BRASI
Empowering Education

COURSE HANDBOOK

CSCF

Certificate in Supply Chain Fundamentals

Module 2: PLANNING

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Module 2

CSCF

CERTIFICATE IN SUPPLY CHAIN FUNDAMENTALS

BRASI
Empowering Education

PLANNING PROCESSES

Welcome to the CSCF self-paced course.

In this course, you will learn the fundamentals of procurement, procurement processes and evaluations, contract management & strategies, covering the key concepts and terms. It is a self-paced course, allowing you to complete it on your own timing.

This course consists of four modules. Each module contains a knowledge check, which is a learning quiz, providing explanation when an incorrect answer is selected. There is also an advanced test based on the case studies that will help you to brainstorm and answer by using the knowledge you got in this course.
In addition to the interactive slides, you also have access to the handbook comprising the slides and notes. The handbook is already set up for printing, which you can do on your home printer or get it printed at a copy and print shop.

Once you have reviewed all the modules, then you may take the test which is a separate section in the course. Upon passing the test, you will be able to download your certificate. Your certificate will have a unique ID, which is helpful in responding to verification requests in connection with higher education or employment.

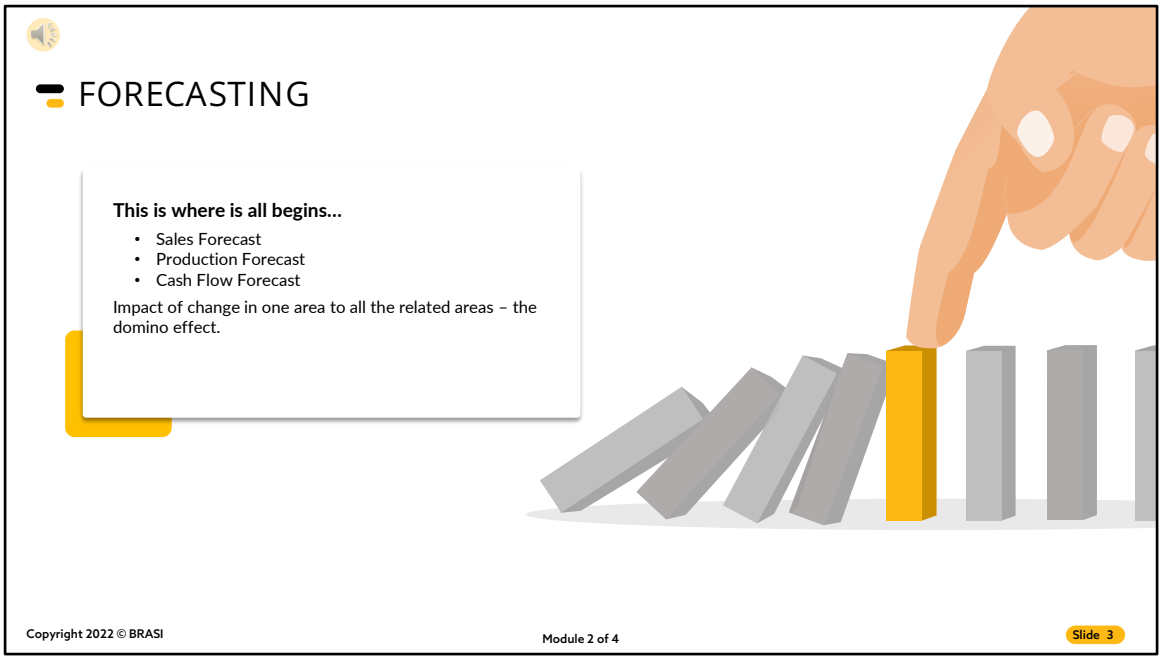
Fasten your seat belt and get into the action! Good luck!

Learning objectives

1. Forecasting – this is where is begins
2. What rides on a forecast?
3. Forecasting techniques - Qualitative
4. Forecasting techniques – Quantitative
5. Sales & Operations Planning
6. Enterprise Resource Planning Systems
7. Master Production Scheduling
8. Materials Requirement Planning
9. Capacity Requirements Planning
10. Components of lead time in manufacturing

Learning objectives for the CSCF certificate program are based on industry research and stakeholder feedback. These include familiarization with the basic principles and practices, essential skills, tools and methodologies of Supply Chain Management.

You will note that the learning objectives are listed at the beginning of each module, and the portion relevant to each module is covered in that module. This is to help you keep a tab on the overall course content.



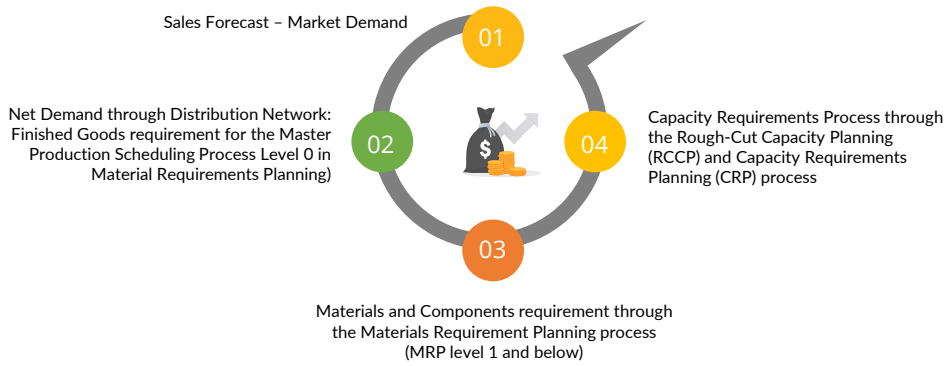
Forecasting is a planning tool that helps management in its attempts to cope with the uncertainty of the future, relying mainly on data from the past and present and analysis of trends for more than one year.

Sales forecasting is the process of estimating future sales. Accurate sales forecasts enable companies to make informed business decisions and predict short-term and long-term performance.

Companies can base their forecasts on past sales data, industry-wide comparisons, and economic trends.

FORECAST OF SALES

Sales forecast is the first step in business planning and triggers the supply planning cycle, as follows:



Product demand begins from the end-customer and travels through the various stages and levels of the product hierarchy, translating into the net demand for raw materials and related inputs.

Demand for the final product sold to the end customer responds to market trends, competition and other factors independent of the supplier's control, hence called Independent Demand. This must be forecast using the available quantitative and qualitative tools, and carry a degree of inaccuracy, hence it is still an estimate, based on trends and certain assumptions.

Demand for the components and raw materials are linked to the demand of the final product, hence called Independent Demand. Once the demand for the final product is known, then the dependent demand for the various stages of manufacturing, through to the purchased raw materials and components, is calculated by the materials requirement planning process, which may be done manually, on a spreadsheet, or using a materials requirement planning system.

FORECASTING TECHNIQUES: QUALITATIVE

01 These include opinion surveys, group discussions, and feedback based on experience.

02 A forecast arrived must include the bases and assumptions on which it is built, in order to track any changes when measuring forecast accuracy.

Qualitative techniques may be used due to lack of historical information as in the case of a new product introduction, or because of new emerging trends that could potentially impact the existing products.

Since any forecasting exercise, whether qualitative or quantitative, must produce a set of numbers, there is more bridging needed between assumptions and numbers in case of qualitative portion, than the quantitative portion of a forecast.

Different types of qualitative forecasting

1. **Delphi Method**
   The Delphi method uses a variation of the consensus approach where a group of experts convene in a room to discuss their views on a specific event or issue. However, the Delphi method removes the cult of personality that often results when an expert with a strong personality overrides the others' opinions.

2. **Jury of Executive Opinion**
   The jury of executive opinion qualitative forecasting model relies on the opinions of high level managers. Companies may incorporate statistical models to help with the analysis. The resulting group estimate becomes the forecast. Small businesses may find this model easier to use because of its simplicity.

3. **Grassroots Forecasting**
   The grassroots forecasting method requires a sophisticated, knowledgeable sales force. It works best in non-retail environments where sales people or account managers have deep customer relationships and thoroughly understand their customer base.

4. **Market Research**
   The market research method involves consulting with current or potential customers. Companies conduct market research to obtain information to use to make accurate predictions about the size, scope, demographics and buying habits of a particular product and service market or niche.

This slides shows the different types of qualitative forecasting available to use.

FORECASTING TECHNIQUES: QUANTITATIVE

Quantitative techniques are based on history of product sales. In case of new product, data from similar products may be used in combination with adjustment factors.

Common Quantitative Forecasting techniques are as follows:

1. **MOVING AVERAGE METHOD.**
   Simple moving average of 'n' number of past periods.

2. **EXPONENTIAL SMOOTHING METHOD.**
   Utilizes an 'Alpha' factor between 0 and 1, reflecting the nature of demand; a low factor for stable demand and a high factor for fast changing demand.

In principle, qualitative techniques use historical data to project the future. Quantitative techniques range from a simple projection of recent history using the moving average method, to sophisticated models using exponential smoothing factors which allows to adjust emphasis between recent trends and log term view.

FORECASTING TECHNIQUES: QUANTITATIVE

Forecast, Average, Deviation and Bias

Month	Original Forecasting	Actual	Variance	MAD	Bias	Bias%
January	100	95	-5	5	-5	5.0%
February	100	89	-11	11	-16	16.0%
March	100	105	5	5	-11	11.0%
April	100	103	3	3	-8	8.0%
May	100	105	5	5	-3	3.0%
June	100	104	4	4	1	1.0%
July	100	103	3	3	4	4.0%
August	100	88	-12	12	-8	8.0%
September	100	110	10	10	2	2.0%
October	100	110	10	10	12	12.0%
November	100	100	0	0	12	12.0%
December	100	101	1	1	13	13.0%

Demo - Forecasting

This slide shows a screenshot from the Excel file containing the forecasting spreadsheet.

The file is available in your learner portal, and contains the formulas and relationships used in sales forecasting.

Difference between qualitative and quantitative forecasting techniques

There are several differences between qualitative and quantitative forecasting techniques and their use in supply chain management or logistics. Qualitative forecasting deals with the opinion of managers or customers survey which helps to get an overview of forecasted information. Whereas quantitative forecasting deals with numerical data.

SUPPLY CHAIN PLANNING

What is supply chain planning (SCP)?

Supply chain planning (SCP) is the component of supply chain management involved with predicting future requirements to balance supply and demand.

Supply Chain Management is broken down into the stages of planning, execution and shipping. Supply chain planning and supply chain execution (SCE) are the two main categories of SCM software.

HIERARCHY OF SUPPLY CHAIN PLANNING

Mid-Term/Business Planning.
Driven by mid-term profitability objectives. Defines the parameters for operations/execution. Time horizon – current to three years out, in monthly or weekly time buckets.

Strategic/Long-Term Planning.
Driven by long term growth objectives, based on competitive environment. Time horizon 3 to 10 years, in yearly or quarterly time buckets. Defines the scope for Mid-Term Planning.

Operations/Tactical Planning.
Driven by customer service targets. Performs within the scope defined by planning. Current to three months, in weekly or daily time buckets.

The supply chain of an organization includes all the inbound entry of raw materials or resources and the outbound exit of finished products to other members of the distribution channel known as channel partners.

It must be noted that the **supply chain management hierarchy** is structured with a view to ensure greater clarity in the traffic not only of the resources but also of information.

To establish a failsafe supply chain, the scale of production, the corresponding demand patterns, prices and a wide gamut of other parameters need to be taken into account. All channel partners and market conditions greatly influence the supply chain strategies of an organization.

The **supply chain management hierarchy** ensures proper delegation of roles and responsibilities at various levels in accordance with the organizations' line of business. For instance, the supply chain strategies of a modern trade retail giant would be quite different from those of a large FMCG company

HIERARCHY OF SUPPLY CHAIN PLANNING

Strategic/Long-Term Planning. Planning and performance tracking is mostly reduced to financial terms: Market share, Net Profit, Cash Flow, Leverage, Assets, etc. Split by Business Units, Product Categories and Markets.

Mid-Term/Business Planning. Planning and performance tracking includes both financial and physical units. Split by Business Units, Sites, Customers, Vendors and Channel Members. Focus in resource management and utilization.

Operations/Tactical Planning. Planning is mostly in the form of schedules, focusing on flow of goods and services, maximizing efficiencies at a tactical level. Customer Relationship Management – product substitutions/Available to Promise. *DELIVERS THE COMPANY'S VISION*

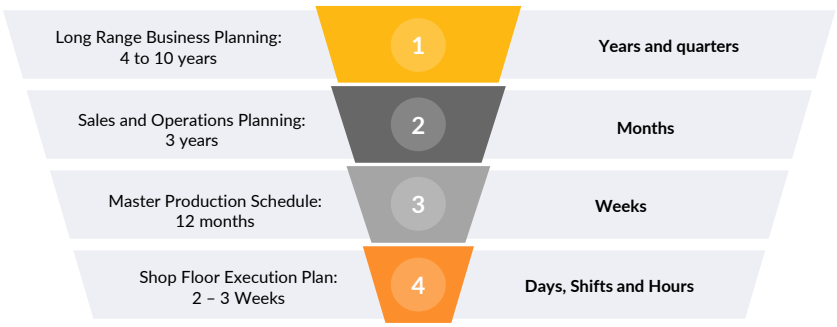
The strategic Level is involved in taking the long term decisions. These decisions are related to the quantity of materials to be ordered in line with the production capacity of their manufacturing units, the frequency of order batching, inventory levels, transportation facilities and so on.

The planning Level takes short term decisions regarding weekly demand forecasts with the help of primary and secondary market data, trend analyses, etc. Here, activities of production planning and planning of material requirement are also carried out by choosing the right linear programming software.

The Tactical Level is concerned with the ultimate execution of the supply chain strategies at the floor level as communicated and directed by the preceding hierarchies. The activities are carried out on a daily basis with the strict objective of order fulfillment

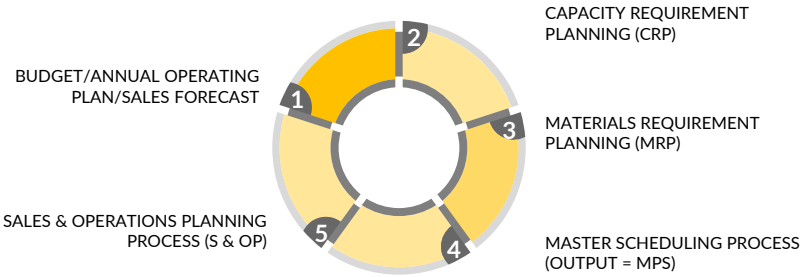
PLANNING HORIZONS AND TIME BUCKETS

Planning horizons may be sub-divided into smaller units for finite scheduling and tracking. These sub-divisions are called 'time buckets' and are proportionate to the overall planning horizon.



The farther we look into the future, the numbers are more aggregate and the milestones are further apart. Conversely, as we get closer to the event, more details become available and the activities can be scheduled in more specific terms.

SC PLANNING PROCESSES



Enterprise resource planning is the integrated management of core business processes, often in real-time and mediated by software and technology.

These business activities can include product planning, purchasing, manufacturing, marketing, inventory management, shipping and finance.

SALES & OPERATIONS PLANNING PROCESSES (S&OP

S & OP comprises of monthly meetings between Sales, Production, Engineering/Product Development, Finance, Quality, and any other concerned function.

Plans and decisions made in the S&OP meetings become binding to all concerned parties and constitute the authorized 'build plan' for the respective supply units.

The Planning Horizon is three years; both financial and physical units are discussed.

Sales and Operations Planning is central to supply chain management, as it brings together the primary stakeholders to review the demand and supply situation.

Sales and Operations Planning is a series of meetings held once a month to review sales against forecast and the product supply to meet the demand.

ENTERPRISE RESOURCE PLANNING (ERP)

Advancement in information technology makes it easier to extend the planning beyond the immediate manufacturing environment, giving birth to Enterprise Resource Planning (ERP), which encompasses all processes related to the production, storage, quality control and delivery of the product or service.

Enterprise resource planning is a business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

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Today, there are many ERP software are in use, making it possible to manage operations in real time and provide information for decision making.

Role of ERP in Supply Chain Management

Demand and planning

An ERP system meant for supply chain management can automatically create demand when orders are received. ERP streamlines supply chain management by creating effective job scheduling. As a result, supervisors can know in real time what resources are being consumed and which resources are used.

Procurement

An ERP meant for SCM offers more effective way to manage procurement and supply of the goods, services, and other resources across the chain.

Production

The ERP system enables the creation of bill of material (BOM) for each item. After production starts, all records for machine and labor resources are created and updated in real time. All shipping documents are recorded through the ERP system for proper supply chain management, eliminating errors due to manual process.

Shipment

Once the item has been shipped, the ERP software can create an invoice that has to be finally sent to the customer. An ERP system helps in maintaining a central repository for customer shipments and all delivery details to ensure that items are delivered on time.

ERP solutions has been an integral part Supply chain management. Manufacturers need to interact with various suppliers and partners to obtain the raw materials and resources at the right time and at the right amount to bring finished goods to market. Businesses are actively focusing on several supply chain strategies to boost plant productivity, enhance product quality, and cut down on manufacturing costs. As the operations become more extensive and globalized, the integration of SCM becomes all the more important. ERP solution can support multiple modes, such as make-to-order, engineer-to-order and configure-to-order and provide operations support across multiple sites in real time.

ERP – BENEFITS AND LIMITATIONS

1. ERP can improve quality and efficiency of the business.
2. ERP supports upper-level management by providing information for decision making.
3. ERP creates a more agile company that adapts better to change.
4. ERP can improve data security.
5. ERP provides increased opportunities for collaboration.
6. Customization can be problematic.
7. ERP can cost more than less integrated or less comprehensive solutions.
8. Integration of truly independent businesses can create unnecessary dependencies.
9. Extensive training requirements take resources from daily operations.
10. High ERP switching costs can increase the ERP vendor's negotiating power, which can increase support, maintenance, and upgrade expenses

You will find some features and benefits of the enterprise resource planning software listed on this slide.

There are some limitations too, of the enterprise resource planning software, as shown here.

KEY COMPONENTS OF ERP RELATED TO SCM

MASTER DATA

- Material/SKU Numbers
- Material Master
- Bill of Materials
- Resource Master
- Vendor Master
- Recipe or Routing
- Customer Master
- Shop Floor Calendar

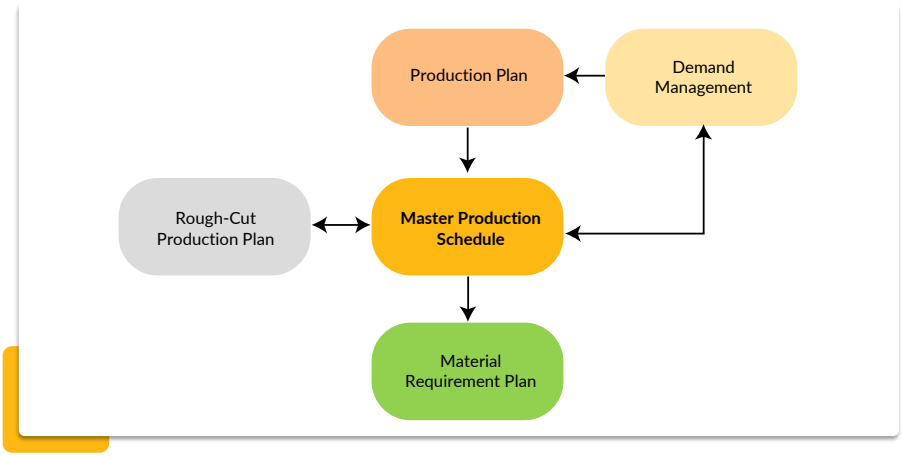
TRANSACTIONAL DATA

- Purchase Order
- Production Order
- Sales Order
- Pick List
- Inventory
- Receipts/Issues

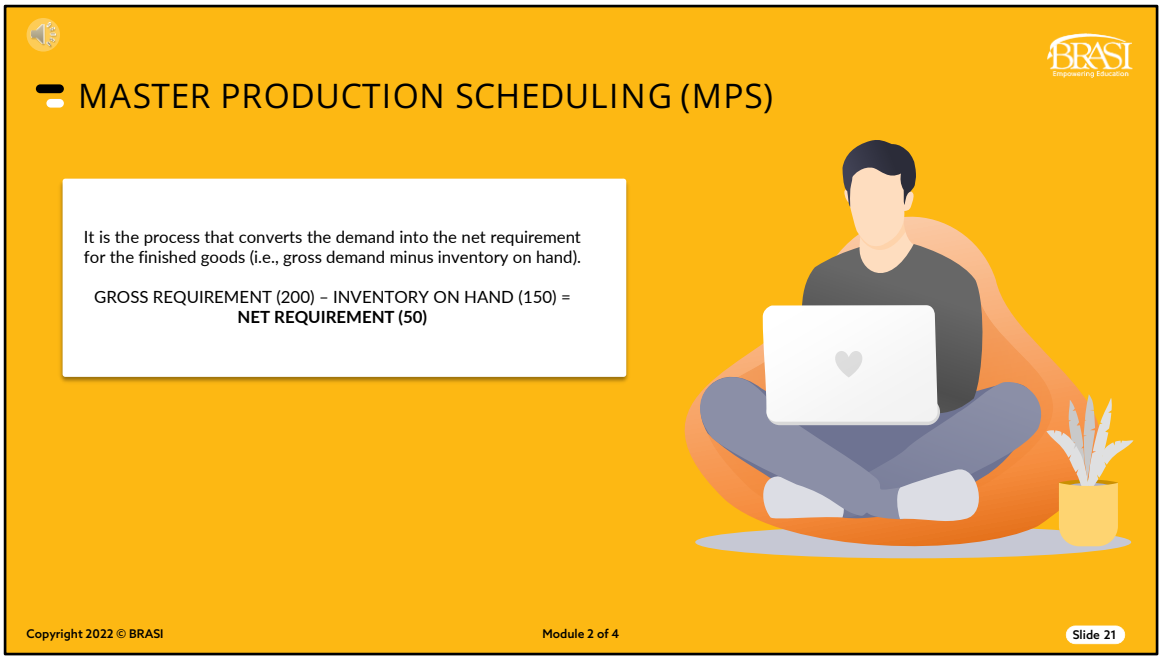
The enterprise resource planning software works with a number of data tables and code that links the table with the respective calculations and algorithms.

These tables and algorithms form the structure of the software.

Definition of Master Production Schedule



Master Production Schedule (MPS) is a way of planning what products need to be made and when they need to be made. This is used in any industry where production is necessary, like manufacturing, construction, and logistics.

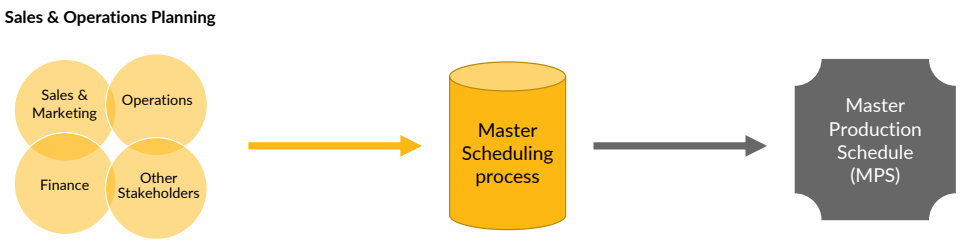


A Master Production Schedule is the plan that a company has developed for production, inventory, staffing, etc. It sets the quantity of each end item to be completed in each week of a short-range planning horizon. A Master Production Schedule is the master of all schedules. It is a plan for future production of end items.

Master Production Scheduling is the process that converts the demand into the net requirement for the finished goods with specific information such as part number, catalogue number, customer item number, etc. which becomes the input for the ensuing Material Requirements Planning, Capacity Requirements Planning and other related processes.

INPUTS AND OUTPUTS OF MASTER SCHEDULING

Decisions made at the Sales & Operations Planning meetings form the input to the Master Scheduling process, which generates the Master Production Schedule (MPS).

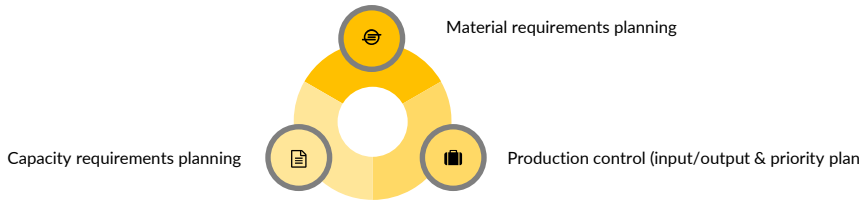


Output of the Master Production Scheduling process is the Master Production Schedule, usually with a plan horizon covering the longest lead time of manufacturing or sourcing.

The Master Production Schedule gives production, planning, purchasing, and top management the information needed to plan and control the manufacturing operation

MASTER PRODUCTION SCHEDULE

The Master Production Schedule drives the Materials Plan, Capacity Plan and Priority Plan:



The above are iterative (repetitive) processes, planning and re-planning as circumstances change.
A Reference must be maintained to track variance from the original plan.

Master Production Schedule is an input to the Material Requirements Planning, Capacity Requirements Planning and Production Scheduling.

TIME HORIZON OF MASTER PRODUCTION SCHEDULE

The time horizon of the Master Production Schedule spans the longest lead time for manufacturing or sourcing:

1

Raw Materials Supply = 8 weeks, Manufacturing = 16 weeks, QC Release and Shipping = 4 weeks = total 28 weeks Minimum MPS Horizon.

2

Materials (MRP) and Capacity (CRP) should be aligned in order for MPS to be feasible.

3

Time horizon for execution depends on the ability to change set-ups and components availability without disruption or additional cost.

4

A **master production schedule** is a plan for individual commodities to be produced in each time period such as production, staffing, inventory, etc. It is usually linked to manufacturing where the plan indicates when and how much of each product will be demanded.

This plan quantifies significant processes, parts, and other resources in order to optimize production, to identify bottlenecks, and to anticipate needs and completed goods. Since an MPS drives much factory activity, its accuracy and viability dramatically affect profitability.

MATERIAL REQUIREMENT PLANNING (MRP) PROCESS

This process converts the net demand for the specific finished goods into its component parts, including chemicals, raw materials, packaging and any MRO's (Maintenance, Repair and Operating supplies) that would be required to manufacture or source the required quantity of the finished goods.

Netting: Subtracting inventory from the gross demand in order to obtain the net demand. If the answer is below zero, then there is no net demand until depletion of the inventory.

Exploding: Splitting the parent item into the component parts, through the Bill Of Materials.

Offsetting: Subtracting the supply lead time (manufacturing or procurement) from the need date in order to determine the date when the process (manufacturing or procurement) should be initiated.

Material requirements planning is a production planning, scheduling, and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, but it is possible to conduct MRP by hand as well.

Material Requirements Planning process converts the net demand for the specific finished goods into its component parts, including chemicals, raw materials, packaging and Maintenance, Repair and the Operating supplies that would be required to manufacture or source the required quantity of the finished goods.

This is done through the Bill Of Materials for each finished product, in pretty much the same way as a recipe lists the ingredients to cook a meal

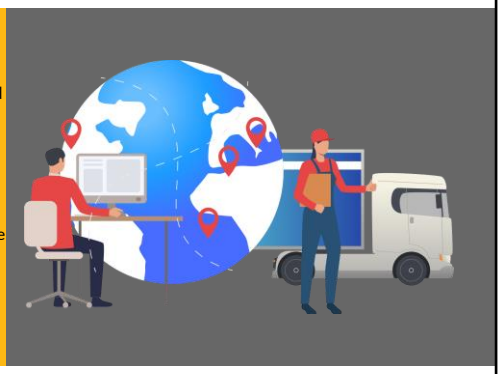
The Supply/Demand Equation

Gross Demand = Market Demand (Sales Forecast/Rolling Forecast (RF))
Net Demand = Gross Demand – Inventory On Hand (IOH)
Planned or Scheduled Receipts = Quantities to be received during a plan period
Projected Available Balance (PAB) = Inventory at the end of a plan period

PAB = IOH + Planned or Scheduled Receipts – Gross Demand

Example: At the beginning of week # 40, inventory on hand is 150 units, additional 300 units are scheduled to arrive during the week, and the gross demand during the week is 275 units. Calculate the Projected Available Balance at the end of week # 40.

PAB = 150+300-275 = 175 Units will be in stock at the end of week # 40.



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The Supply/Demand Equation (Contd.)

Exercise:

Gross demand during week # 50 is 700 units. Inventory on hand at the beginning of the week is 500 units. Target inventory at the end of week # 50 is 650 units. How many units need to be supplied during the week in order to achieve the ending inventory target?

PAB = IOH + Planned or Scheduled Receipts – Gross Demand

Ans:

Planning conventions:

- Opening inventory and planned receipts are available for use at the start of the period.
- Closing inventory is the remaining balance a the end of the period, available for use at the start of the next period.

The supply/demand expression is the basis for the MRP algorithm in the Material Requirements Planning software.

MRP PARAMETERS

MRP Parameters are those elements of data that are used in MRP calculation. These are:

1. **Lot Size:** May be Fixed or Variable. Generally, the Fixed lot size is the Economic Order Quantity, and must be ordered in the same quantity each time, even if the net demand is less than the lot size. Variable lot size depends of the demand, and is equal to order quantity. The term 'Lot' is used in case of discrete items (pieces) and 'Batch' in case of non-discrete products such as liquids.

2. **Safety Stock:** To buffer against the variability in supply and/or Demand Lead Time. Determination of Economic Order Quantity OQ and Safety Stock is discussed in the following chapter(s).

3. **Lead Time:** The time required to complete the operation from start to finish. Includes quality testing time and any other planned activity necessary for the operation or phase.

The MRP parameters are set up in the material planning process of an enterprise resource planning process, as a part of its master data.

These parameters impact the purchasing and manufacturing decisions and therefore, need to be approved and monitored.

MRP PLANNING PARAMETERS

LOT SIZE

This is based on the economic order quantity for a production run or a purchasing

LEAD TIME

The time from initiating the production order or purchase order until the material is available for use

SAFETY STOCK

The minimum amount of inventory that must be maintained at all times, in order to avoid stock-out

REORDER POINT

When inventory drops to Re-order point, the next supply order is generated

MRP Parameters are the inputs to the algorithm that calculates the quantity to be ordered and when to order.

THE MRP PROCESS

INPUTS

Inventory on Hand

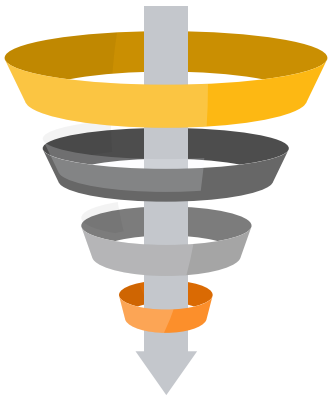
Dependent Demand Through BOM

Any Independent Demand for the Component

Replenishment Lead Time

OUTPUT

Procurement Proposals and Exception Messages

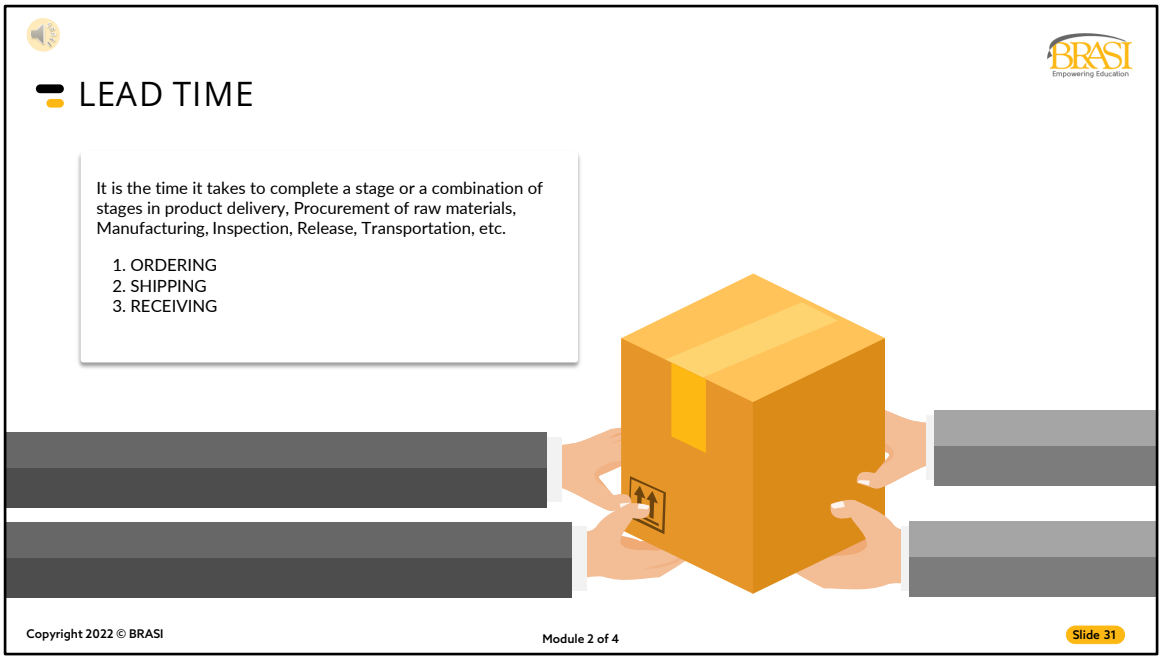


The MRP Process consists of the following three steps:

Netting is the subtracting of available inventory from the gross demand in order to obtain the net demand. If the answer is below zero, then there is no net demand until depletion of the inventory.

Exploding is the splitting the parent item into the component parts, through the Bill Of Materials.

Offsetting is the moving up order point from delivery point by the amount of lead time.

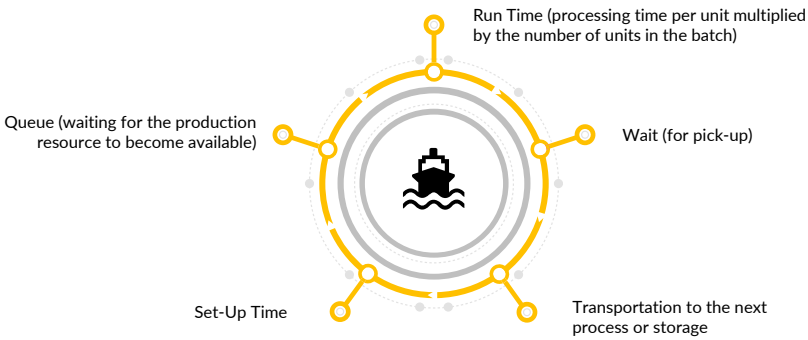


Lead Time is the amount of time from initiating the production order or purchase order until the material is available for use.

Lead time may be Manufacturing Lead Time, as in case of products manufactured in-house or Procurement Lead Time, as in case of purchased items.

MANUFACTURING LEAD TIME

Manufacturing Lead Time comprises the following elements:



You will find the five elements of lead time listed on this slide.

MANUFACTURING LEAD TIME

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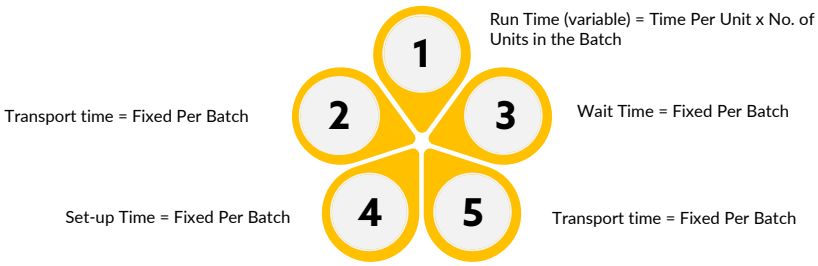


Question: Which of the above times influence the Economic Order Quantity or Lot Size?

Manufacturing Lead Time is the latency between the initiation and execution of a process. For example, the lead time between the placement of an order and delivery of a new car from a manufacturer may be anywhere from two weeks to six months. I

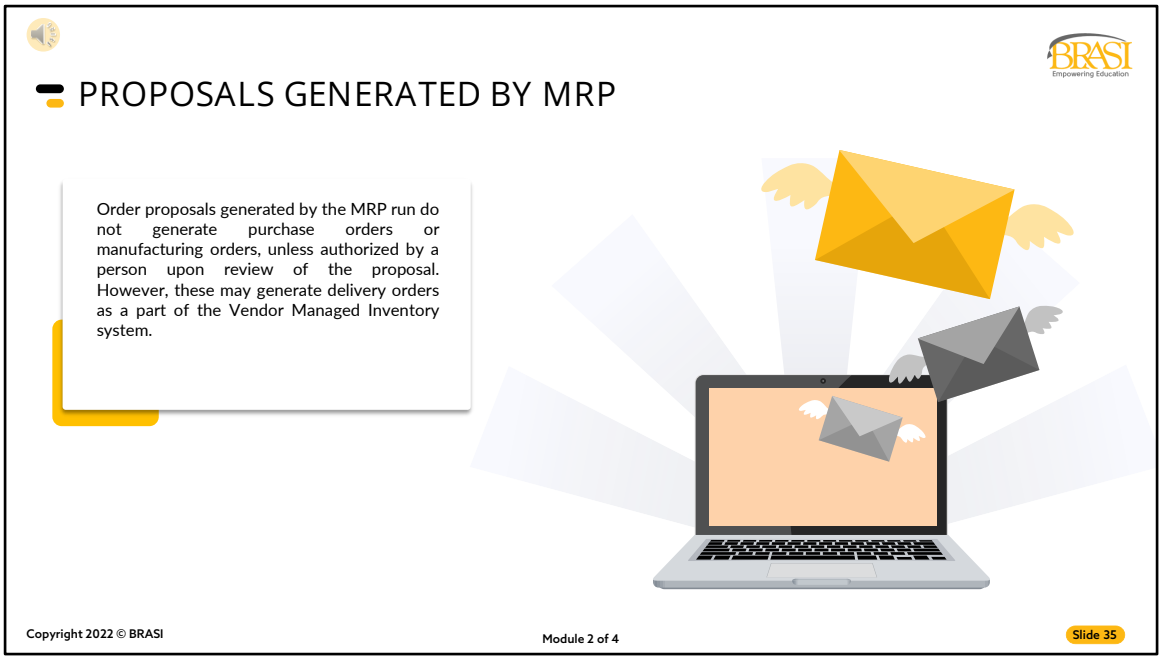
Reducing the lead time is an important objective of lean manufacturing.

MRP PROCESS STEPS

System Messages: Expedite, De-expedite, Opening Late, Ending Late…

Demo – the MRP Grid

You will find the Excel file on this topics quite helpful in understanding the concepts and relationships.

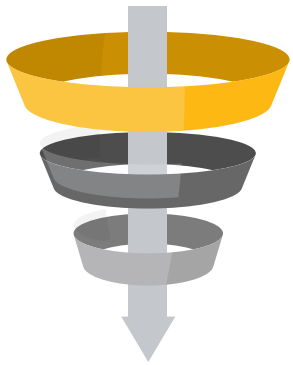


Outputs of the MRP processes include the proposals for production orders (for items made in-house) or purchase orders (for purchase items), and the date of issuing the orders advanced by the amount of lead time from the date the material is needed.

The output may include exceptions or warnings in case the action to make or buy is behind schedule and needs to be expedited or ahead of schedule and needs to be moved out.

Order proposals generated by the MRP run do not generate purchase orders or manufacturing orders, unless authorized by a person upon review of the proposal. However, these may generate delivery orders as a part of the Vendor Managed Inventory system.

ROUGH-CUT CAPACITY PLANNING (RCCP)



INPUTS

Unconstrained Requirement

Aggregate Capacities

Major Planned Downtimes/Projects

OUTPUT

LOAD PROFILE

Rough Cut Capacity Planning is based on aggregate demand at the S&OP stage. Unconstrained demand may be considered against historical supply levels.

Needs balancing at an aggregate level

Rough cut Capacity Planning is the first stage of review, when the available capacity is measured against demand. Sometimes, unconstrained demand is used to test the boundaries of capacity. This is also referred to as infinite capacity check. Normally, rough cut capacity is the historically demonstrated capacity expressed in terms of product families or groups. This exercise may be done within the ERP system or externally, manually or using spreadsheets.

Once the demand is considered to be within broad capacity limits, then the next step is to do the finite capacity, or Capacity Requirements Planning, which involves scheduling each SKU on the relevant resources. This process is linked with the MRP process, providing a validated MPS plan, which is feasible from a material as well as capacity perspective. This process is essentially conducted within the integrated ERP system.

CAPACITY REQUIREMENTS PLANNING (CRP)

(CRP) process matches the workload from each product to the machine and staffing capacity, in order to determine the plan feasibility.

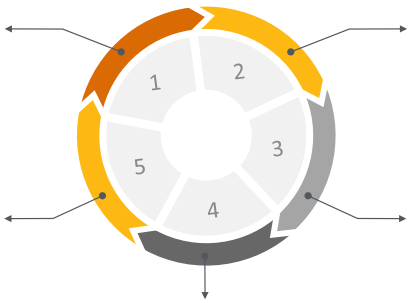
The capacity planning exercise may be conducted at two levels or stages:

Capacity Requirements Planning (CRP) is based on the Materials Requirement Plan, specific to SKUs and Equipment listed in the recipe or routing. CRP is also called, "Finite Capacity Planning".

Rough-cut capacity planning is conducted at the Sales & Operations Planning stage, to verify the aggregate production plan. Once validated and approved, it leads to detailed Master Scheduling which drives the finite capacity planning and the materials requirement planning processes.

CAPACITY REQUIREMENTS PLANNING (CRP) PROCESS

1. Production Capacity is defined in Time units for discrete batch manufacturing operations, and in Quantity units for non-discrete, flow manufacturing.



2. Example: Discrete: Tables, Toasters Manufacturing.
Capacity of individual equipment is measured against all the components planned to be made on it.

5. LOAD INFORMATION is derived from the MATERIAL MASTER and RECIPE.

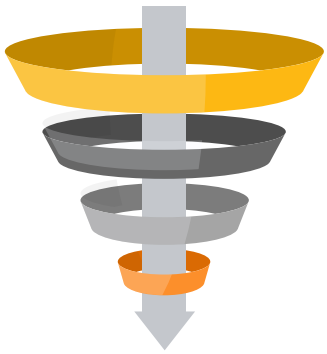
3. Example: Non-discrete: Oil refining, Steel Rolling – Rate based
Capacity of the entire plant is measured, based on the process.

4. CAPACITY INFORMATION is derived from the Machine Master.

Capacity is normally defined in terms of units of output for process industries, where a single product flows through the system, such as liters per day, tons per week, automobiles per hour.

In case of discrete batch manufacturing, such as machinery, consumer durables, furniture etc., where a variety of products and processes exist, capacity is measured in hours, measuring the available hours of resources versus the sum of standard hours required by different products.

INPUTS TO CAPACITY REQUIREMENTS PLANNING PROCESS



INPUTS

Capacity Profile (Machines and Staffing)

Holidays and Maintenance Schedules

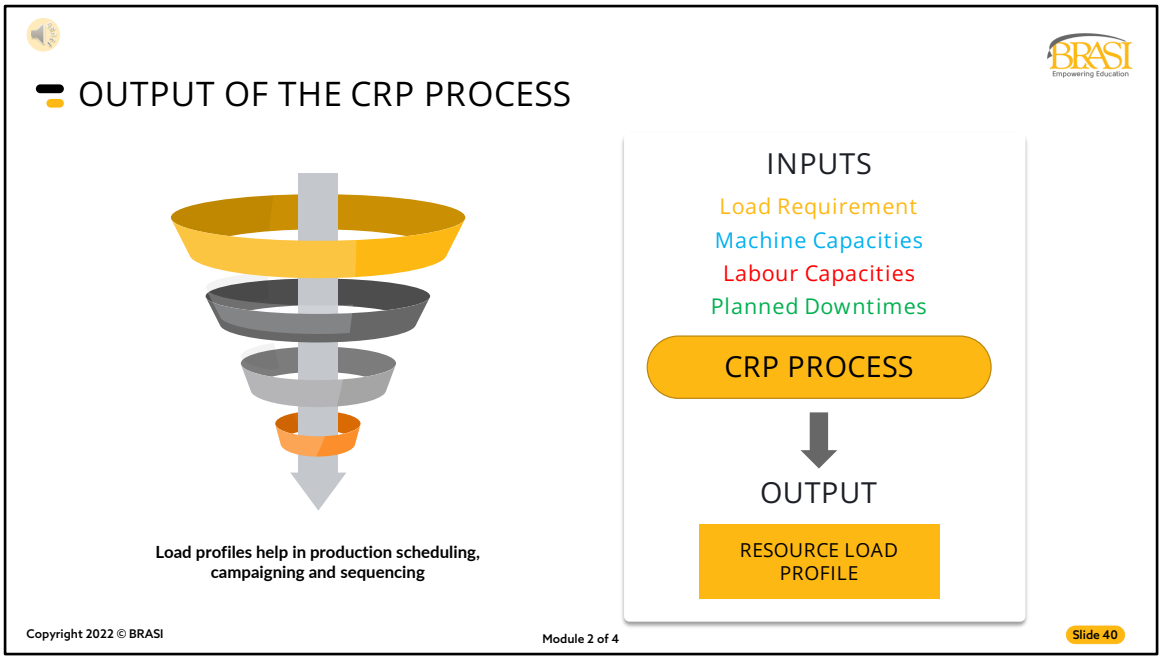
Strategies for Increasing or Reducing Capacities

Machine Specs for Certain Capabilities

↓

Capacity Requirement Planning Process

Inputs to Capacity Requirements Planning include Planned orders and released orders from MRP system, Loading information from the work center status file and the routing information from the shop routing
file.



The capacity requirement planning converts those orders into standard labor and machine hours of load on the appropriate workers and on the machines as identified from the work center status and shop routing files.

The output is a load-projection report work center wise. If the work center capacities are adequate, the planned order releases are verified for the MRP systems and released orders become purchase and shop orders.

Work load reports are also used for controlling input and outputs. If the initial load projection report reveals inadequacy of capacity in any work center, either the capacity must be increased by using overtime or sub-contracting, or the master production schedule must be revised.

Outputs of the process include Rescheduling information which calls for capacity modification or revision of MPS, Verification of planned orders for MRP system and Load reports.

CRP EXAMPLE- Determining the Capacity

Machine A: Sheet Punching Press

Available Hours:
Number of Working Days in the week = 5
Number of Shifts = 1
Business Hours per shift = 8

Less Planned Down Time
Start-up = 15 Min
Wind down/Cleaning = 15 Min
Meal & Other breaks = 60 Min
Total planned down time = 90 minutes or 1.5 Hours
Available Time = Business Hours – Total Planned Downtime
= 8.0 – 1.5 = 6.5 Hours
Operating Equipment Efficiency = 80%. This includes normal interruptions, adjustments, quality of materials being processes, etc., and is based on studies and/or historical data.

Net Capacity = Available Time x OEE = 6.5 Hrs. x 0.8 = 5.2 Hours per day
Total capacity for the week = 5.2 x 5 = 26 Hours

This example provides the basic algorithm used for capacity planning in a discrete batch manufacturing environment.

This part shows how the capacity of a manufacturing resource is determined.

CRP EXAMPLE-Calculating the Load

LOAD – From Production Plan and Material Master Data
Items planned:

Top Plate, Part # 100123
Batch Size = 1,000 Pieces
Set-up time (Fixed time component)= 2 Hours
Punching Time Per Piece (Variable time component) = 30 seconds = 0.5 Minutes = .0083 Hrs.
Machine Time required per batch = Fixed Time + Variable time x number of pieces
in the batch = 2 + (0.0083 x 1,000) = 10.3 Hours

Side Plate, Part # 100124
Batch Size = 1,000 Pieces
Set-up time (Fixed time component)= 3 Hours
Punching Time Per Piece (Variable time component) = 45 seconds = 0.75 Minutes = 0.0125 Hrs.
Machine Time required per batch = Fixed Time + Variable time x number of pieces in the batch
= 3 + (0.0125 x 1,000) = 15.5 Hours

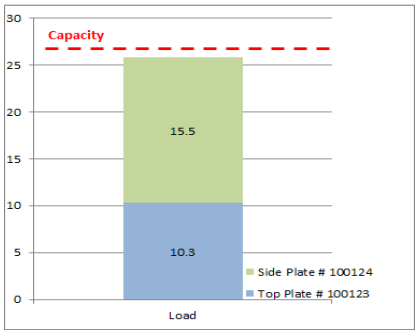
Total load on the Machine = 10.3 + 15.5 = 25.8 Hours

This part shows the work load from a production order, for the associated manufacturing resource or equipment.

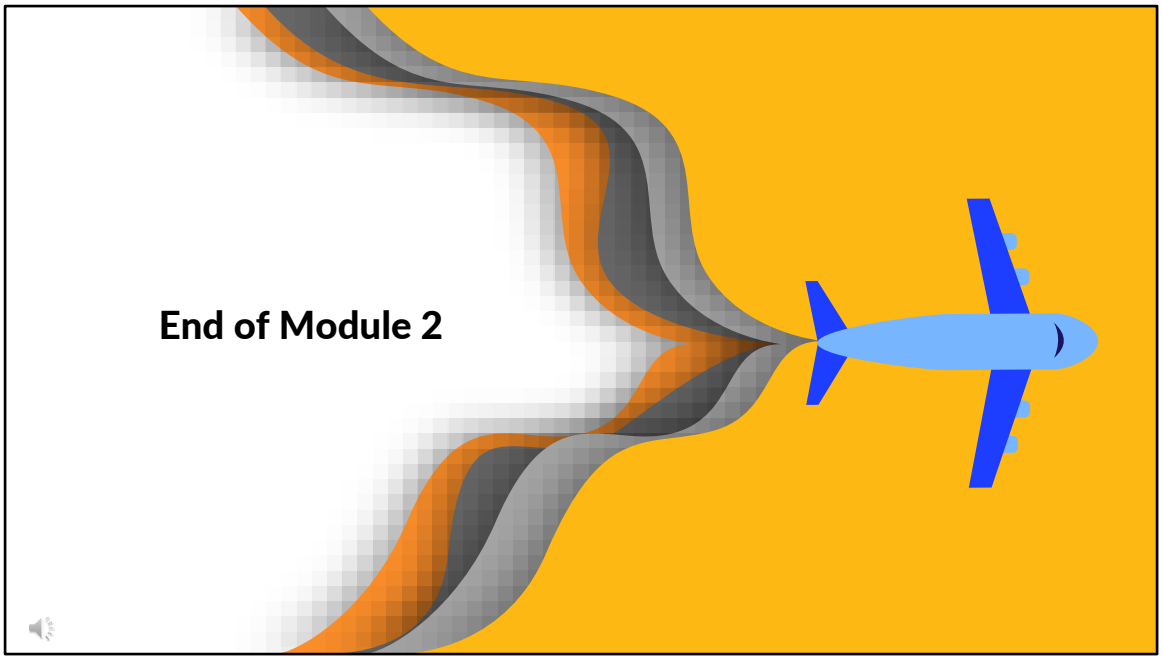
CRP EXAMPLE – Load Profile

Capacity/Load Profile
Machine A:
Sheet Punching Press

	Load
Top Plate # 100123	10.3 H
Side Plate # 100124	15.5 H
Total Load	22.8 H
Machine Capacity	26.0 H
Balance Capacity	0.2 H



This is a graphical representation of the workload against resource capacity, which offers a quick visual evaluation of over-loaded or under-utilized resources, for the purpose of load balancing, using various techniques, where possible.



The end of Module 2.

Key Topics

- Supply Chain Channels
- Complexity
- Centralization and Decentralization
- Integration
- Infrastructure Choices
- Supply Chain Function and Roles
- Plant Location Model
- Trade Bodies and Agreements
- Simulation and Optimization

Module 2: PLANNING

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