Rough Cut Capacity

Planning-(RCCP)-(Case Study)

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Abstract

Many people are familiar with the Manufacturing Planning and Control (MPC) Systems which are driven by Material requirements planning (MRP) engines. In such systems MRP uses a master production schedule (MPS) of end items to determine the quantity and timing of component parts’ production. MRP does not consider any capacity limitation; it strictly assumes that, sufficient capacity is available to produce components at the time when they are needed. The most common problem which is encountered in operating MRP based systems is the existence of an overstated MPS. An overstated master production schedule is the one which orders more than the production resources can complete. An overstated MPS causes raw materials and WIP inventories to increase because more materials are purchased and released to the shop than are completed and shipped. It also causes a buildup of queues on the shop floor. Since jobs have to wait to be processed, actual lead times increase, causing ship dates to be missed. As lead times increase, forecast over the planning horizon becomes less accurate. This is because of the fact that, forecasts are more accurate for shorter periods than for longer ones. Thus, overstated master production schedules lead to missed due dates. Because of all the above given reasons, validating the MPS with respect to available capacity is an extremely important step in MRP. The term used for this validation exercise is “Rough Cut Capacity Planning (RCCP)”. The methods commonly used in energy planning outline is a technique factors College ((Overall Factors, and is a way to convert the amount of products contained in the scheduling main production to the power requirements are expressed in hours of work a total of some or all production resources (processes or certain sections). Then these requirements are being distributed from the total energy required to types of energy depending on the rates of use of each type to
the total species during the last period, which has been used in this paper as a case study in the medical syringe plant in Babylon in Iraq.

**Introduction**

The essence of energy planning productivity detailed (RCCP-Rough Cut Capacity Planning) is the conversion of production scheduling Home (MPS-Master production Schedule) to the energy needs of core resources, and then determine whether scheduling the main possible within the determinants of production capacity. If you were not as well as it should change Schedule Home and modified in order to be within the constraints of energy, and in some cases may be required to change the total in order to be within the limits of power. Accordingly, the process of energy planning outline is closely linked with the production scheduling Home.

**-Research Methodology: - include**

A - Research problem: lie in the following points:
1 - Do not interview the maturity date.
2 - not kept at the lowest level of the reserved capital in production.
3 - Increasing industrial deadlines.
4 - Increase the time third party product.
5 - Lack of modern management information than is required to do in the field of energy productivity.

B - the objectives of the research: - The thus:
1 - Planning the required levels of energy productivity in all centers of production and determine the number of machines and labor force required for access to the main production scheduling (MPS).
2 - to give accurate estimates of the detailed energy for the plant and all products.

C - The importance of research:
The importance of research need to be productive capacity available is sufficient and able to enable the factory to satisfy current demand and future right time and the right amount and in a manner consistent with the message factory. It is also necessary owning institution capacity appropriate so that ICON has a surplus of this energy and thus become production costs

High, which will affect the competitiveness of the plant. Must also make it clear that there is a shortage because it will reduce the ability of factory to satisfy the demand of time and the right amount and without recourse to some of the policies mandated policy overtime or rely on other suppliers or request waiting customers.
D - Search Tools:
Will be the adoption of a methodology (case study) and the reality of the detailed work to production lines in the medical syringe plant in Babylon.

- Theoretical side:
First: The concept of capacity and energy requirements planning (RCCP) For energy production known (Evans, 2005) as a measure of the amount of production that can be produced during the period of time a source is important and that you should be able institution of control. Expressed as the maximum amount of units produced during a certain time-period. With regard to energy requirements planning (RCCP) them (Slack, 2004) as the maximum level of activity of the value-added (Added-Value) for a certain period of time and which managed to get the job done under normal operating conditions. Known as the process of balance between the industrial unit available resources and the burden arising as a result of the demand for those products unit. The (Evans, 2005) confirms that the process of planning the energy needs are similar to those in the energy planning model and the difference is that the MRP system creates the required quantities of full and timing of each part and component while the MPS poses simply article concluding programmed addition examines energy planning and basic equipment for private and action Center (jams) and examines the planning for the energy needs of several business centers and thus provides more details and information, and that the energy needs of these sums after that length of time and action Center, for the purpose of presentation of the accounts (RCCP). As for the concept of production scheduling Home (MPS): requires the direction and guidance of operations in the factory to the detailed plans short-term, and since the plan's total production is characterized by generalized, it is fragmented to schedule a major production. Means scheduling main producing as detailed schedule (is usually on a weekly basis or even daily) quantity that non-production of certain products or groups of products.
And known (Evans, 2005) as the final amount of detection finished products to be produced and when it will be produced?
The ((MPS production plan the production of short-term takes into account both the overall demand on the resources of the factory and energy and processors are usually put this plan on a weekly basis for a period ranging between (6-12) weeks and derives most of its plans for materials, labor and equipment from this plan. The purpose of the (MPS) is to translate the plan total to a detailed plan for the products individually as they provide essential inputs to the planning system physical requirements (MRP). Moreover, they help managers to develop priorities
for scheduling by selecting the maturities of production Products individual. The formulation can be (MPS).
There is no general agreement on the level of detail that should be incorporated in the MPS validation. An APICS monograph presents case histories of several companies, including details on the capacity planning process. Some companies using very crude techniques while others are using detailed, time phased, methods. Basically there are three approaches to perform rough cut capacity planning. These can be summarized as follows:

a) Capacity planning using overall factors (CPOF) :
It is the least detailed approach. Capacity requirement is quickly computed but is insensitive to shifts in product mix.

b) “Bill of labor” (or bill of required types of machine hours) approach :
It involves multiplying two matrices, “the bill of labor” and the “master production schedule”. This approach picks up shifts in product mix, but does not consider lead time offsets. It strictly assumes a lot-for-lot policy for setting lot sizes. When other techniques, such as economic order quantity etc is used, then this approach gives a very rough estimate.

c) “Resource Profile” approach :
It is exactly same as “Bill of labor approach”, except that it takes lead-time offsets into account. Again, it strictly assumes a lot-for-lot policy for setting lot sizes as in the case of “bill of labor approach”.

The role of capacity planning in the production planning and control system.

An overview of the entire manufacturing planning and control (MPC) process based on MRP is given in Figure 2. Within this process, capacity management techniques are usually separated into four categories as;

a) resource requirements planning (RRP),
b) rough cut capacity planning (RCCP),
c) capacity requirements planning (CRP), and
**Rough cut capacity planning-(RCCP)-(case study)**

**d)** input/output control

In fact, these capacity management techniques represent the four planning time horizons considered. In a typical MRP system the general sequence is: to create a master schedule, use rough cut capacity planning to verify that the MPS is feasible, perform the MRP explosion, and send planned order release data to capacity requirements planning.

![Figure 1: An Overview of Capacity Management](image)

**It is appropriate ways with energy demand:**

1 - to make changes in functional staffs.
2 - Amendment of equipment and processes which includes the purchase of new machines.
3 - Improved methods (approaches) to increase production.
4 - Redesign the product to facilitate more output.

It must be taken into consideration when planning capacity term:

**Utilization Rate** indicates beneficial to add additional power or cancel the required energy is the greatest difficulty lies in the calculation of the benefit in determining the maximum energy, as follows:
- Utility (Utilization Effective = ((output / capacity-efficient) X 100%)

![Diagram](image)

**Figure 2: Load and Capacity**

Priority and capacity are balanced by various techniques. For PP, MPS and MRP, the corresponding capacity planning tools are resource requirement planning (RRP), rough-cut capacity planning (RCCP), and capacity requirement planning (CRP). Figure 3 shows the relations of the priority and capacity plans.

![Diagram](image)

**Figure 3: Relations of Priority and Capacity plans**

**The Practical Side:**

Assuming a practical example of the planned orders demand for the component are as follows: -
Assuming that requires component (1.10) hours of work per unit in a particular duty station and (1.5) hours of the time of configuration and setup, authorized: energy needs in the period (1) is

\[(20 \text{ units}) \times (1.10) + (1.5 \text{ h}) = 23.5 \text{ hr}\]

The same is true in the periods (3.4), as we have

\[(25 \text{ units}) \times (1.10) + (1.5 \text{ h}) = 29 \text{ hr}\]

Such information is usually available in the report of pregnancy (Load Report). Van there were not enough power available must make decisions about overtime, transportation of personnel between departments, hiring secondary education, the program is the basis for the production may have to modify also the face of the available power, and that this requires recycling program (MRP), to provide planning for energy needs feedback between basic programming and (MRP). And reflects (Waller, 2003) for (RCCP) that production program basic developer of customer's requests fixed or expected, forecasts, reports the position of production and information capacity, requests urgent very placed in the first place and available for (MPS) and including that all requests have been made in space ensuing detailed and energy planning which shows the pregnancy center work with regard to energy production available energy has the equivalent of pregnancy is likely to exceed the load energy.

He adds (Schroeder, 2000) an important point with regard to the detailed planning of energy that should be used the closed session of the system (MRP) Explain (Evans, 2005) as a case study model factories couldn beer (Golden Brew) It did not specify whether the energy is sufficient and available and under a short time to be able to achieve (MPS), and under the working conditions of ordinary Laffan power plant (2200) barrels per month (or 5,867) fund in the week, and overtime can increase the power to the (2800 barrels per month (or (7,467 Fund in the week, these selections are due capabilities Equipment Co., Ltd. production., and (Tab key) found that for week (12) has been production within energy, and beyond this point, the program planned for golden cannot be achieved within the limits of (7,467) per week Fund, Therefore Snmay the saying that the basic program is inadequate.
This is the essence of energy detailed any conversion (MPS) to the needs of energy sources basic selection after that whether the basic program appropriate. With regard to the limits of power, the program is essential that modifies (MPS) to remain within the parameters (restrictions) energy, and in some cases it may be necessary to modify the plan total production, for example, in the weeks (14 and 15) will be produced ((Golden Delight and early in the week (15) are switching to (Golden Brew) is produced by the latter for week (18) when they are switching to (Golden Delight) and so on. permission: detailed energy planning process duplicate associated with basic programming for production.

Key advantage in energy planning detailed is the public scrutiny quick and inexpensive for the availability of the main needs of energy for the implementation of scheduling the main production. Provide such a feature which may acceptance of the results approximate that gives it that the level of precision available where enough to make decisions about the validity of scheduling Home for implementation. among methods commonly used in energy planning outline is a technique factors College ((Overall Factors, and is a way to convert the amount of products contained in the scheduling main production to the power requirements are expressed in hours of work a total of some or all production resources (processes or specific sections) . then those requirements are being distributed from the total energy required to types of energy depending on the rates of use of each type to the total species during the last period, which have been used in this paper as a case study and also in the medical syringe plant in Babylon according to Dilwoorth method. As shown in the tables below:

A= large syringe
B= medium syringe
C= small syringe

The following is a tentative master schedule for 12 weeks at a syringe plant in Babylon:

Table (1) Master scheduling for products A, B, C

<table>
<thead>
<tr>
<th>product</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1500</td>
<td>1800</td>
<td>2000</td>
<td>1500</td>
<td>2100</td>
<td>1800</td>
<td>1500</td>
<td>2000</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>C</td>
<td>2300</td>
<td>2300</td>
<td>2300</td>
<td>2500</td>
<td>2500</td>
<td>2500</td>
<td>2300</td>
<td>2800</td>
<td>4000</td>
<td>3800</td>
<td>3500</td>
<td>4000</td>
</tr>
</tbody>
</table>
Table (2) the bill of labor in the key work centers for the plant three major products is as follows:

<table>
<thead>
<tr>
<th>Department</th>
<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.20</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>2</td>
<td>0.06</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>3</td>
<td>0.11</td>
<td>0.08</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Determine the load on department (1) over the next 12 weeks. The load profile for department (1) over the next 12 weeks is found by multiplying the labor requirement in department (1) for each product by the quantity of that product to be produced in each week and summing the hours required for all products in each week.

Hours required in each week

**Week 1**

For product A 0.20(1500) =300
For product B 0.06(2000)=120
For product C 0.10(2300) =230
Sum=650

**Week 2**

A 0.20(1800) =360
B 0.06(3000) =180
C 0.10(2300) =230
Sum=770
Week 3

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.20(2000)</td>
<td>400</td>
</tr>
<tr>
<td>B</td>
<td>0.06(2500)</td>
<td>150</td>
</tr>
<tr>
<td>C</td>
<td>0.10(2300)</td>
<td>230</td>
</tr>
</tbody>
</table>

Sum = 780

Week 4

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.20(1500)</td>
<td>300</td>
</tr>
<tr>
<td>B</td>
<td>0.06(2000)</td>
<td>120</td>
</tr>
<tr>
<td>C</td>
<td>0.10(2500)</td>
<td>250</td>
</tr>
</tbody>
</table>

Sum = 670

So on of weeks rest.........(from 5-12)to department(1).

Determine the load on department (2) over the next 12 weeks. The load profile for department (2) over the next 12 weeks is found by multiplying the labor requirement in department(2) for each product by the quantity of that product to be produced in each week and summing the hours required for all products in each week.

Hours required in each week

Week 1

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.06(1500)</td>
<td>90</td>
</tr>
<tr>
<td>B</td>
<td>0.10(2000)</td>
<td>200</td>
</tr>
<tr>
<td>C</td>
<td>0.12(2300)</td>
<td>276</td>
</tr>
</tbody>
</table>

Sum = 566

Week 2

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.06(1800)</td>
<td>108</td>
</tr>
<tr>
<td>B</td>
<td>0.10(3000)</td>
<td>300</td>
</tr>
<tr>
<td>C</td>
<td>0.12(2300)</td>
<td>276</td>
</tr>
</tbody>
</table>
So on of weeks rest........ (From 5-12) to department (2).

Determine the load on department (3) over the next 12 weeks. The load profile for department (3) over the next 12 weeks is found by multiplying the labor requirement in department(3) for each product by the quantity of that product to be produced in each week and summing the hours required for all products in each week.

<table>
<thead>
<tr>
<th>Hours required in each week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week1</strong></td>
</tr>
<tr>
<td>A  0.11(1500) =165</td>
</tr>
<tr>
<td>B  0.08(2000) =160</td>
</tr>
<tr>
<td>C  0.15(2300) =345</td>
</tr>
<tr>
<td>Sum=670</td>
</tr>
<tr>
<td><strong>Week2</strong></td>
</tr>
<tr>
<td>A  0.11(1800) =198</td>
</tr>
<tr>
<td>B  0.08(3000) =240</td>
</tr>
</tbody>
</table>

Sum=684

<table>
<thead>
<tr>
<th>Week3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  0.06(2000) =120</td>
</tr>
<tr>
<td>B  0.10(2500) =250</td>
</tr>
<tr>
<td>C  0.12(2300) =276</td>
</tr>
<tr>
<td>Sum=646</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  0.06(1500) =90</td>
</tr>
<tr>
<td>B  0.10(2000) =200</td>
</tr>
<tr>
<td>C  0.12(2500) =300</td>
</tr>
<tr>
<td>Sum=590</td>
</tr>
</tbody>
</table>
C 0.15(2300) = 345
Sum = 783

**Week 3**

A 0.11(2000) = 220
B 0.08(2500) = 200
C 0.15(2300) = 345
Sum = 765

**Week 4**

A 0.11(1500) = 165
B 0.08(2000) = 160
C 0.15(2500) = 375
Sum = 700

So on of weeks rest........ (From 5-12) to department (3).

Table (3) Rough cut capacity planning for plant to Month 1 in all departments.

<table>
<thead>
<tr>
<th>Product</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>555</td>
<td>480</td>
<td>851</td>
</tr>
<tr>
<td>Week 2</td>
<td>666</td>
<td>720</td>
<td>851</td>
</tr>
<tr>
<td>Week 3</td>
<td>740</td>
<td>600</td>
<td>851</td>
</tr>
<tr>
<td>Week 4</td>
<td>555</td>
<td>480</td>
<td>925</td>
</tr>
<tr>
<td>Sum of Month 1</td>
<td>2516</td>
<td>2280</td>
<td>3478</td>
</tr>
</tbody>
</table>

So on for all months in year are the same determined.
-Conclusions:

1-Insight: distinction between independent and dependent demands
2-Advantages:
• General approach
• Supports planning hierarchy (Mps)
3-Problems:
• Assumptions ---especially infinite capacity
• Cultural factors --e.g., data accuracy, training, etc.
4-Multiple demand types and planning passes helped to plan seasonal peaks
within the constraints of time and capacity while honoring everyday requirements
5-The CTM planning engine was chosen to layer supply source decisions in one
run while considering priorities, capacity, modes, and quotas
6-RCCP decisions integrate with the detailed planning through the use of two
tables
6-1 Key Dates table to move forecast to a common date and to fix orders.
6-2 Internal/External Allocation table to guide DRP sourcing choices.
7-The simple rough cut network of locations and resources were used to model
choices, not physical assets.

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