

Production planning by MRP at finite capacity

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Introduction

Manufacturers always need to innovate and pay attention to optimizing their business organization and take urgent decisions to keep the cost down, thus increasing the profit margin. Researchers also play their part in keeping their solutions efficient and up-to-date.

In this context the most common production planning method in the industry is materials requirements planning (MRP), but it is not flawless. We noticed that the MRP algorithm does have a major flaw that it does not take into account the production capacity. We will suggest other methods that could be used alongside MRP to fill in its gaps and establish the best production plan.

Materials requirements planning

Material requirements planning (MRP) is a system for calculating the materials and components needed to manufacture a product.[1]

MRP History

MRP 1

1. Which product?
 2. For when?
 3. How much will it cost?
 4. Do I have the capacity to do it?
 5. How long will it take?
 6. With what priority?
- Information needed for MRP1:
- Product Bills of Materials
 - Product lead times
 - Workload items
 - Manufacturing routings

1980

MRP 2

1. Which product?
 2. For when?
 3. How much will it cost?
 4. Do I have the capacity to do it?
 5. How long will it take?
 6. With what priority?
 7. At what price?
- All company information is necessary for mrp 2

1970

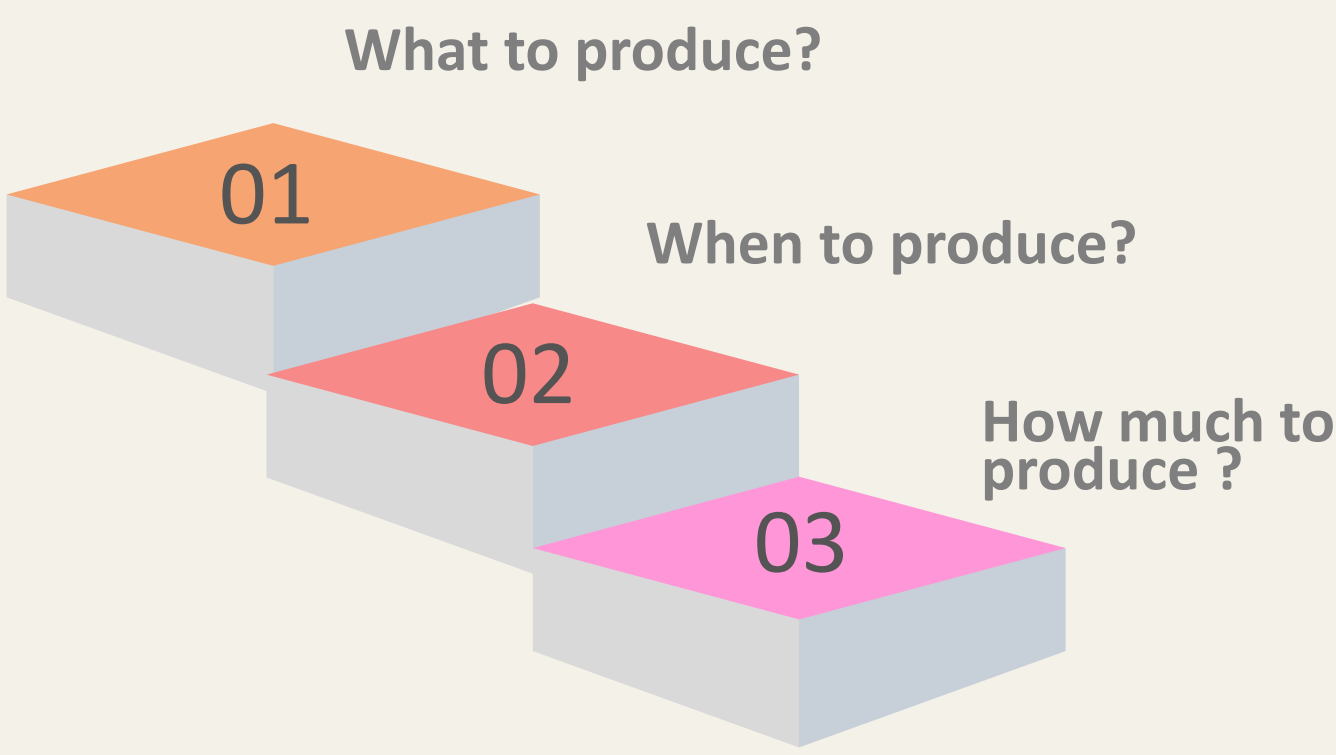
MRP 0

- Allows you to answer the questions:
1. Which product?
 2. For when?
 3. How much will it cost?
- Information needed for MRP0:
- Bills of material
 - Product lead times
- Allows.

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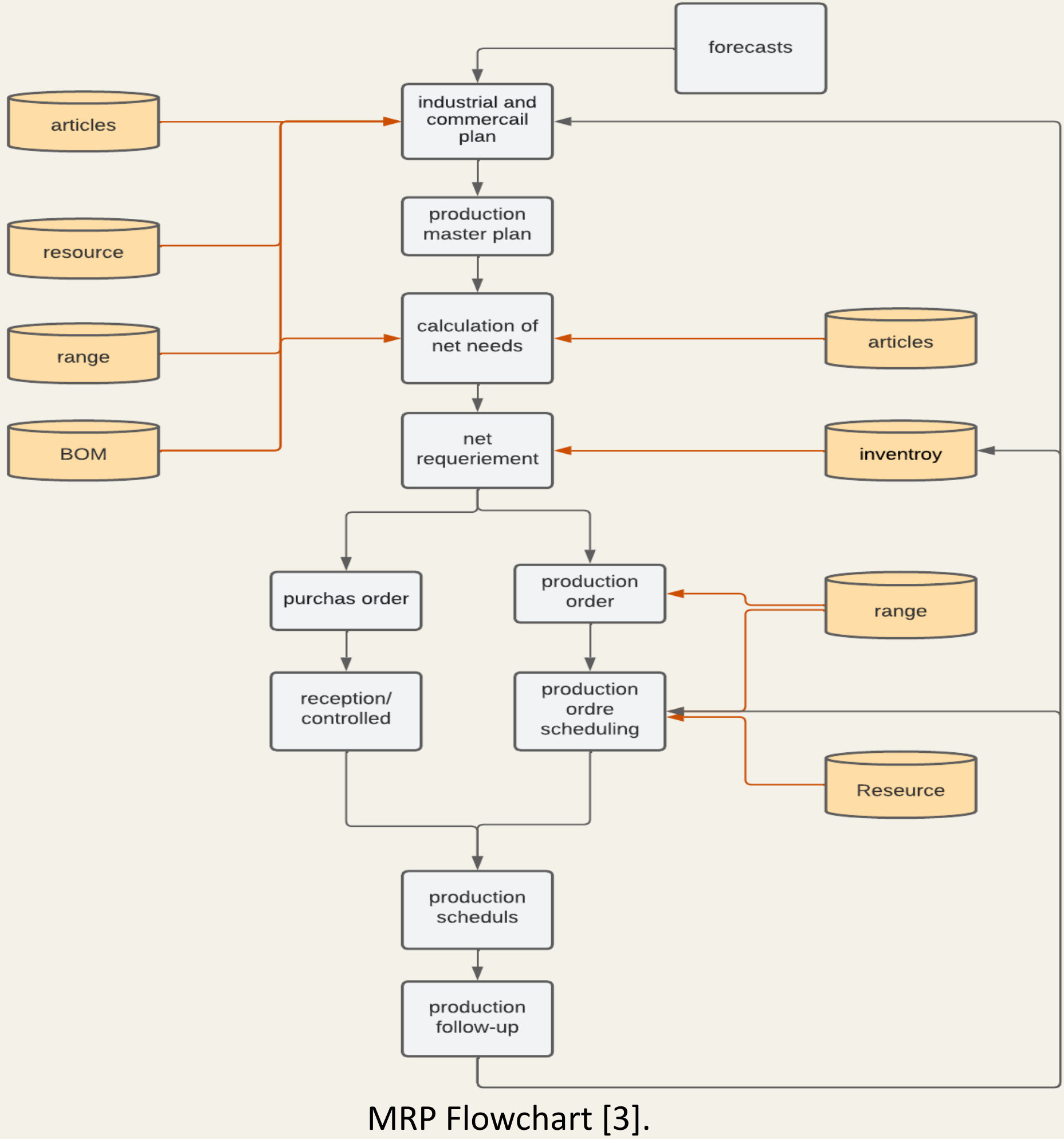
The logic of MRP

The planning goal is described a production plan for a time scale defined by a planning horizon and a refresh period. A production plan answers the following questions.



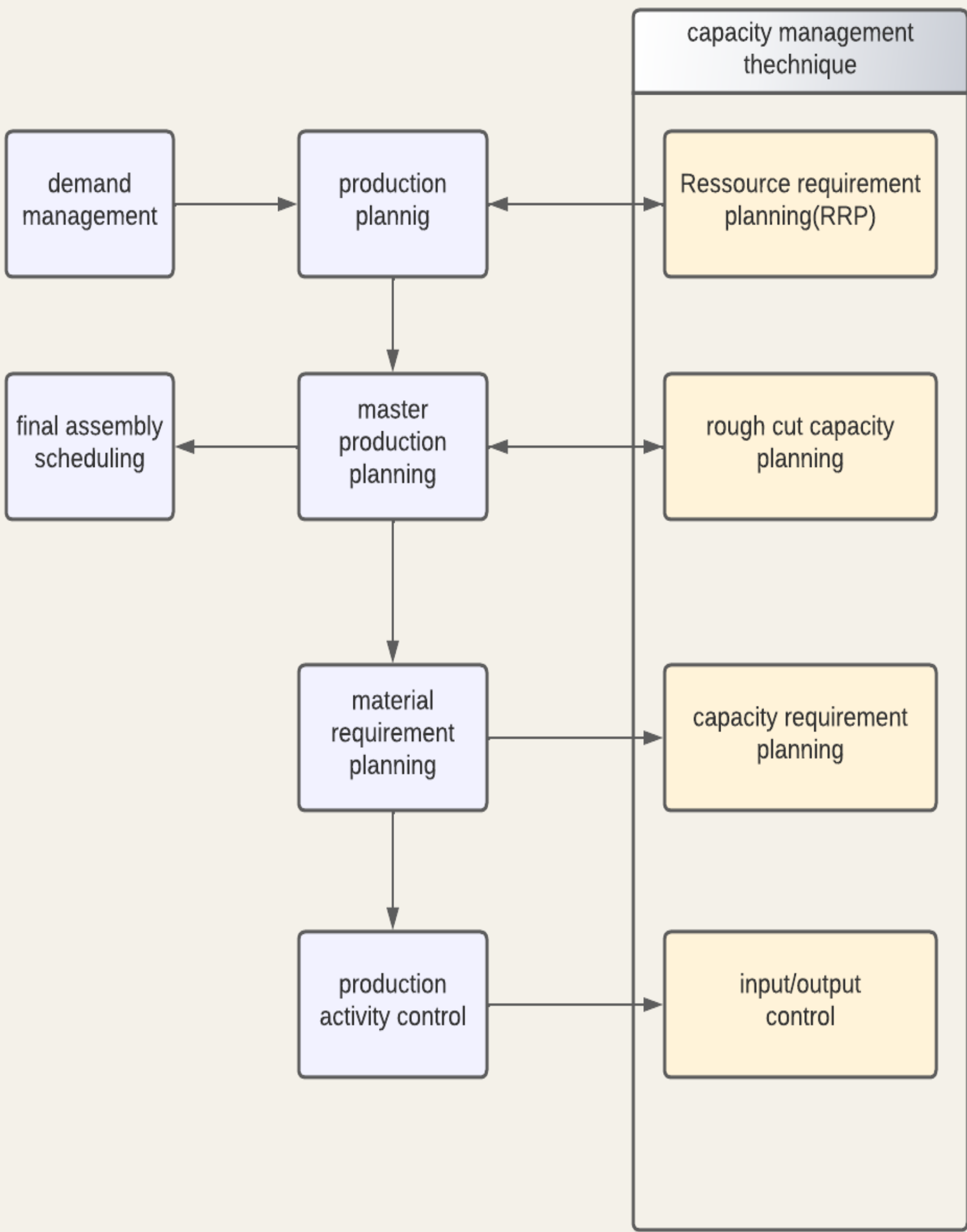
MRP steps

There are different levels of industrial planning which can be broken down into successive stages over time .



Production capacity planning:

Capacity planning presents the different techniques that have been developed to ensure the feasibility of production plans.



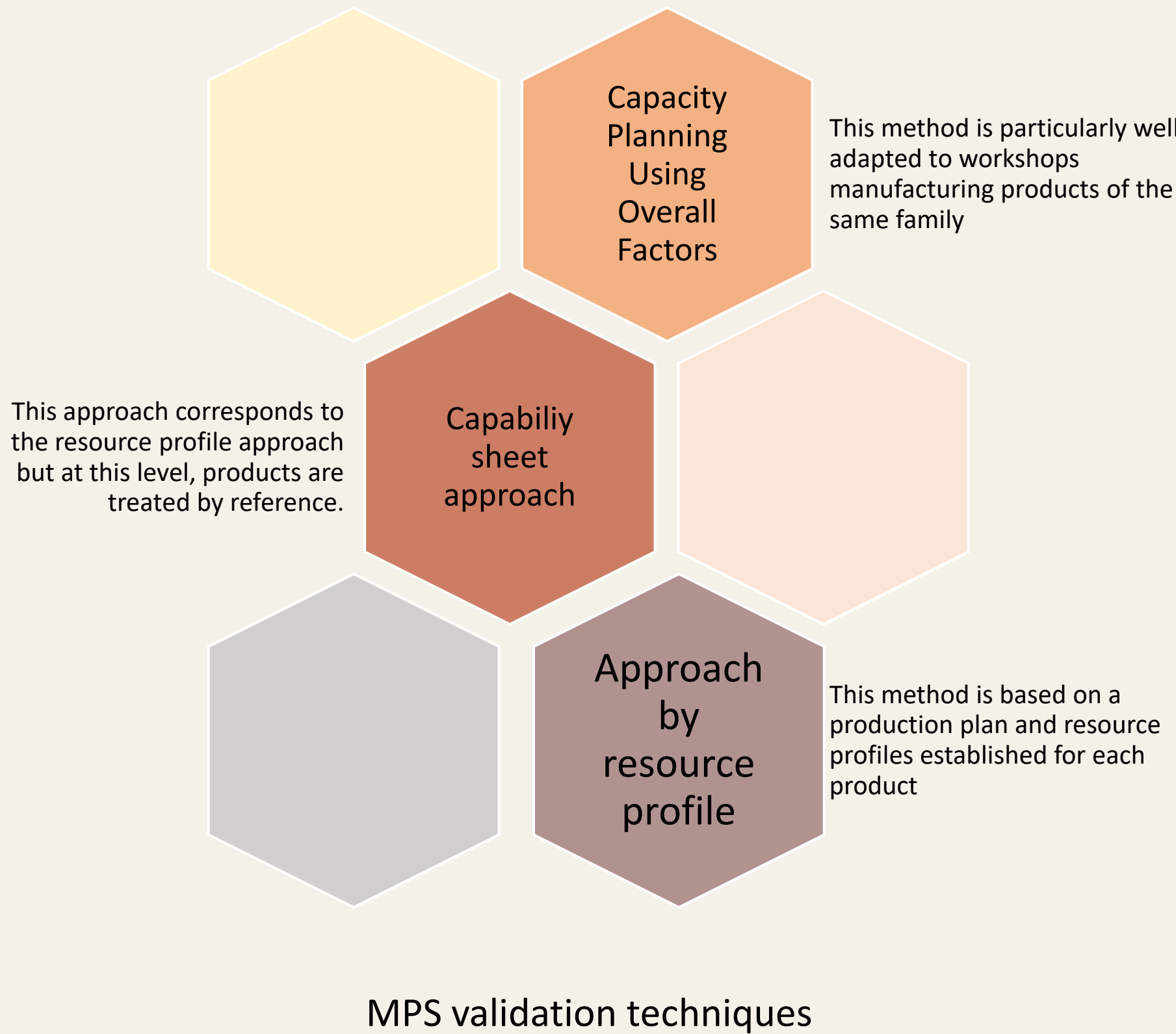
Capacity planning [4].

Resource Requirements plans (RRPs)

The first phase of capacity management involve looking forward in the long term to predict the requirements for large structural parts of the operation, such as the numbers, locations and sizes of new plants. This process is similar to MRP Except, that instead of planning the needs in components, we planned the needs in human resources, materials, and financial resources necessary to the realization of the production plan (PMP).

Validation of the production master plan

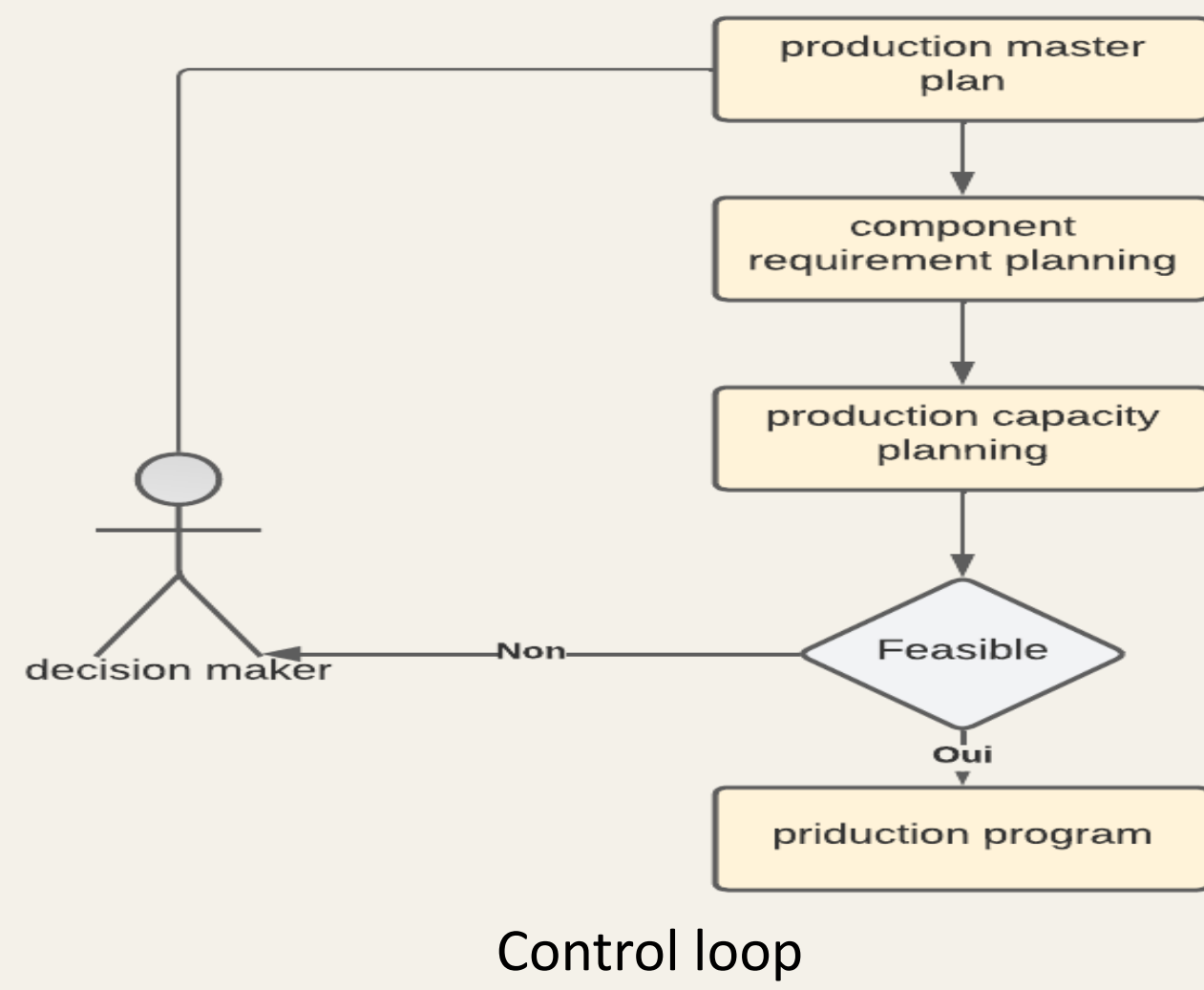
Rough-cut capacity plans (RCCPs) – are used in the medium and short term, to check the master production schedules against known capacity bottlenecks, in case capacity constraints are breached. The feedback loop at this level only checks the MPS and key resources there are three MPS validation techniques which are grouped under the term Rough Cut Capacity Planning.



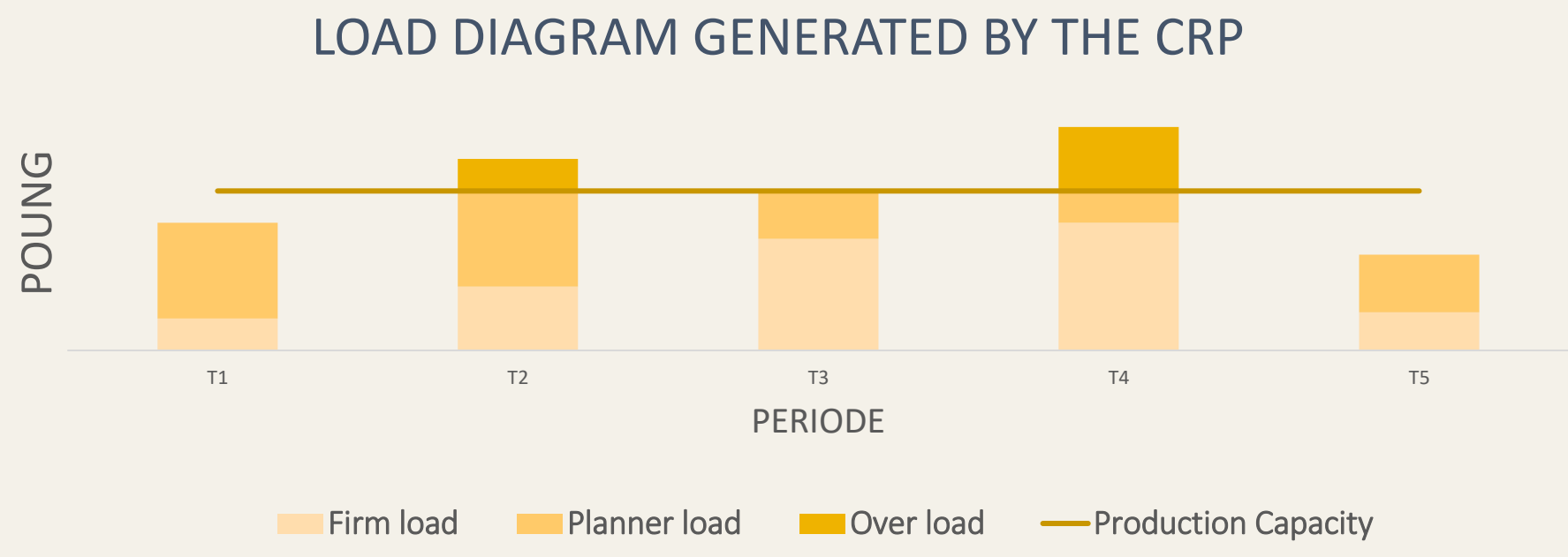
MPS validation techniques

Capability Requirements Plans (CRP)

CRP role is determining the capacities necessary to carry out a production operation. Indeed, from firm and planned manufacturing orders. The CRP is able to calculate the load caused by these orders on the resources of a workshop by simulating their execution.

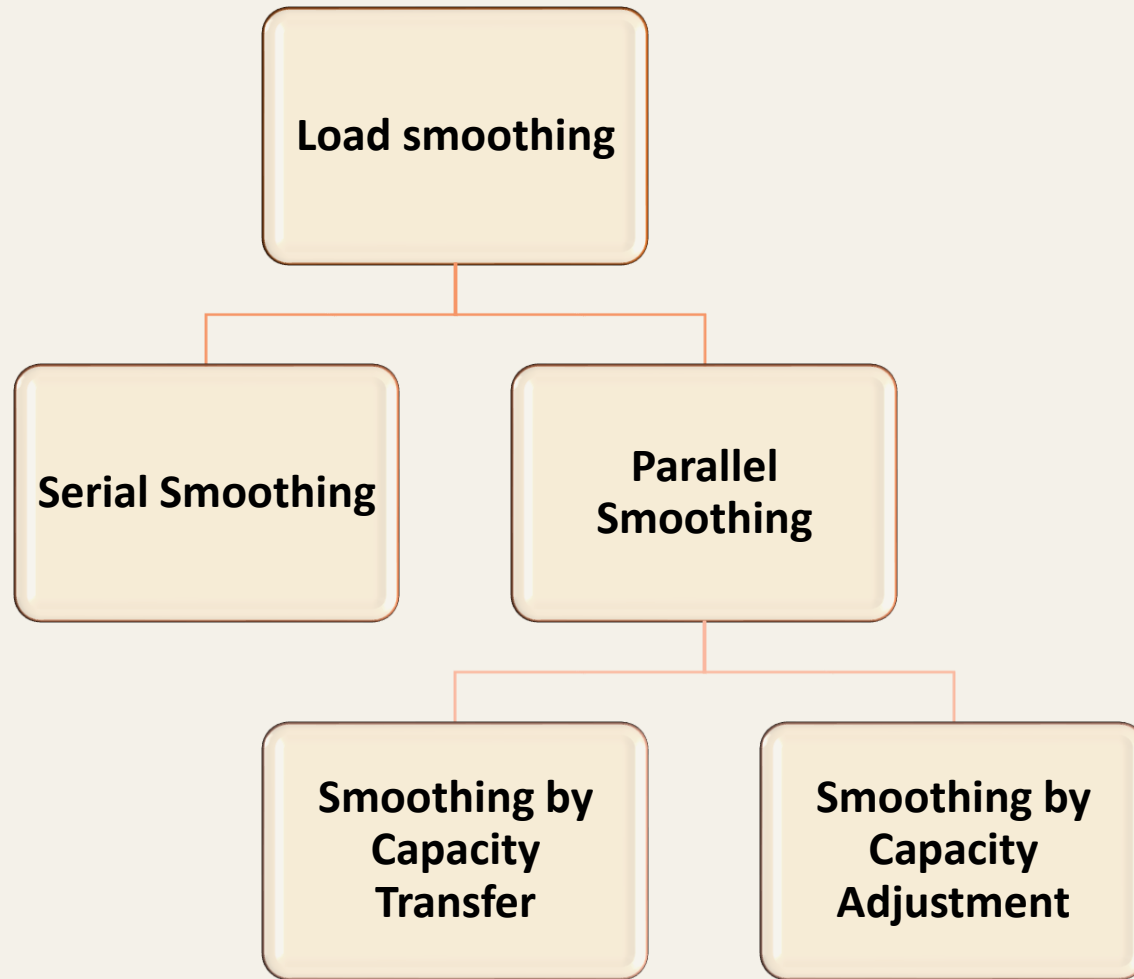


CRP Results



Load smoothing techniques

We can solve some overload problem by using smoothing techniques,

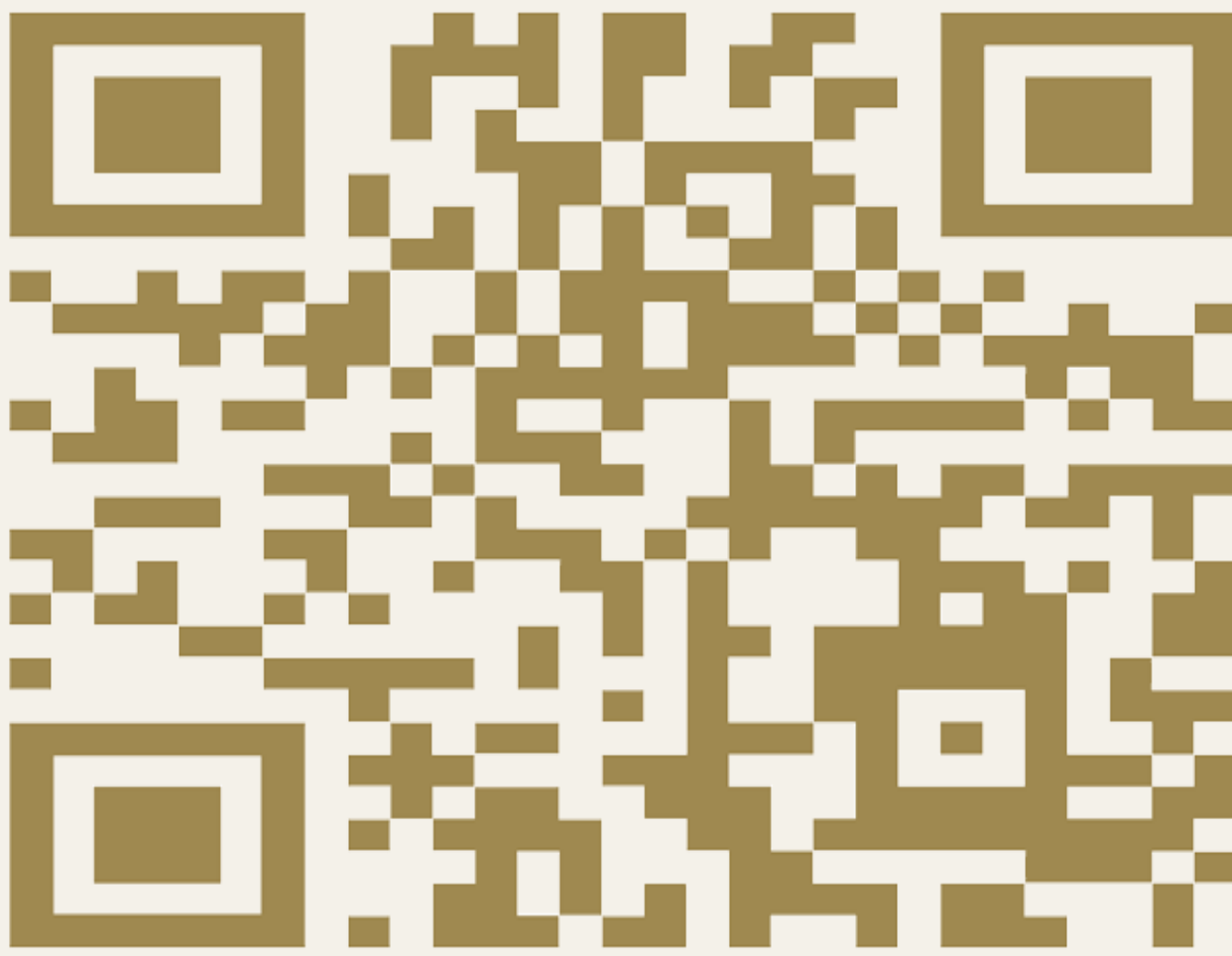


Conclusion

We conclude that the MRP method works and raises its main flaw, namely the failure to take production capacity into account when developing the schedule. However, there is a number of methods that can be used to plan production capacity requirements at different times during the production of the MRP system. These methods cannot guarantee that there will be no overflow. Therefore, there are load smoothing techniques that can be applied to the MRP results in an attempt to eliminate temporary overflow issues. This type of process only appeared with MRP-2.

References

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