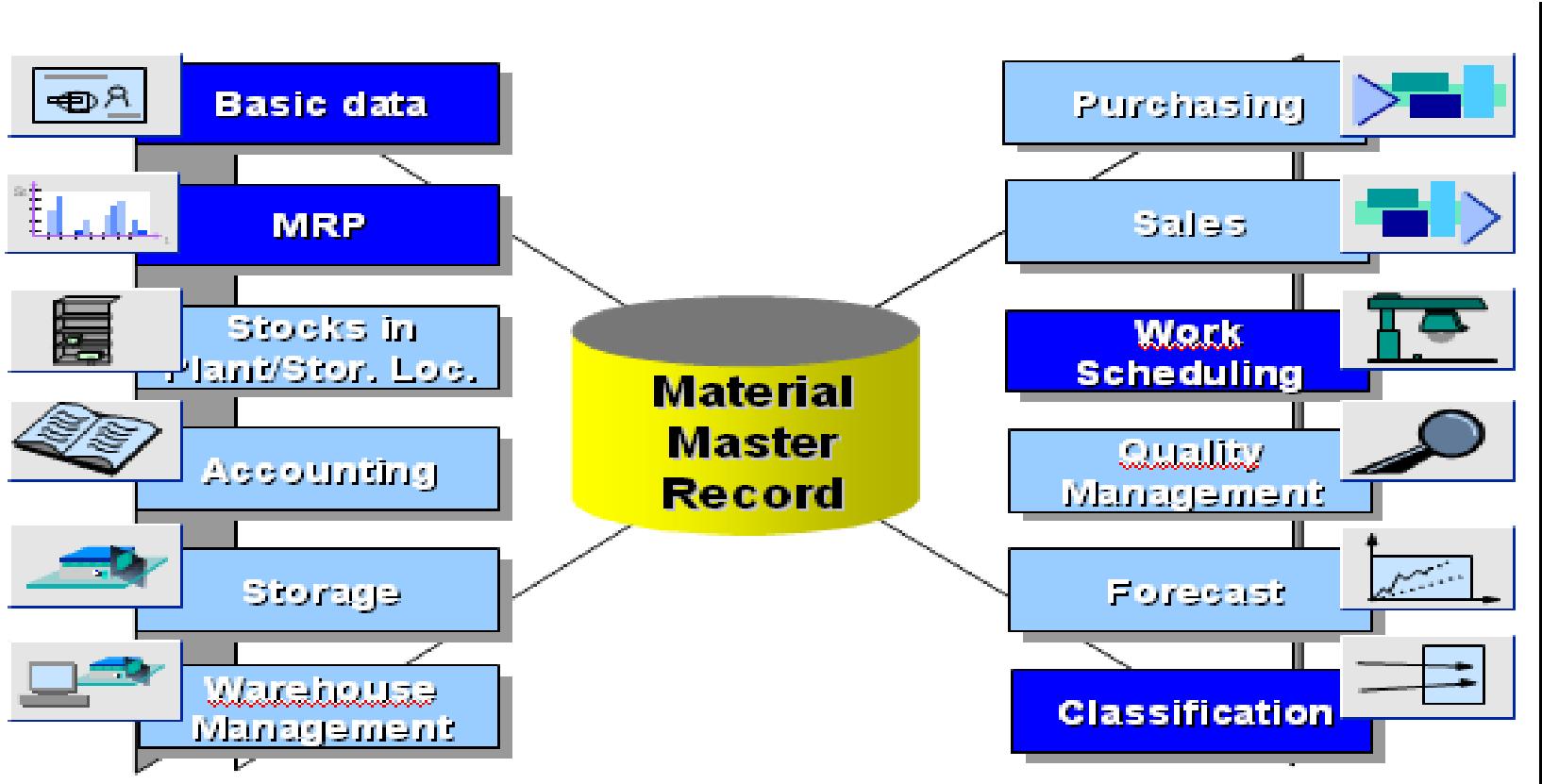
Master data – Material Master



Material

Substance or commodity that is bought or sold on a commercial basis, or is used, consumed, or created in production; a material can also be a service

Master data – Material Master

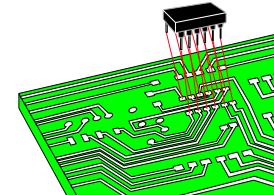
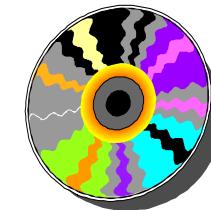
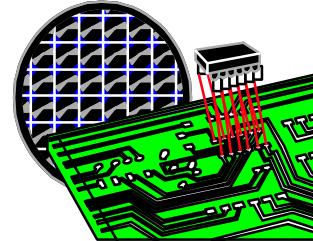


Highlighted are the master data used in PP-PI

Material Type and Industry Sector

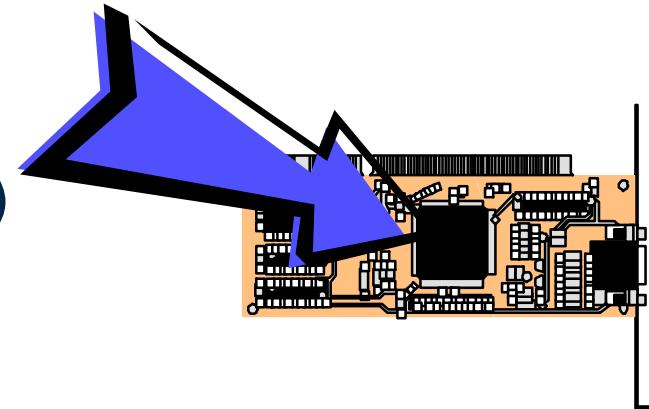
Material Type:

- **Finished (FINH)**
- **Semi-Finished (SEMI)**
- **Raw Material (RAW)**



Industry Sector:

- **Cement Industry (I)**



Master Data- Material: Basic data

The screenshot shows the SAP Master Data - Material: Basic data interface. It displays two tabs at the top: "Basic data 1" and "Basic data 2". Both tabs have a checked checkbox icon next to them. The "Basic data 1" tab is active, showing the following fields:

- Material: FINISH1
- Type: finished good
- General data:
 - Base Unit of Measure: EA
 - each
 - Material Group: 04
 - Old material number
 - Ext. Matl Group
 - Division
 - Lab/Office
 - Product allocation
 - Prod.hierarchy
 - X-plant matl status
 - Valid from
 - Assign effect. vals
 - GenItemCatGroup: NORM
 - Standard item
- Material authorization group:
 - Authorization Group
- Dimensions/EANs:
 - Gross Weight
 - Weight unit: KG
 - Net Weight
 - Volume
 - Volume unit
 - Size/dimensions
 - EAN/UPC
 - EAN Category
- Packaging material data:
 - Matl Grp Pack.Mats
 - Ref. mat. for pckg

The "Basic data 2" tab is also visible, showing the following fields:

- Other Data:
 - Prod./Insp. memo
 - Ind. Std Desc.
 - Page format
 - CAD Indicator
 - Basic material
- Environment:
 - DG indicator profile
 - Environmentally friendly
 - Highly viscous
 - In bulk/liquid
- Design documents assigned:
 - No link
- Design Drawing:
 - Document
 - Document type
 - Doc.vers.
 - Page number
 - Doc.ch.no.
 - Page format
 - No. sheets
- Client-specific configuration:
 - Cross-plant CM
 - Material is configurable
 - Variant
 - Configure variant
- Additionals:
 - Fabric

Master Data- Material: MRP data

The screenshot displays two identical material master records for 'FINISH1' side-by-side, illustrating the configuration of MRP parameters. The top navigation bar shows 'Purchase order text' and several MRP checkboxes (1 through 4) which are checked for both records. A red box highlights the 'MRP 1' and 'MRP 2' checkboxes in the first record, and another red box highlights the 'MRP 1' and 'MRP 2' checkboxes in the second record.

Material		FINISH1	finished good	
Plant	BP01	BP01 Plant		
General Data				
Base Unit of Measure	EA	each	MRP group	
Purchasing Group			ABC Indicator	
Plant-sp.matl status			Valid from	
MRP procedure				
MRP Type	PD	MRP	Planning time fence	
Reorder Point			MRP Controller	001
Lot size data				
Lot size	EX	Lot-for-lot order quantity	Maximum Lot Size	1.000
Minimum Lot Size	1		Maximum stock level	
Fixed lot size			Storage costs ind.	
Ordering costs			Takt time	
Assembly scrap (%)			Rounding value	
Rounding Profile				
Unit of Measure Grp				
MRP areas				
<input type="checkbox"/> MRP area exists		MRP areas		

Master Data- Material: MRP data

The screenshot displays two identical SAP MRP (Material Requirements Planning) screens side-by-side, both showing material master data for FINISH1 at BP01 Plant. The top navigation bar includes tabs for MRP 1, MRP 3, MRP 4, AP, Foreign Trade, Forecasting, and other system icons.

Material Details:

- Material: FINISH1 (finished good)
- Plant: BP01 (BP01 Plant)

Forecast Requirements:

- Period Indicator: M
- Fiscal Year Variant: [empty]
- Splitting indicator: [empty]

Planning:

- Strategy group: 40 (Planning with final assembly)
- Consumption mode: 2 (Bwd consumption per.: 20)
- Fwd consumption per.: 20 (Mixed MRP)
- Planning material: [empty]
- Plng conv. factor: [empty]
- Planning plant: [empty]
- Planning matl BUUnit: [empty]

Availability check:

- Availability check: 02 (Tot. repl. lead time: [empty] days)
- Cross-project: [empty]

Plant-specific configuration:

- ConfigurableMaterial: [empty]
- Variant: [empty]
- Planning variant: [empty]

BOM explosion/dependent requirements:

- Selection method: [empty]
- Individual/coll.: [empty]
- Component scrap (%): [empty]
- Requirements group: [empty]
- Version Indicator: ProdVersions
- MRP dep.requirements: [empty]

Discontinued parts:

- Discontin. ind.: [empty]
- Eff.out: [empty]
- Follow-up mail: [empty]

Repetitive manufacturing / assembly / deployment strategy:

- Repetitive mfg: [empty]
- REM profile: [empty]
- Action control: [empty]
- Fair share rule: [empty]
- Push distribution: [empty]
- Deployment horizon: [empty]

Material memo:

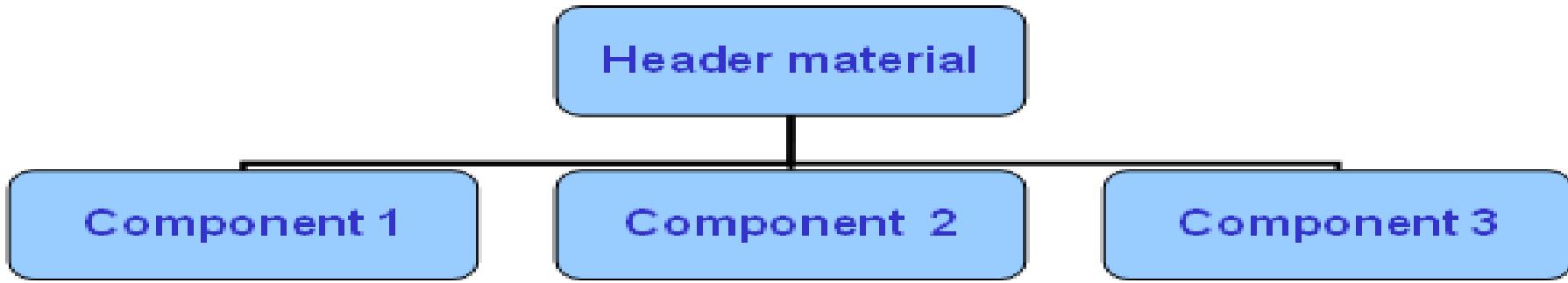
- Material memo: [empty]
- Material memo exists: [empty]

Master data – Bill of materials

BOM

A bill of material is a complete, formally structured list of the components which make up a product or assembly. The list contains the description and object number of each component together with the quantity and unit of measure.

Master data – Bill of materials



Sample view

The screenshot shows the SAP Change material BOM: General Item Overview interface. The header displays the title and various toolbar icons. Below the header, there are fields for Material (CAR_1), Plant (10000 - Werk Hamburg), and Alternative BOM (None). The main area features a table with columns: Item, ID, Component, Component description, Quantity, UoM, CO-VA, Status, Valid From, Valid To, and Change Info. The table lists components for a car, including the body, wheels, engine, and tires.

Item	ID	Component	Component description	Quantity	UoM	CO-VA	Status	Valid From	Valid To	Change Info
0010 L	B001	Body	Body of Car	1	EA	PO	OK	24.01.2000	31.12.2009	
0020 L	B001.0	Body_Wheel	Body of Car_Wheel	1	EA	PO	OK	24.01.2000	31.12.2009	
0030 L	ENGINE	Engine	Engine of Car	1	EA	PO	OK	24.01.2000	31.12.2009	
0040 L	TYRE_C	Tyre	Tyre-C	4	EA	PO	OK	24.01.2000	31.12.2009	
0050 L	TYRE	Tyre	Tyre	4	EA	PO	OK	24.01.2000	31.12.2009	
0060 L										
0070 L										
0080 L										

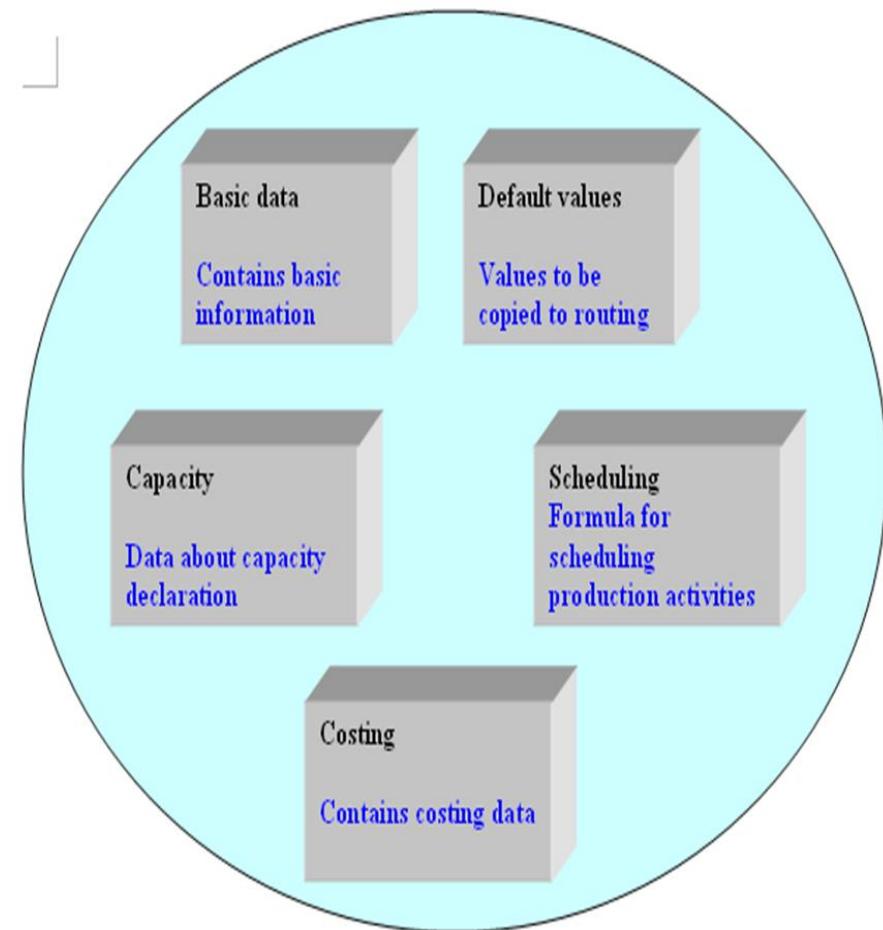
Master data – Resource

Resources are means of production and persons in the production process which have capacities assigned to them.

A resource can have several capacities allocated to it.

To calculate costs, execution time and capacity requirement, formulas can be defined for resources

In PP-PI, resources perform the same function as work centers do in PP.

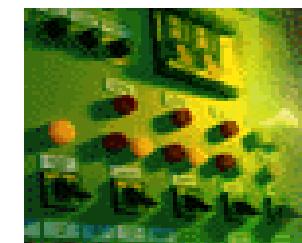


Resource

A resource is where an operation or activity is carried out within a production plant.



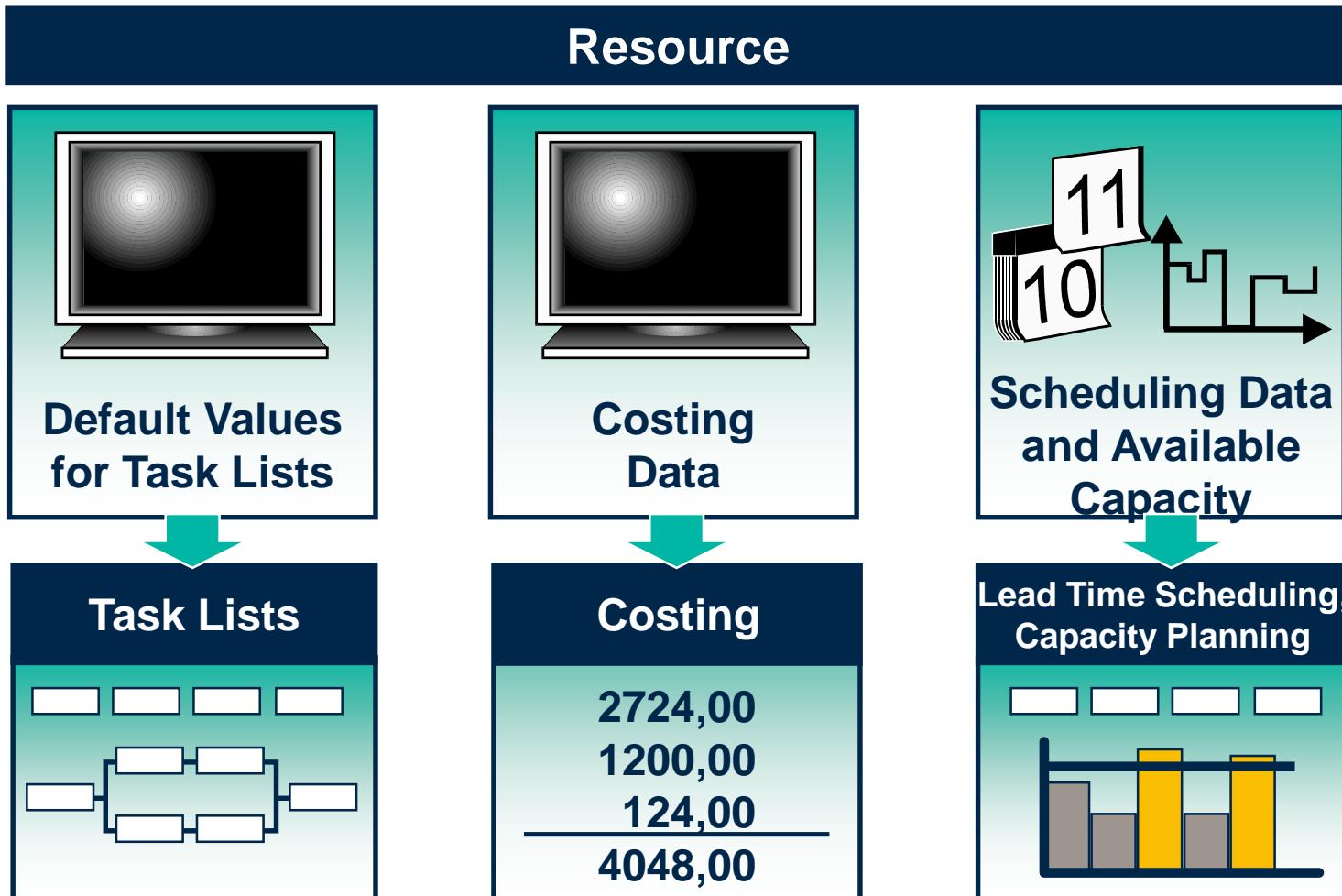
A resource can be a machine or a group of machines



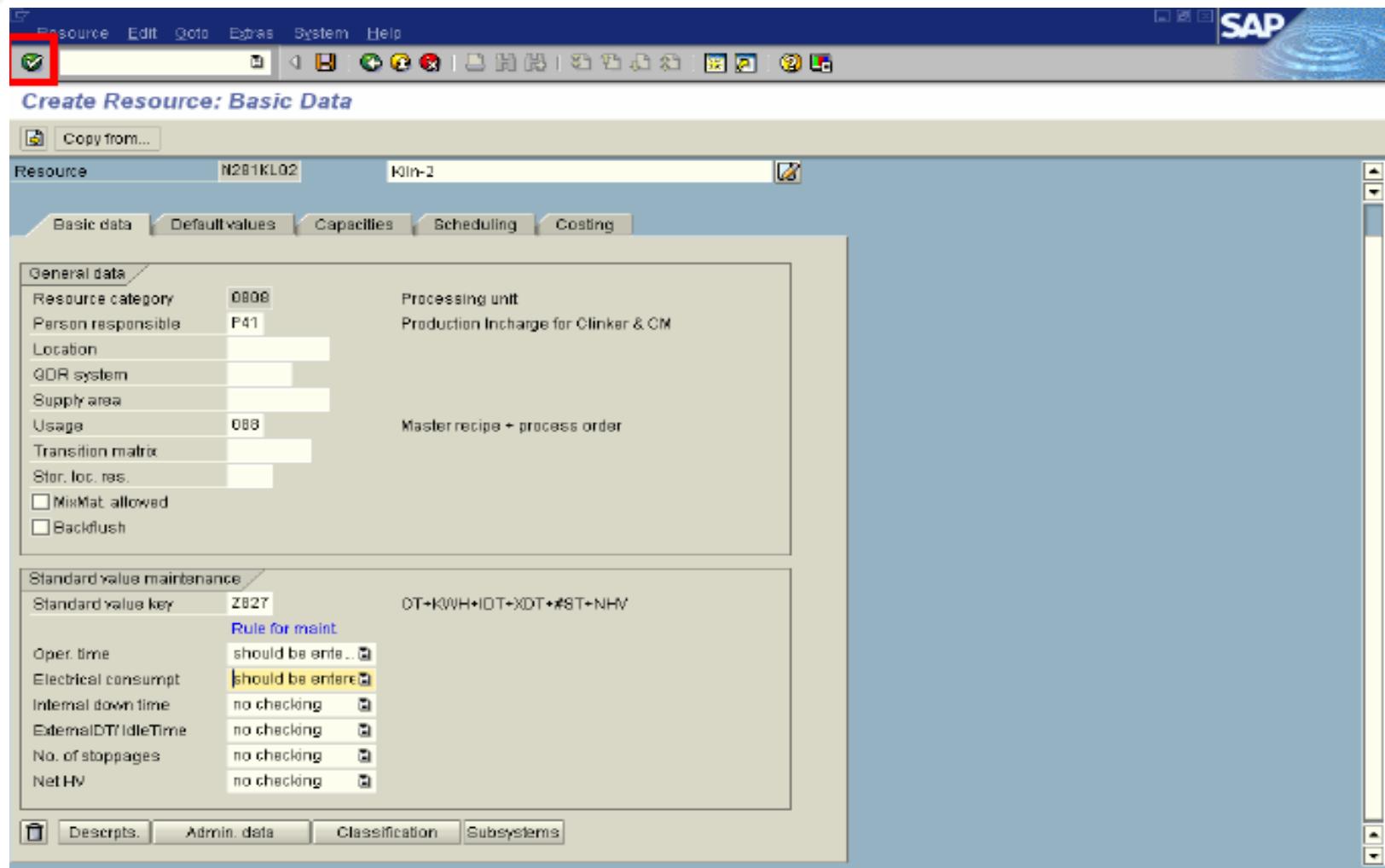
A resource can be a person or a group of people



Primary Function of Resource



Master data – Resource



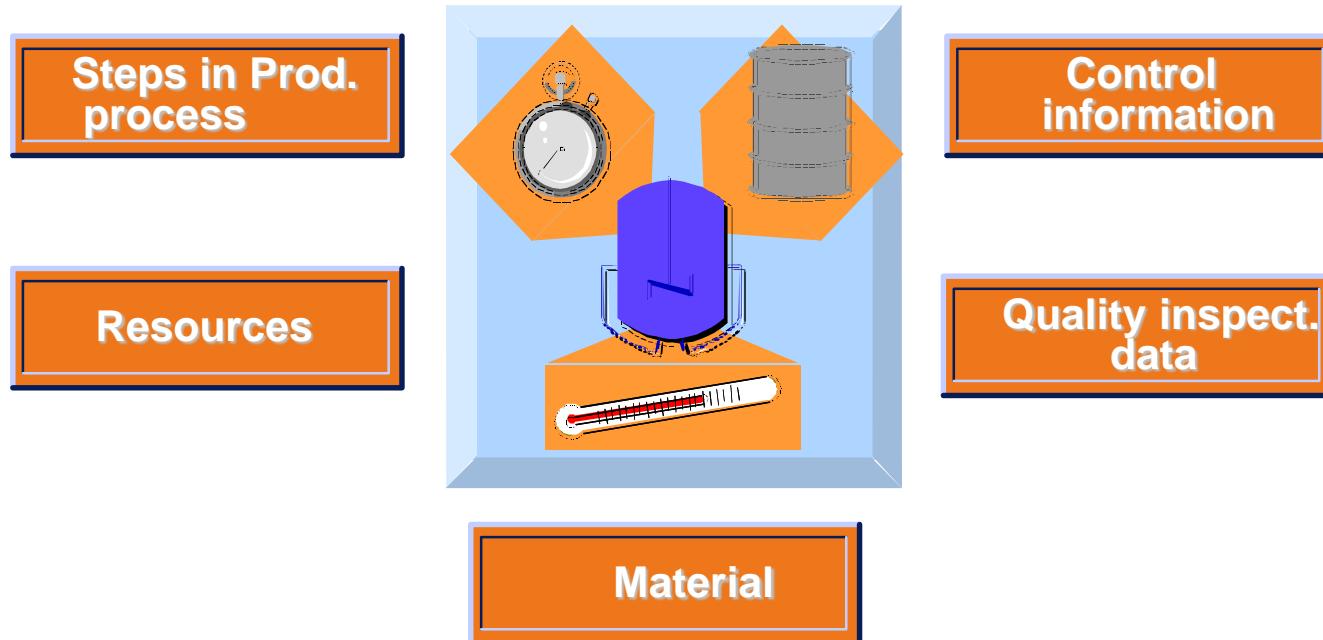
Master data - Master Recipe

- In the master recipe, you describe the processes to be used for producing materials in your plant as well as the resources and ingredients required for production.
- Master recipes are mainly used for planning the manufacture of products. However, you can also use them to describe the clean-out or changeover of a production line.
- Master recipes are used as a reference for process orders as well as the basis for product costing

Master data - Master Recipe

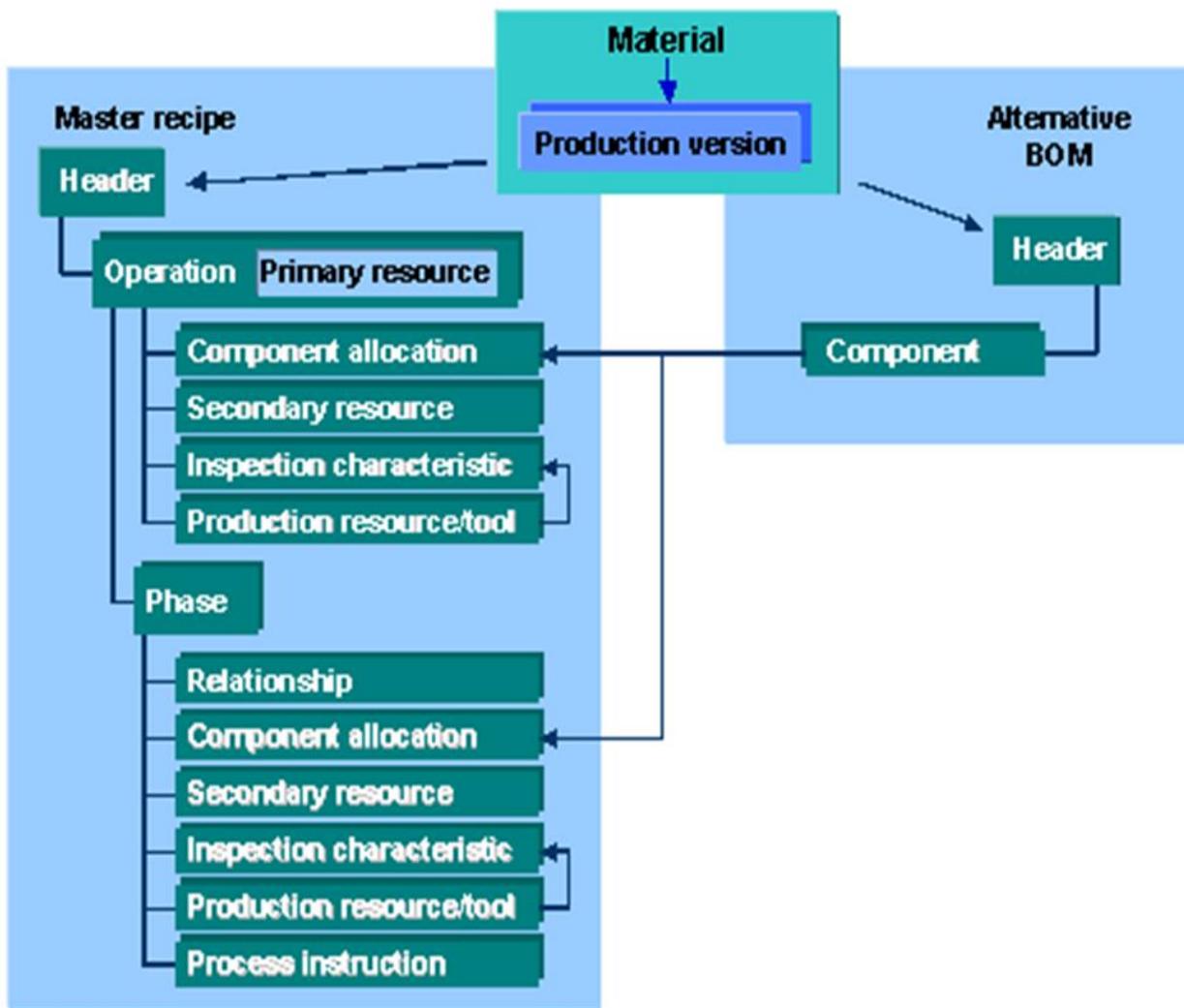
- A master recipe consists of a header and several operations, each of which is carried out at a primary resource. An operation is subdivided into phases.
- A master recipe contains process control data that can be stored in the following way:
 - in the form of characteristic-based process instructions, which you define in the operation overview for the phases.
 - in the form of X Steps, that you maintain in the XStep editor (XSteps).

Master Recipe



→ Process order → Control Recipe

Master data — Master Recipe structure



Master Recipe

Definition

A recipe describes the processing steps required to produce a material or provide a service in the process industries

Examples

The following is a typical recipe.

Work Step

0010 Crushing

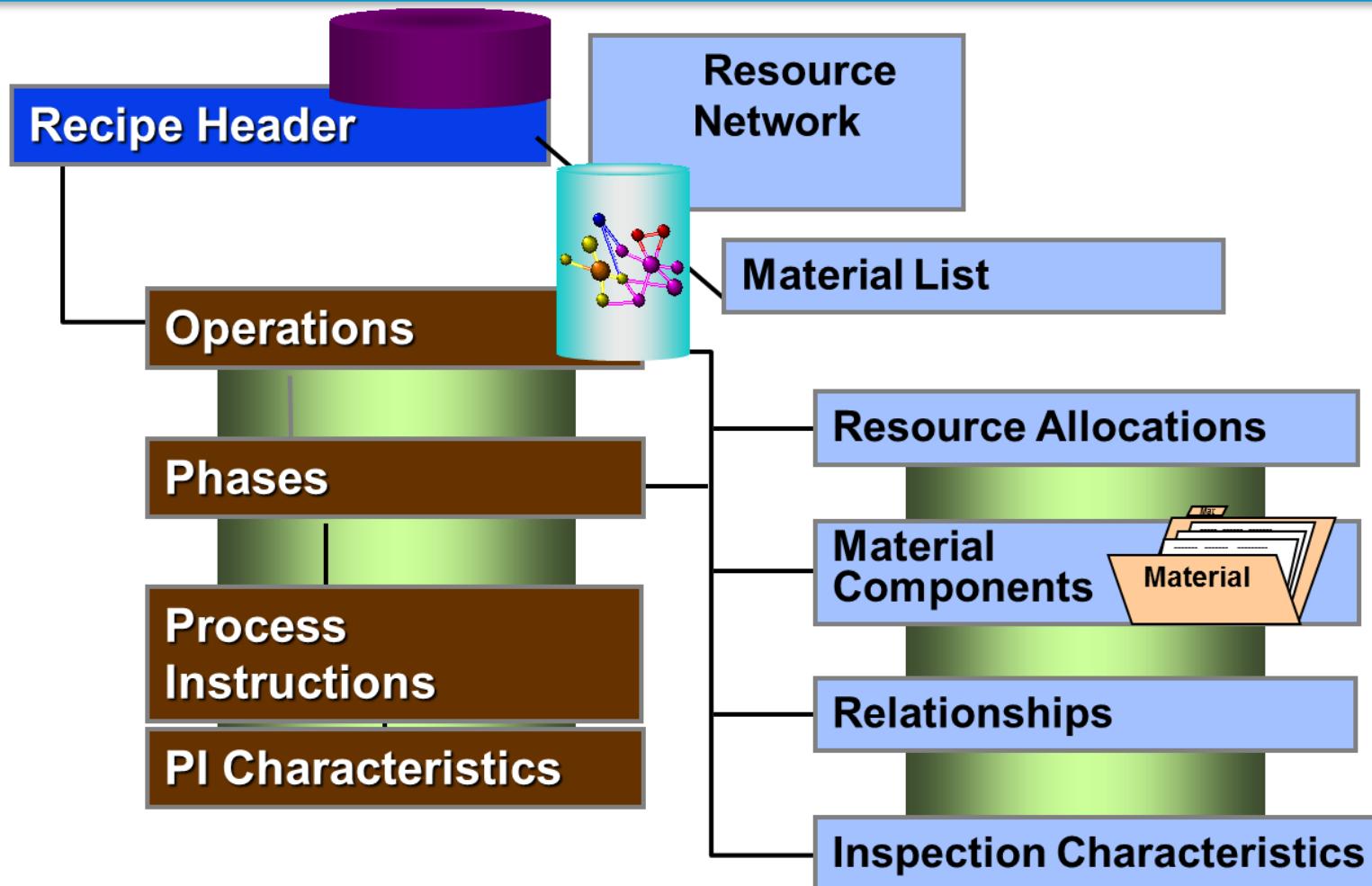
0020 Grinding

0030 Checking

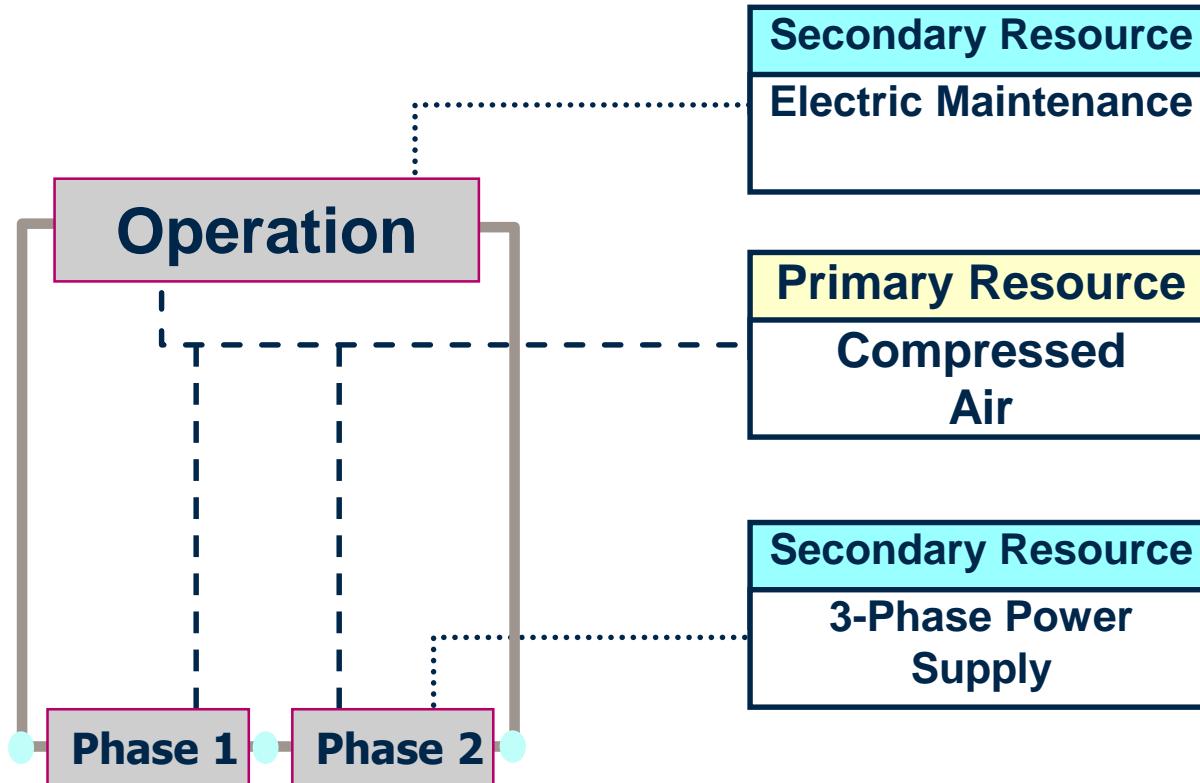
0040 Fine Grinding

0050 Final Check

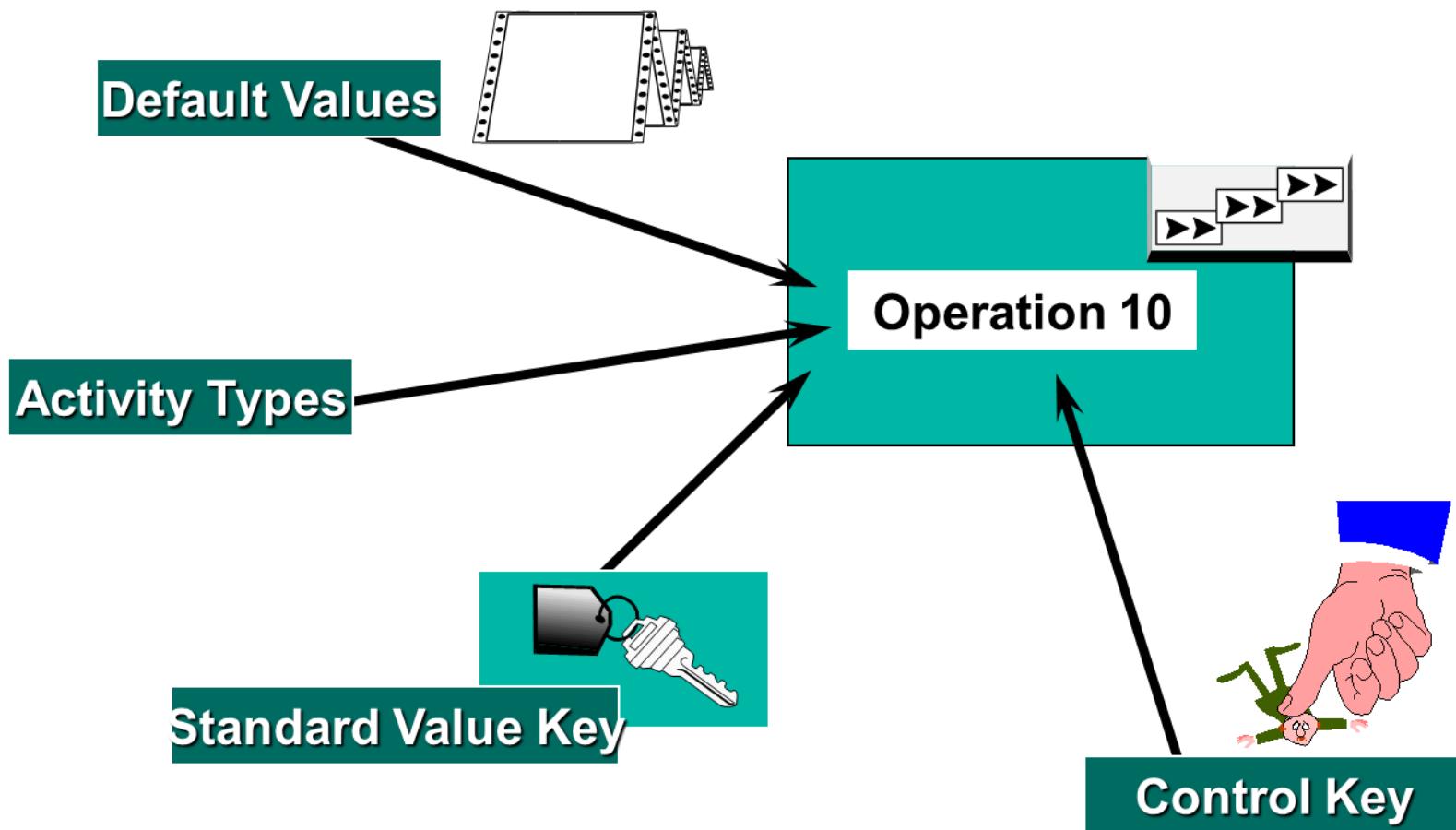
Master Recipe Structure



Recipe Resource Requirements



Relationship between Resources and Operation

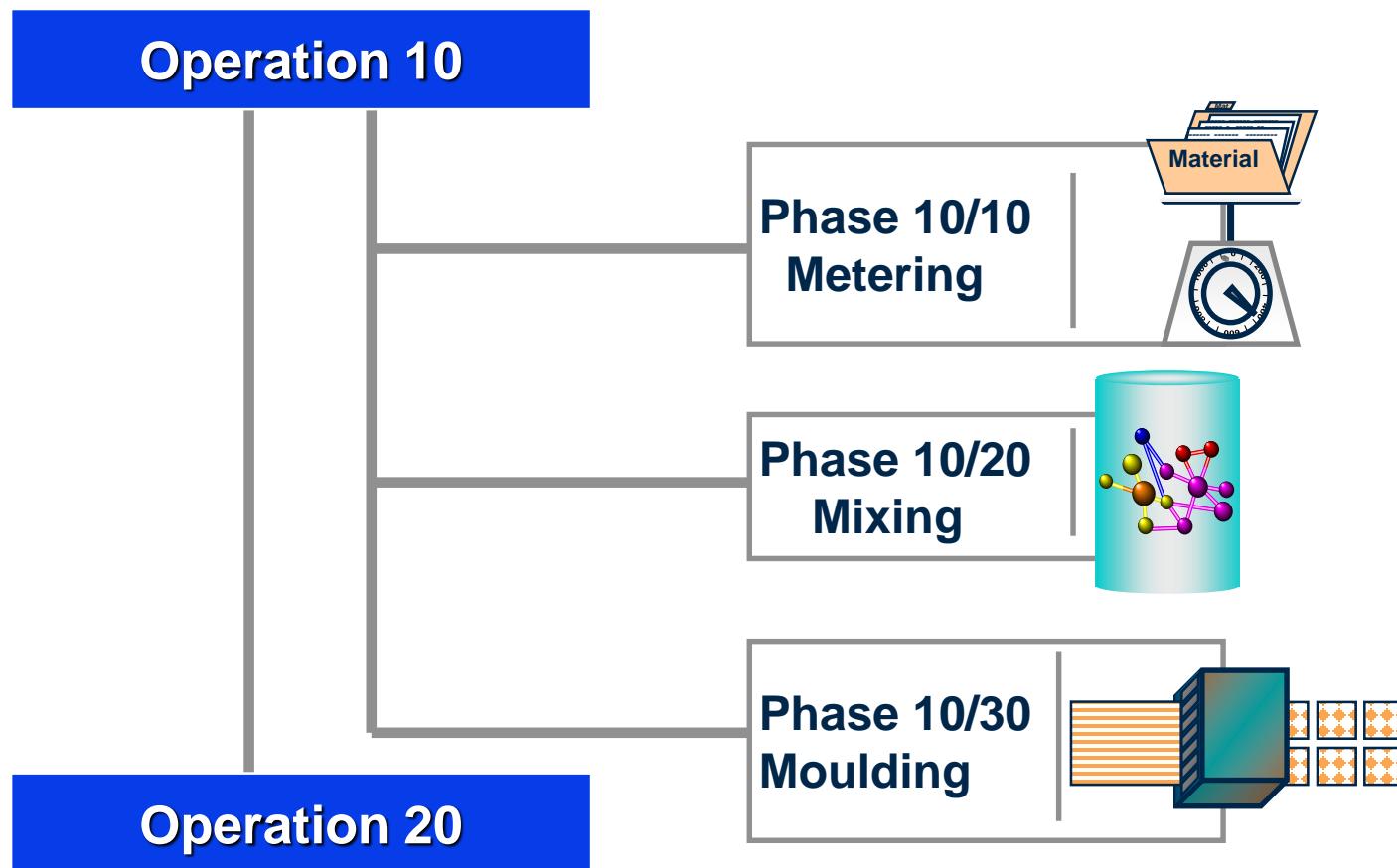


Recipe Materials

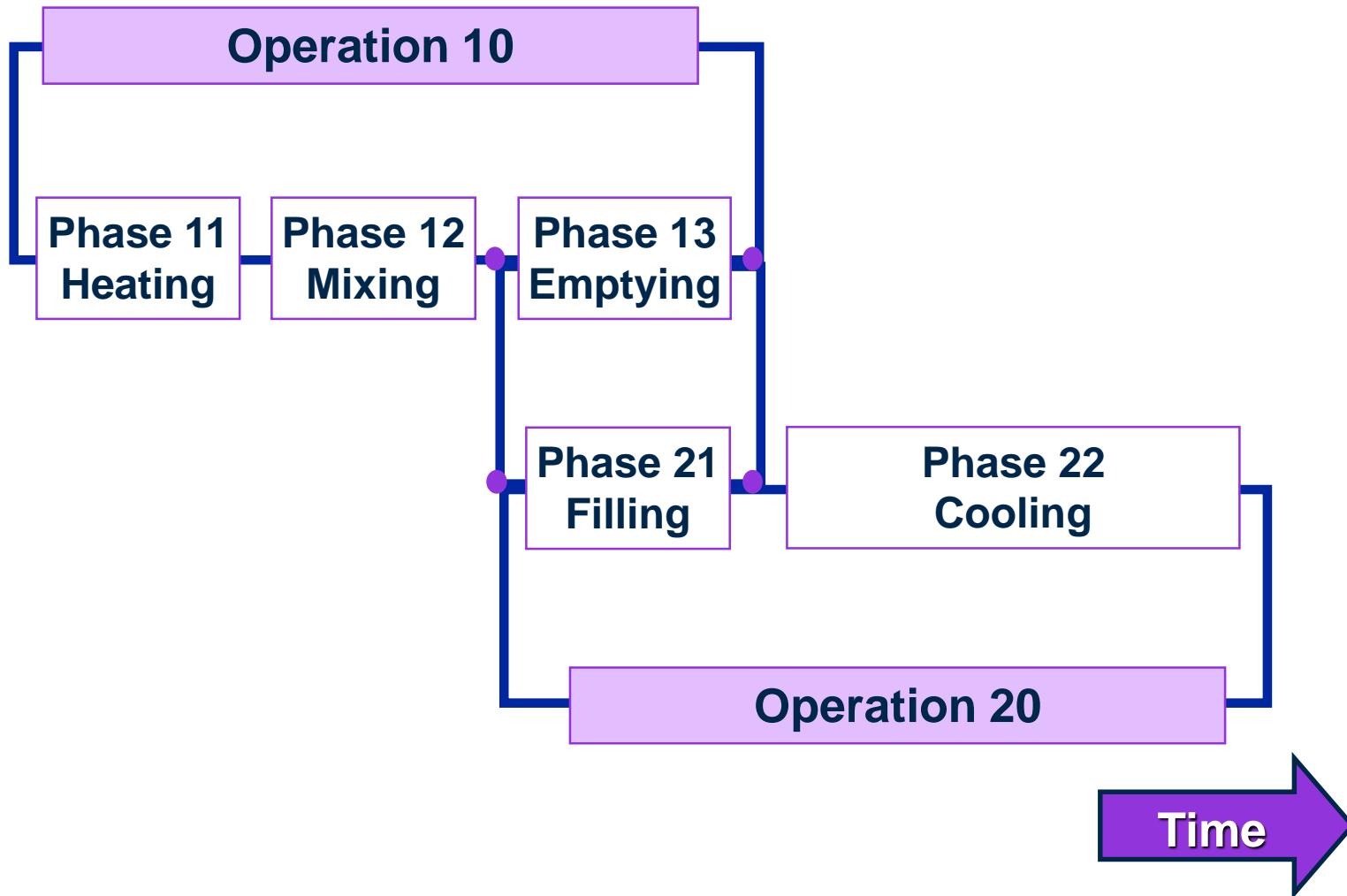


Material List Of Recipe
Semi 1
Raw 1
Raw 2
Raw 3
Semi 2
Co-Prod 1

Phases



Operations/Phases/Relationships



Master data – Master Recipe view

The screenshot shows the SAP interface for creating a master recipe. The title bar reads "Create Master Recipe: Recipe". The toolbar includes standard SAP icons for file operations like New, Open, Save, Print, and Help. The main area has fields for Recipe group (N201RP), Recipe (2), and Plant (N201). A status bar indicates "Deletion flag" and "Long text exists". Below these are tabs: Recipe header, Operations, Materials (which is highlighted with a red box), and Administrative data. The main grid displays recipe operations (Operat., P..., Sup..., De..., Resource, Co..., Lo..., Standa...) with their descriptions and associated resource types (PI01, PI02, etc.). The "Materials" tab shows a list of resources with their descriptions and base quantities (e.g., 100 T0). The row for "Crusher Dummy" is highlighted with a yellow background.

Operat.	P...	Sup...	De...	Resource	Co...	Lo...	Standa...	Description	Len...	Rel...	Cla...	Obj...	Base qty.	Un	1st std.v
0010				N201CR01	PI01									100	T0
0020	<input checked="" type="checkbox"/>	0010	01	N201CR01	PI01			LIMESTONE PRIMARY CRUSHER	X					100	T0
0030				N201CR02	PI01									100	T0
0040	<input checked="" type="checkbox"/>	0030	01	N201CR02	PI01			SECONDARY CRUSHER	X					100	T0
0050				N201CRDM	PI03									100	T0
0060	<input checked="" type="checkbox"/>	0050	01	N201CRDM	PI03			Crusher Dummy	X					100	T0
0070					PI01				X					100	T0
0080					PI01				X					100	T0
0090					PI01				X					100	T0
0100					PI01				X					100	T0
0110					PI01				X					100	T0
0120					PI01				X					100	T0
0130					PI01				X					100	T0
0140					PI01				X					100	T0
0150					PI01				X					100	T0
0160					PI01				X					100	T0

Master data – Master Recipe view

Display Master Recipe: Operation

The screenshot shows the SAP interface for displaying a master recipe operation. At the top, there's a toolbar with icons for navigation and file operations. Below it, the header information is displayed:

Recipe group	50000042	Vanilla Ice Cream
Recipe	1	Plant 3100 Chicago
Oper./Act.	1200	<input checked="" type="checkbox"/> Ph Pack Ice Cream
Sup. operation	1000	<input type="checkbox"/> LongText Standard text key

Below the header, there are tabs for General data, Standard values, User fields, Process instructions, and Relationships. The General data tab is selected. It contains the following fields:

Control key	PI01	Master recipe/process order
Base Quantity	100	KG
Charge Quantity	1	KG Equals
Operation Qty	1	KG
Resource	T-VI300	Mixer 3
Plant	3100	
Duration	10	MIN Activity Type 1420
<input type="checkbox"/> Flex. duration		

Header
Data

Operatio
n data

Process Management

Purpose

You can use this component to coordinate the exchange of production-relevant data between the SAP R/3 System and the SAP R/3-independent production level. The production level can be controlled as follows:

- Manually

The planned production steps are carried out manually by the process operator

- Automated

The planned production steps are carried out automatically by the process control system.

- .Partially-Automated

The planned production steps are carried out both manually by a process operator and automatically by a process control system

Process Management

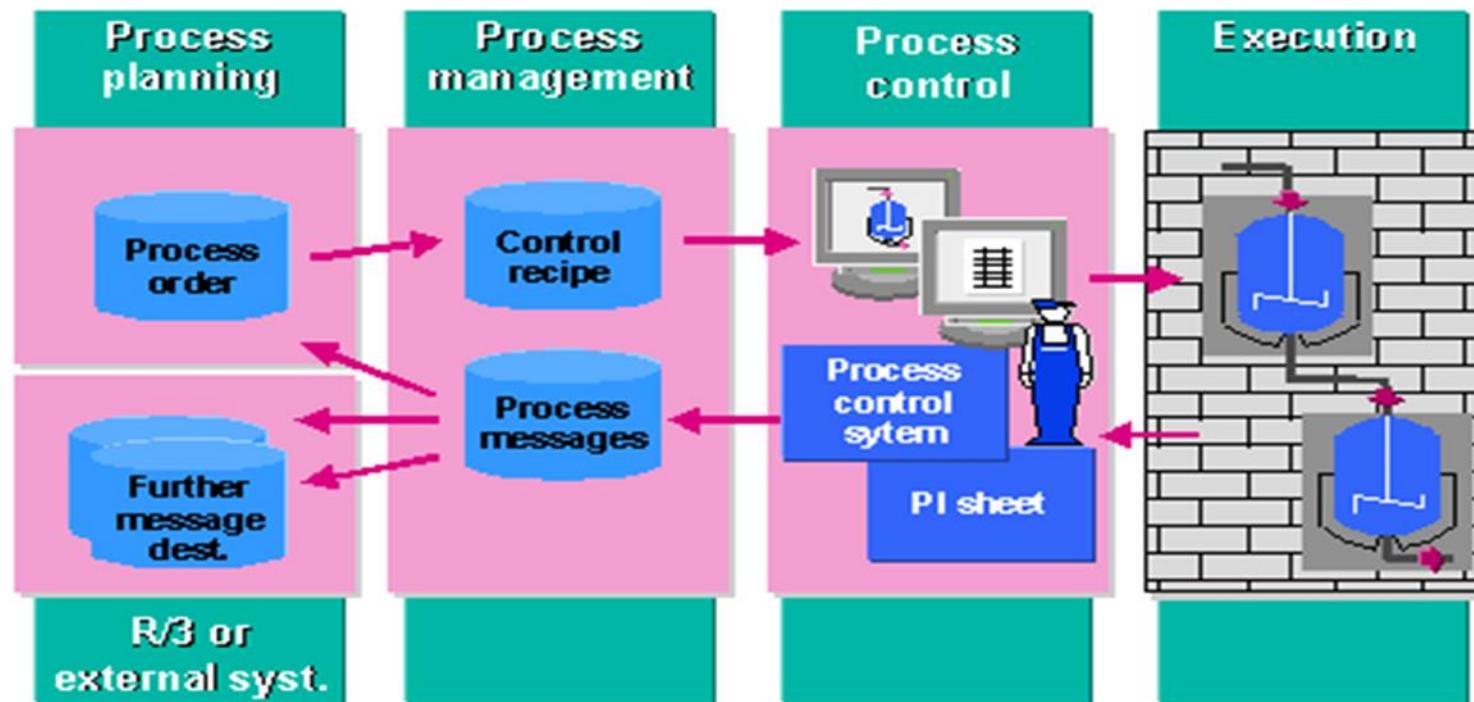
To settle a process order, the actual quantities produced and the time needed must be confirmed from production. Process management supports the direct confirmation from the PI sheet and process control system to the process order by sending process messages to predefined message destinations.

Process Management

Functions supported by Process management;

- Receiving control recipes from released process orders
- Sending control recipes to process operators or process control systems.
- Preparing process instructions as texts so that they can be displayed and edited on the screen by the process operator
- Receiving, checking, and sending process messages with actual process data
- Monitoring process messages and control recipes
- Manually creating process messages

Process Management

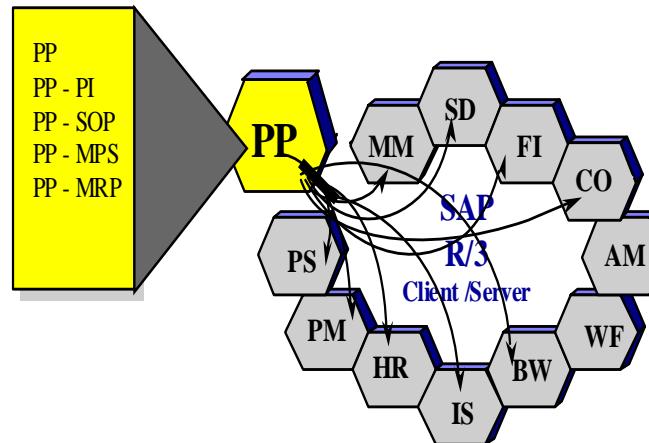


Integration with other modules

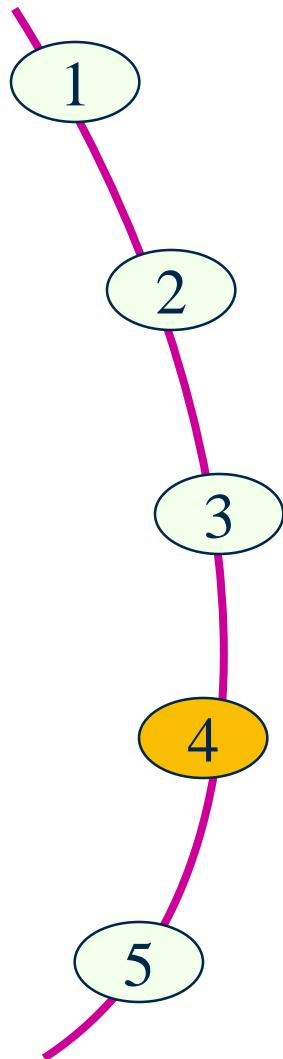
The SAP PP-PI module interfaces with:

- Sales and Distribution (SD)
- Materials Management (MM)
- Controlling (CO)
- Project System (PS)
- Human Resources (HR)
- Finance (FI)
- Plant Maintenance (PM)
- Investment Systems (IS)
- Business Warehouse (BW)

PP Integration with the R/3 System



Production Planning Overview –Process Industries



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HelpMe

Practice & Exercise



Illustration

Step 1

Production Planning activities starts as given below.

- Creating demand in case of Make to stock scenario
- Referring from Sales information systems/Sales Order in case of make to stock scenario.

Illustration

Step 2

MRP execution

Based on demand like Planned independent requirements in case of MTS or Sales Order in case of MTO, material requirements are planned thro MRP run.

Planned Orders for items to be produced at In-house and Purchase requisitions for external procurable items are generated.

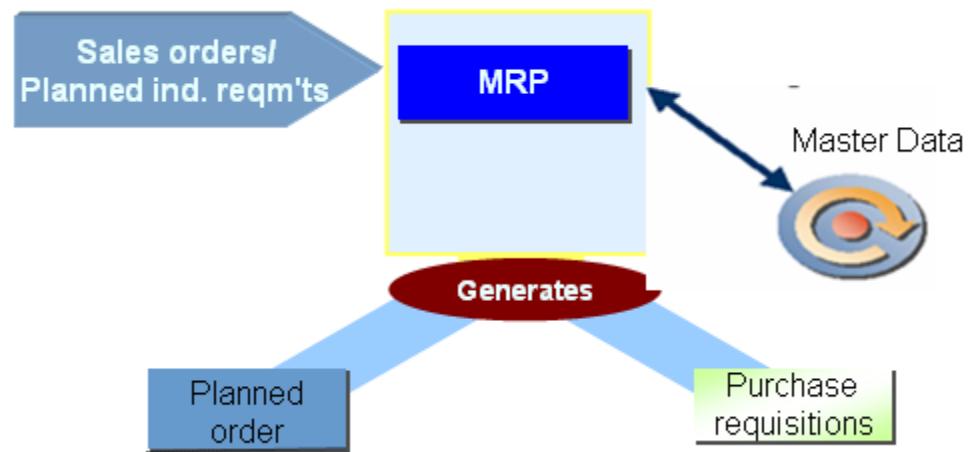
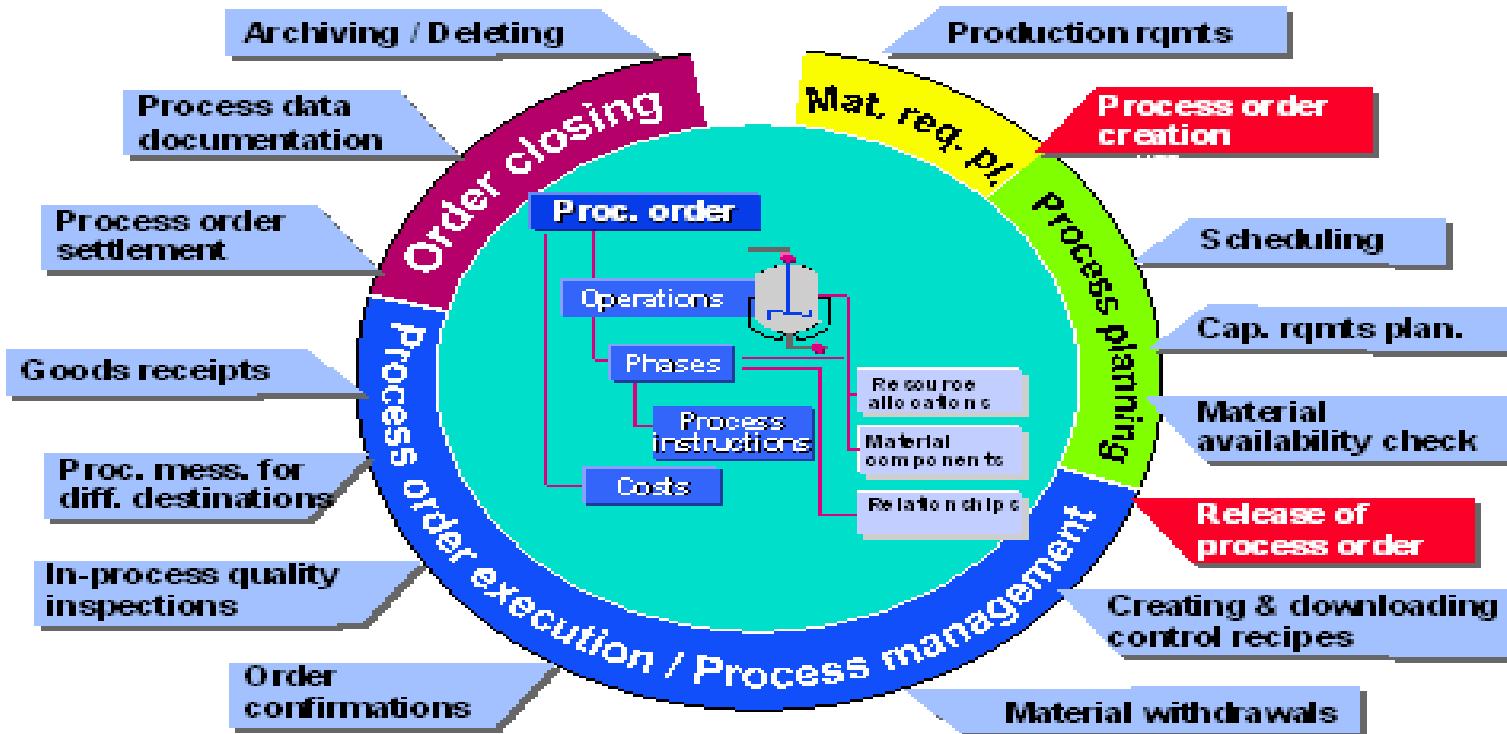


Illustration – Process Order Execution

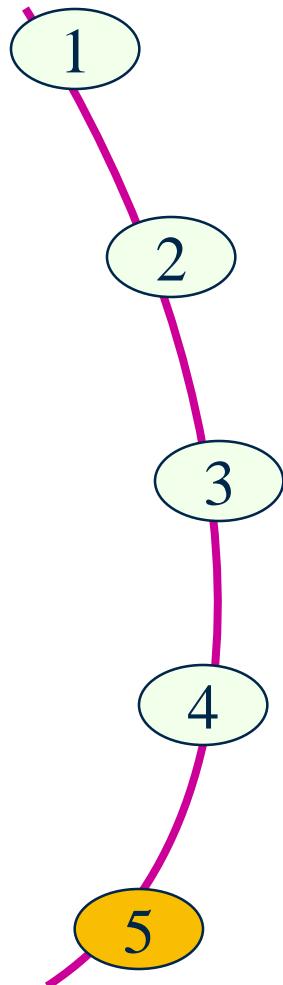
Step 3



List of Transactions

CRC1	Create Resource
C201	Create Recipe
MD61	Create PIRs
MD02	MRP Run
MD04	Stock Requirement List
COR1	Create Process order
CORK	Confirm Process order

Production Planning Overview –Process Industries



PrepareMe

TellMe

ShowMe

LetMe

HelpMe

References – Table info

Production Planning –Process Industries
is distributed in following tables

- MAST-Material BOM
- STKO-BOM Header
- STOP-BOM Positions (detail)
- MAPL-Assignment for Task Lists to Materials
- PLKO-Recipe Group Header
- PLSO-Recipe Group Sequence
- PLPO-Recipe Group Operations
- AFKO-Process Order Header
- AFPO-Process Order Position (details)

Reference

For details refer other training materials as listed below, subject to availability.

Document #	Description
PP0002	PP Master Data Overview
PP1001	Long Term Planning
PP1002	Master Production Scheduling (MPS)
PP1003	Materials Requirement Planning (MRP)
PP1004	Capacity Planning
PP1005	Repetitive Manufacturing (REM)
PP1008	Material Master - PP Master Data
PP1009	Bills of Materials
PP1010	Work Centers
PP1011	Routings
PP1012	SOP
PP1013	Demand Management
PP1014	Production Order Management
PP2002	Variant configuration
PP2002	Eng change management

Summary

- Process industries – Where production is taken place in dedicated process line for continuous production over entire period. Ex Chemical Industries.
- Master Recipe – Where you describe the processes to be used for producing materials in your plant as well as the resources and ingredients required for production.
- Process Order – In a process order, you copy the process described in a master recipe and adjust it to the actual production run.
- Control Recipe- Using control recipes, we transfer control data from the process order to process control. The information contained in a control recipe and the destination to which it is sent are user-defined
- We can use PI sheets to exchange data between the partially or completely manually operated production level and the R/3 System (PP-PI).



Review Questions

1. We can use PI sheets to exchange data between the partially or completely manually operated production level and the R/3 System (PP-PI).

Check whether the statement is true or false

- a. True
- b. False

2. Using control recipes, we transfer control data from the process order to process control

Check whether the statement is true or false

- a. True
- b. False

3. Master recipes are used as a reference for process orders as well as the basis for product costing

- a. True
- b. False



PP PI Overview

THANK YOU

