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# CABLE CLAMP PRODUCTION CAPACITY PLANNING USING ROUGH CUT CAPACITY PLANNING (RCCP) METHOD (A CASE STUDY IN PT FAJAR CAHAYA CEMERLANG)

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***ABSTRACT***

*PT Fajar Cahaya Cemerlang (FCC) is a manufacturing company engaged in Metal Processing. The company often experienced delay in delivering the products, which is due to the lack of careful planning in production process. To overcome this problem, FCC needs to use Rough Cut Capacity Planning (RCCP) method. This study aims to employ RCCP method to plan the production of two types of clamps: Clamp AQ 3E114 FO and Clamp AQ 3E115 FO. Analysis was conducted on the calculation of the required capacity and compare it with the available capacity. The study shows the lack of capacity at Work Center III. For Clamp AQ 3E114 FO the figures for three months are: 8.0892 hours for January, 2.3100 hours for March and 3.4188 hours for July. For Clamp AQ 3E115 FO the results are: 10.4132 hours for January, 4.3932 hours for March, 5.5524 hours for July, and 1.9740 hours for November. Adjustments need to be done by moving workloads to next period. The results show that available capacity can meet the demand from January to December 2016, where the shortage capacity which occurs in a period successfully transferred to the next period without reducing the total existing demand.*

*Key words: Capacity Planning, RCCP, Operation Management, Cable Clamp*

## 1. INTRODUCTION

### 1.1. Background

PT Fajar Cahaya Cemerlang (FCC) is a manufacturing company engaged in the Metal Stamping, Press Welding, Machining, Small Press Dies Manufacturing, Assembly Jig. The company is trying to provide the best service to its customers. However, until now, the quality of services provided by these companies is still not optimal.

Quality of service is the cornerstone to provide maximum services to the customers. Definition of quality of service, as has been said Tjiptono in Musanto (2005) is a dynamic condition associated with products, people, processes and environments that meet expectations. Another understanding of the quality of service that is to describe the quality of service, such as the rate at which a service meets the needs or expectations of the customers. Similarly, as expressed by some authors (Lewis & Mitchell; Dotchin and Oakland; Asubonteng et al; Wisniewski & Donnelly) in Happy (2009). The company must have a good customer service system to provide maximum services to the customers, thus increasing customer satisfaction and can compete positively by companies engaged in similar fields.

Companies must pay attention to the performance of the system is carried out both in terms of production processes and of service to the customer, where it is one of the efforts in providing good service to customers. System performance in terms of production can be done by utilizing resources effectively and efficiently to achieve organizational objectives, and to provide quality service to customers by producing quality products.

The poor quality will lead to customer loyalty is low. Customer loyalty is a behavioral impulse to buy repeatedly and to build customer loyalty to a product/services produced by these enterprises require a long time through a buying process that are repetitive (Olson in Musanto, 2005). Customer loyalty is very important for any company to keep its survival. In this case the customer loyalty can be seen if these

customers receive the products ordered in line with expectations and could be ensured to make the purchase again in the future. And so does the otherwise low quality of service that can negatively impact the company.

Customer loyalty is low will potentially decreased the company's revenue. If the company can not give good service to the customer, the customer will not be loyal to the company and will impact the company's losses. To prevent such losses the company can make its products as well as the strategy in maintaining attention to the quality of services provided.

Delivery of orders in a timely manner is one very important factor in the quality of service. The accuracy in the delivery of timely booking can give a good impression for the company. By doing so the company will have added value in meeting the needs of customers to achieve organizational goals.

In order for the delivery of orders can be made in a timely manner then it takes a mature production planning. Planning is a process that is done for an organization to define a strategy in running the production process. The production process will run smoothly if it is done with the scheduling and planning.

In carrying out the production process to run smoothly can be done by looking at the capacity for each product. The production plan can be realized when the production capacity available. The production capacity is closely related to the master production schedule (MPS), for MPS will describe what and how much should be produced in a given time period.

The problem that often occurs is a delay in delivery. This is due to the lack of careful planning for the production process. To overcome these problems will require planning of production and production capacity planning using Rough Cut Capacity Planning (RCCP).

### 1.2. Problem Statement

Based on the results of the identification of the problems mentioned above, it can be formulated the problem in this research is how to do production capacity planning using Rough Cut Capacity Planning (RCCP)?

### 1.3. Research Purpose

The purpose of this research is to know how to do capacity planning production using Rough Cut Capacity Planning (RCCP).

### 1.4. Limitation of Problem

Boundary problem in this study, ie: 1) the research only do capacity planning production methods Rough Cut Capacity Planning (RCCP); 2) the study does not take into account the cost factor; 3) The data used is the data demand from the company in 2016; and 4) the products to be made the capacity planning are Clamp AQ 3E114 FO and Clamp AQ 3E115 FO.

### 1.5. Assumption

The assumptions used in this study were: 1) a data request is considered valid; 2) labor and equipment is readily available; 3) a standard production process is considered valid; and 4) there was no significant change in demand.

## 2. THEORETICAL BACKGROUND

### 2.1. Capacity Planning

Some authors (Chase and Aquilano, Chase et al., and Russell and Taylor) in Hertanto have said that the capacity is the amount of output that can be produced by a production system in a certain time horizon, which is for one year or several years to come. Capacity can also be interpreted as the number of product units that can be handled, received, stored, or accommodated within a specified time.

Schroeder in Tampubolon (2014) has said that the number of planned capacity should be based on risks in want of compliance with the expected demand. Handoko in Haming and Nurnajamuddin (2012) also has said that the capacity is an output stage, a quantity of output in a given period and is the highest possible output quantity during that time period.

Based on the definition above capacity planning, capacity planning can then be defined as the process of determining the level of planned capacity in a given period and is the highest output quantity during that time period.

### 2.2. Rough Cut Capacity Planning (RCCP)

Handoko in Haming and Nurnajamuddin (2012) has said that the Rough Cut Capacity Planning (RCCP) is a second order of priority planning capacity were instrumental in developing the Master Production Schedule (MPS). Rough Cut Capacity Planning (RCCP) is the same as the Resource Requirements Planning (RRP), except that RCCP is more detailed than the Resource Requirements Planning (RRP) in such things as: 1) RCCP been disaggregated to the level of the item or Stockkeeping Unit (SKU); 2) RCCP disaggregated by daily or weekly time periods; and 3) RCCP consider more production resources.

Gaspersz (1998) has said that the Rough Cut Capacity Planning (RCCP) is second in the hierarchy of planning priorities were instrumental in developing the capacity of the MPS. RCCP validate the MPS which also ranks second in the hierarchy of priorities production planning. In order to set certain specific sources especially expected to be a potential barrier (potential bottleneck) is sufficient to implement the MPS. Thus we can help management to implement RCCP, by providing information about production levels in the future that will satisfy the total demand.

## 3. RESEARCH METHOD

Variables used in this research is the processing time, the number of work centers, each work center capacity, working hours, number of employees, efficiency, demand in 2016.

Data processing method used to solve the above problems is by using RCCP. Steps that can be done in RCCP is as follows:

1) Calculating Capacity Available ($CA_t$) monthly with the formula:
   $CA_t = h_t.e.u$ (1)
   where:
   *h* = working hour available (hours)
   *e* = efficiency (%)
   *u* = utilization (%)
2) Calculating Capacity Requirement ($CR_t$) monthly with the formula:
   $CR_t = a.b_t$ (2)
   where:
   *a* = processing time (hours)
   $b_t$ = number of product (pcs)
   *t* = 1 to n
   *n* = number of periods
3) Calculating excess/shortage capacity ($CC_t$) monthly with the formula:
   $CC_t = CA_t - CR_t$ (3)
   where:
   if $CC_t < 0$ then capacity is shortage;
   if $CC_t = 0$ then capacity is met; and
   if $CC_t > 0$ then capacity is excess.
4) Evaluate, whether there is work center that lack the capacity? If no, then calculate the production plan based $CR_t$ on step 7. If there is, then make adjustments (step 5).
5) Adjusting Capacity Requirement ($CR_t$') monthly if $CC_t < 0$ with the formula:
   $CR'_t = CA_t$ (4)
   $CR'_{t+1} = CR_{t+1} - CC_t$ (5)
6) Repeat step 3 to 5 until $CC_t$ (1 to *n*) ≥ 0.
7) Recalculate the production plan in accordance with the *CR* at the WC has been adjusted.
8) Recalculating the CR on each WC is based on the production plan has been adjusted.

## 4. RESULT AND DISCUSSION

### 4.1. Data Collecting

The data collected, in the form of availability of working hours, working days, the efficiency and utilization of each work center are: 1) hours = 8 hours/day; 2) working days = 7 days/month; 3) efficiency = 91.7%/month; and 4) utilization = 95%/month. Processing time at each work center for each of the products studied were: 1) WC-1 =0.0012 hrs / pcs; 2) WC-2 = 0.0025 hrs / pcs; 3) WC-3 = 0.0056 hrs /

pcs; and 4) WC-4 = 0.0014 hrs / pcs. Data demand (production plan) per month for each product can be seen in Table 1.

Table 1. Production Plan in 2016

| Period | Product (Pcs) | |
|---|---|---|
| | AQ 3E114 FO | AQ 3E115 FO |
| January | 10,156 | 10,571 |
| February | 7,249 | 7,544 |
| March | 9,124 | 9,496 |
| April | 7,776 | 8,093 |
| May | 5,219 | 5,431 |
| June | 7,266 | 7,563 |
| Jule | 9,322 | 9,703 |
| Agust | 6,963 | 7,248 |
| September | 7,456 | 7,760 |
| October | 8,303 | 8,642 |
| November | 8,709 | 9,064 |
| December | 6,618 | 6,889 |
| **Total** | **94,161** | **98,004** |

## 4.2. Data Processing

Data processing was performed using the following steps:

1) Calculating Capacity Available ($CA_t$) monthly with equation (1), that the results shown in Table 2.

Table 2. Capacity Available ($CA_t$) Clamp Product

| Prd | WH (hrs) | WD (days) | Eff (%) | Utz (%) | $CA_t$ (hrs) |
|---|---|---|---|---|---|
| Jan | 8 | 7 | 91,70 | 95 | 48.7844 |
| Feb | 8 | 7 | 91,70 | 95 | 48.7844 |
| Mar | 8 | 7 | 91,70 | 95 | 48.7844 |
| Apr | 8 | 7 | 91,70 | 95 | 48.7844 |
| May | 8 | 7 | 91,70 | 95 | 48.7844 |
| Jun | 8 | 7 | 91,70 | 95 | 48.7844 |
| Jul | 8 | 7 | 91,70 | 95 | 48.7844 |
| Aug | 8 | 7 | 91,70 | 95 | 48.7844 |
| Sep | 8 | 7 | 91,70 | 95 | 48.7844 |
| Oct | 8 | 7 | 91,70 | 95 | 48.7844 |
| Nov | 8 | 7 | 91,70 | 95 | 48.7844 |
| Dec | 8 | 7 | 91,70 | 95 | 48.7844 |

2) Calculating Capacity Requirement ($CR_t$) monthly with equation (2), that the results shown in Table 3 to 4.

3) Calculating excess/shortage capacity ($CC_t$) monthly with equation (3), that the results shown in Table 4 to 6.

Table 3. Capacity Requirement ($CR_t$) Clamp AQ 3E114 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 12.1872 | 25.3900 | 56.8736 | 14.2184 |
| Feb | 8.6988 | 18.1225 | 40.5944 | 10.1486 |
| Mar | 10.9488 | 22.8100 | 51.0944 | 12.7736 |
| Apr | 9.3312 | 19.4400 | 43.5456 | 10.8864 |
| May | 6.2628 | 13.0475 | 29.2264 | 7.3066 |
| Jun | 8.7192 | 18.1650 | 40.6896 | 10.1724 |
| Jul | 11.1864 | 23.3050 | 52.2032 | 13.0508 |
| Aug | 8.3556 | 17.4075 | 38.9928 | 9.7482 |
| Sep | 8.9472 | 18.6400 | 41.7536 | 10.4384 |
| Oct | 9.9636 | 20.7575 | 46.4968 | 11.6242 |
| Nov | 10.4508 | 21.7725 | 48.7704 | 12.1926 |
| Dec | 7.9416 | 16.5450 | 37.0608 | 9.2652 |

Table 4. Capacity Requirement ($CR_t$) Clamp AQ 3E115 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 12.6852 | 26.4275 | 59.1976 | 14.7994 |
| Feb | 9.0528 | 18.8600 | 42.2464 | 10.5616 |
| Mar | 11.3952 | 23.7400 | 53.1776 | 13.2944 |
| Apr | 9.7116 | 20.2325 | 45.3208 | 11.3302 |
| May | 6.5172 | 13.5775 | 30.4136 | 7.6034 |
| Jun | 9.0756 | 18.9075 | 42.3528 | 10.5882 |
| Jul | 11.6436 | 24.2575 | 54.3368 | 13.5842 |
| Aug | 8.6976 | 18.1200 | 40.5888 | 10.1472 |
| Sep | 9.3120 | 19.4000 | 43.4560 | 10.8640 |
| Oct | 10.3704 | 21.6050 | 48.3952 | 12.0988 |
| Nov | 10.8768 | 22.6600 | 50.7584 | 12.6896 |
| Dec | 8.2668 | 17.2225 | 38.5784 | 9.6446 |

Table 5. Capacity Excess/Shortage ($CC_t$) Clamp AQ 3E114 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 36.5972 | 23.3944 | (8.0892) | 34.5660 |
| Feb | 40.0856 | 30.6619 | 8.1900 | 38.6358 |
| Mar | 37.8356 | 25.9744 | (2.3100) | 36.0108 |
| Apr | 39.4532 | 29.3444 | 5.2388 | 37.8980 |
| May | 42.5216 | 35.7369 | 19.5580 | 41.4778 |
| Jun | 40.0652 | 30.6194 | 8.0948 | 38.6120 |
| Jul | 37.5980 | 25.4794 | (3.4188) | 35.7336 |
| Aug | 40.4288 | 31.3769 | 9.7916 | 39.0362 |
| Sep | 39.8372 | 30.1444 | 7.0308 | 38.3460 |
| Oct | 38.8208 | 28.0269 | 2.2876 | 37.1602 |
| Nov | 38.3336 | 27.0119 | 0.0140 | 36.5918 |
| Dec | 40.8428 | 32.2394 | 11.7236 | 39.5192 |

Table 6. Capacity Excess/Shortage ($CC_t$) Clamp AQ 3E115 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 36.0992 | 22.3569 | (10.4132) | 33.9850 |
| Feb | 39.7316 | 29.9244 | 6.5380 | 38.2228 |
| Mar | 37.3892 | 25.0444 | (4.3932) | 35.4900 |
| Apr | 39.0728 | 28.5519 | 3.4636 | 37.4542 |
| May | 42.2672 | 35.2069 | 18.3708 | 41.1810 |
| Jun | 39.7088 | 29.8769 | 6.4316 | 38.1962 |
| Jul | 37.1408 | 24.5269 | (5.5524) | 35.2002 |
| Aug | 40.0868 | 30.6644 | 8.1956 | 38.6372 |
| Sep | 39.4724 | 29.3844 | 5.3284 | 37.9204 |
| Oct | 38.4140 | 27.1794 | 0.3892 | 36.6856 |
| Nov | 37.9076 | 26.1244 | (1.9740) | 36.0948 |
| Dec | 40.5176 | 31.5619 | 10.2060 | 39.1398 |

4) In Table 5 and 6 shows that the shortage of capacity in the WC-3, ie for product Clamp AQ 3E114 FO in January, March and July, while for the product Clamp AQ 3E115 FO in January, March, July and November. Thus there will be an adjustment *CRt* in these months.

5) Adjusting Capacity Requirement ($CR_t'$) monthly if $CC_t < 0$ with equation (4) and (5).

6) This adjustment process will be repeated until all CCT value> 0, that the result shown in Table 7 and 8.

Table 7. Adjusting Capacity Requirement ($CR_t$') on WC-3 Clamp AQ 3E114 FO (hours)

| Prd | $CA_t$ | $CR_t$ | $CC_t$ | $CR_t$' | $CC_t$' |
|---|---|---|---|---|---|
| Jan | 48.7844 | 56.8736 | (8.0892) | 48.7844 | - |
| Feb | 48.7844 | 40.5944 | 8.1900 | 48.6836 | 0.1008 |
| Mar | 48.7844 | 51.0944 | (2.3100) | 48.7844 | - |
| Apr | 48.7844 | 43.5456 | 5.2388 | 45.8556 | 2.9288 |
| May | 48.7844 | 29.2264 | 19.5580 | 29.2264 | 19.5580 |
| Jun | 48.7844 | 40.6896 | 8.0948 | 40.6896 | 8.0948 |
| Jul | 48.7844 | 52.2032 | (3.4188) | 48.7844 | - |
| Aug | 48.7844 | 38.9928 | 9.7916 | 42.4116 | 6.3728 |
| Sep | 48.7844 | 41.7536 | 7.0308 | 41.7536 | 7.0308 |
| Oct | 48.7844 | 46.4968 | 2.2876 | 46.4968 | 2.2876 |
| Nov | 48.7844 | 48.7704 | 0.0140 | 48.7704 | 0.0140 |
| Dec | 48.7844 | 37.0608 | 11.7236 | 37.0608 | 11.7236 |
| **Tot** | **585.4128** | **527.3016** | **58.1112** | **527.3016** | **58.1112** |

Table 8. Adjusting Capacity Requirement ($CR_t$') on WC-3 Clamp AQ 3E115 FO (hours)

| Prd | $CA_t$ | $CR_t$ | $CC_t$ | $CR_t$' | $CC_t$' |
|---|---|---|---|---|---|
| Jan | 48.7844 | 59.1976 | (10.4132) | 48.7844 | - |
| Feb | 48.7844 | 42.2464 | 6.5380 | 48.7844 | - |
| Mar | 48.7844 | 53.1776 | (4.3932) | 48.7844 | - |
| Apr | 48.7844 | 45.3208 | 3.4636 | 48.7844 | - |
| May | 48.7844 | 30.4136 | 18.3708 | 35.2184 | 13.5660 |
| Jun | 48.7844 | 42.3528 | 6.4316 | 42.3528 | 6.4316 |
| Jul | 48.7844 | 54.3368 | (5.5524) | 48.7844 | - |
| Aug | 48.7844 | 40.5888 | 8.1956 | 46.1412 | 2.6432 |
| Sep | 48.7844 | 43.4560 | 5.3284 | 43.4560 | 5.3284 |
| Oct | 48.7844 | 48.3952 | 0.3892 | 48.3952 | 0.3892 |
| Nov | 48.7844 | 50.7584 | (1.9740) | 48.7844 | - |
| Dec | 48.7844 | 38.5784 | 10.2060 | 40.5524 | 8.2320 |
| **Tot** | **585.4128** | **548.8224** | **36.5904** | **548.8224** | **36.5904** |

7) Recalculate the production plan in accordance with the *CR* has been adjusted, that the results shown in Table 9.

Table 9. Adjusting Demand Clamp Product (Pieces)

| Prd | AQ 3E114 FO | | AQ 3E115 FO | |
|---|---|---|---|---|
| | Before | After | Before | After |
| Jan | 10,156 | 8,712 | 10,571 | 8,712 |
| Feb | 7,249 | 8,694 | 7,544 | 8,712 |
| Mar | 9,124 | 8,712 | 9,496 | 8,712 |
| Apr | 7,776 | 8,189 | 8,093 | 8,712 |
| May | 5,219 | 5,219 | 5,431 | 6,289 |
| Jun | 7,266 | 7,266 | 7,563 | 7,563 |
| Jul | 9,322 | 8,712 | 9,703 | 8,712 |
| Aug | 6,963 | 7,574 | 7,248 | 8,240 |
| Sep | 7,456 | 7,456 | 7,760 | 7,760 |
| Oct | 8,303 | 8,303 | 8,642 | 8,642 |
| Nov | 8,709 | 8,709 | 9,064 | 8,712 |
| Dec | 6,618 | 6,618 | 6,889 | 7,242 |
| **Tot** | **94,161** | **94,161** | **98,001** | **98,001** |

8) Recalculating the CR on each WC is based on the production plan has been adjusted, that the results shown in Table 10 and 11.

Table 10. Adjusting Capacity Requirement ($CR_t$') on each WC Clamp AQ 3E114 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Feb | 10.4322 | 21.7338 | 48.6836 | 12.1709 |
| Mar | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Apr | 9.8262 | 20.4713 | 45.8556 | 11.4639 |
| May | 6.2628 | 13.0475 | 29.2264 | 7.3066 |
| Jun | 8.7192 | 18.1650 | 40.6896 | 10.1724 |
| Jul | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Aug | 9.0882 | 18.9338 | 42.4116 | 10.6029 |
| Sep | 8.9472 | 18.6400 | 41.7536 | 10.4384 |
| Oct | 9.9636 | 20.7575 | 46.4968 | 11.6242 |
| Nov | 10.4508 | 21.7725 | 48.7704 | 12.1926 |
| Dec | 7.9416 | 16.5450 | 37.0608 | 9.2652 |

Table 11. Adjusting Capacity Requirement ($CR_t$') on each WC Clamp AQ 3E115 FO (hours)

| Prd | WC-1 | WC-2 | WC-3 | WC-4 |
|---|---|---|---|---|
| Jan | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Feb | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Mar | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Apr | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| May | 7.5468 | 15.7225 | 35.2184 | 8.8046 |
| Jun | 9.0756 | 18.9075 | 42.3528 | 10.5882 |
| Jul | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Aug | 9.8874 | 20.5988 | 46.1412 | 11.5353 |
| Sep | 9.3120 | 19.4000 | 43.4560 | 10.8640 |
| Oct | 10.3704 | 21.6050 | 48.3952 | 12.0988 |
| Nov | 10.4538 | 21.7788 | 48.7844 | 12.1961 |
| Dec | 8.6898 | 18.1038 | 40.5524 | 10.1381 |

### 4.3. Discussion

Production capacity Clamp AQ 3E114 FO happened shortage of capacity, as shown in Table 5, which is on the WC-3: 8.0892 hours for January, 2.3100 hours for March and 3.4188 hours for July. As for the product Clamp AQ 3E115 FO also experienced the same thing, ie the shortage of capacity on a WC-3, but many more: 10.4132 hours for January, 4.3932 hours for March, 5.5524 hours for July and 1.970 hours for November. This can be seen in Table 6. The capacity of the two products was no trouble at other WC.

However, when viewed as a whole, the total capacity requirement on the WC-3 was 527.3016 hours for Clamp AQ 3E114 FO, whereas its total available capacity was 585.4128 hours. This means that the capacity available is still capable of being used to meet the capacity requirements. Similarly to Clamp AQ 3E115 FO, total capacity requirement on the WC-3 amounted to 548.8224 still be met with its available capacity.

Table 7 and 8 also show that in total, WC-3 occurs excess capacity was 58.1112 hours for Clamp AQ 3E114 FO and 36.5904 hours for Clamp AQ 3E115 FO. This means

shortages that occur in these periods can be met by transferring the workload in the form of shortage of capacity to the next period that still has excess capacity. Thus the necessary adjustments to the production plan that has been prepared in advance so that all demand can be met.

Adjustments were made on WC-3 for the product AQ 3E114 FO is to remove the burden 8.0892 hours from January to February that still has 8.1900 hours excess capacity, so that the WC-3 will operate full capacity in January and only have 0.1008 hours excess capacity in February. The next adjustment is shifting the burden 2.3100 hours from March to April at 2.3100 clock that still has 5.2388 hours excess capacity, so that the WC-3 will operate full capacity in March and only have 2.9288 hours excess capacity in April. The workload is shifted 3.4188 hours from July to August that still has 6.3728 hours excess capacity.

Adjustments were made on WC-3 for the product AQ 3E115 FO is to remove the burden 10.4132 hours from January to February. However, only available 6.5380 hours excess capacity in February. As a result happened 3.8752 shortage capacity in February. The expenses were forced to be diverted into March, but during that period it also happened 4.3932 hours shortage capacity, so that the WC-3 happened 8.2684 hours accumulation shortage capacity shortage in March. The transfer of the load to April was found to reduce 4.8048 hours shortage capacity. The shortage capacity can be resolved in May because there is 18.3708 hours excess capacity in the period. Thus there is still 13.5660 hours excess capacity in May, while WC-3 full capacity operated from January to April. Shortage capacity occurred again 5.5524 hours in July and the load can be shifted into August that still has 8.1956 hours excess capacity. Thus WC-3 full capacity operated in the period and there is still 2.6432 hours excess capacity in August. The next adjustment is shifting the burden 1.9740 hours from November to December that still has 10.2060 hours excess capacity. The result is WC-3 full capacity operated in November and still have 8.2320 hours excess capacity in December.

After adjusting the load capacity of the WC-3, further adjustments will be made production plans both products, as shown in Table 9. In the table shows that there was no change in total demand in both products, but only the details per period are changed. This means that adjustments made to the WC-3 does not affect the total demand for a year.

The result of the adjustment of the production plan will then be used as the basis for capacity adjustment plan on the entire WC, namely WC-1 through 4. The adjustment results shown in Tables 10 and 11. The result of the adjustment is to be used as a reference in Clamp AQ 3E114 FO and Clamp AQ 3E115 FO production plan.

## 5. CONCLUSION

Based on the analysis of the capacity requirements with available capacity, the production plan in January-December 2016 for products Clamp AQ 3E114 FO and Clamp AQ 3E115 FO were not feasible because there is still a shortage of capacity in the WC- 3. Therefore, it are necessary to make adjustments to address the shortage of capacity on a WC-3, ie by adjusting workloads by shifting the workloads to the next period. The result is a shortage of capacity for Clamp AQ 3E114 FO that occurred 8.0892 hours from January, 2.3100 hours from March and 3.4188 hours from July, as well as to Clamp AQ 3E115 FO happens 10.4132 from January, 4.3932 hours from March, 5.5524 hours from July and 1.9740 hours from November each successfully transferred to the next period without reducing the total existing demand.

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