

LAMPIRAN I

Perhitungan *Availability* Bulan Januari 2017 sampai dengan bulan Desember 2017:

$$Availability = \frac{Operation\ Time}{Loading\ Time} \times 100\%$$

Nilai *Availability* mesin *hydraulic press* untuk Januari 2017 sampai dengan bulan Desember 2017 adalah sebagai berikut:

- Bulan Januari 2017 :

$$Availability = \frac{336,08}{453} \times 100\% = 74,18\%$$

- Bulan Februari 2017 :

$$Availability = \frac{370,76}{479} \times 100\% = 77,40\%$$

- Bulan Maret 2017 :

$$Availability = \frac{342,87}{441} \times 100\% = 83,42\%$$

- Bulan April 2017 :

$$Availability = \frac{454,36}{590} \times 100\% = 77,01\%$$

LAMPIRAN II

Perhitungan *Performance Efficiency* bulan Januari 2017 sampai dengan bulan Desember 2017:

$$\text{Performance Efficiency} = \frac{\text{Processed Amount} \times \text{Ideal Cycle Time}}{\text{Operation Time}}$$

Kapasitas mesin produksi selama 8 jam kerja adalah : 320 unit

$$\text{Waktu Optimal menghasilkan produk} = \frac{320 \text{ unit}}{8 \text{ Jam}} = 40 \text{ unit/Jam}$$

$$\text{Ideal Cycle Time} = \frac{1 \text{ Jam}}{40} = 0,025 \text{ Jam/Kg}$$

Sehingga Nilai *Performance Efficiency* mesin *hydraulic press* untuk bulan Januari 2017 sampai dengan bulan Desember 2017 dapat dihitung sebagai berikut:

- Bulan Januari 2017 :

$$\text{Performance Efficiency} = \frac{11970 \times 0,025}{336,08} \times 100\% = 89,04\%$$

- Bulan Februari 2017 :

$$\text{Performance Efficiency} = \frac{10980 \times 0,025}{370,76} \times 100\% = 74,03\%$$

- Bulan Maret 2017 :

$$\text{Performance Efficiency} = \frac{12870 \times 0,025}{342,87} \times 100\% = 93,84\%$$

- Bulan April 2017 :

$$\text{Performance Efficiency} = \frac{11030 \times 0,025}{454,36} \times 100\% = 60,68\%$$

- Bulan Mei 2017 :

$$\text{Performance Efficiency} = \frac{9007 \times 0,025}{380,11} \times 100\% = 59,23\%$$

- Bulan Juni 2017 :

$$\text{Performance Efficiency} = \frac{7080 \times 0,025}{364,09} \times 100\% = 48,61\%$$

- Bulan Juli 2017 :

$$\text{Performance Efficiency} = \frac{9880 \times 0,025}{300,44} \times 100\% = 82,21\%$$

- Bulan Agustus 2017 :

$$\text{Performance Efficiency} = \frac{9900 \times 0,025}{371,07} \times 100\% = 66,69\%$$

- Bulan September 2017 :

$$\text{Performance Efficiency} = \frac{8790 \times 0,025}{291,97} \times 100\% = 75,26\%$$

- Bulan Oktober 2017 :

$$\text{Performance Efficiency} = \frac{7530 \times 0,025}{239,09} \times 100\% = 78,73\%$$

- Bulan November 2017 :

$$\text{Performance Efficiency} = \frac{9655 \times 0,025}{311,98} \times 100\% = 77,36\%$$

- Bulan Desember 2017 :

$$\text{Performance Efficiency} = \frac{11056 \times 0,025}{354,42} \times 100\% = 77,98\%$$

Nilai Rata – rata *Performance Efficiency*

$$\begin{aligned} \text{Nilai Rata – rata } \text{Performance Efficiency} &= \frac{\text{Total Jumlah Data}}{\text{N (Jumlah Data)}} \\ &= 883,72 / 12 = 73,64 \% \end{aligned}$$

Jadi nilai rata – rata *Performance Efficiency* selama bulan Januari 2017 sampai dengan bulan Desember 2017 adalah sebesar 73,64 %.

LAMPIRAN III

Perhitungan *Rate Of Quality Product* Bulan Januari 2017 sampai dengan bulan Desember 2017 :

$$\text{Rate Of Quality Product} = \frac{\text{Processed Amount} - \text{Defect Amount}}{\text{Processed Amount}} \times 100\%$$

Nilai *Rate Of Quality Product* mesin *hydraulic press* untuk Januari 2017 sampai dengan bulan Desember 2017 adalah sebagai berikut:

- Bulan Januari 2017 :

$$\text{Rate Of Quality Product} = \frac{11970 - 895}{11970} \times 100\% = 92,52\%$$

- Bulan Februari 2017 :

$$\text{Rate Of Quality Product} = \frac{10980 - 387}{10980} \times 100\% = 96,47\%$$

- Bulan Maret 2017 :

$$\text{Rate Of Quality Product} = \frac{12870 - 309}{12870} \times 100\% = 97,59\%$$

- Bulan April 2017 :

$$\text{Rate Of Quality Product} = \frac{11030 - 465}{11030} \times 100\% = 95,78\%$$

- Bulan Mei 2017 :

$$\text{Rate Of Quality Product} = \frac{9007 - 249}{9007} \times 100\% = 96,73\%$$

- Bulan Juni 2017 :

$$\text{Rate Of Quality Product} = \frac{7080 - 288}{7080} \times 100\% = 95,93\%$$

- Bulan Juli 2017 :

$$\text{Rate Of Quality Product} = \frac{9880 - 310}{9880} \times 100\% = 96,83\%$$

- Bulan Agustus 2017 :

$$\text{Rate Of Quality Product} = \frac{9900 - 459}{9900} \times 100\% = 95,36\%$$

- Bulan September 2017 :

$$\text{Rate Of Quality Product} = \frac{8790 - 275}{8790} \times 100\% = 96,87\%$$

- Bulan Oktober 2017 :

$$\text{Rate Of Quality Product} = \frac{7530 - 295}{7530} \times 100\% = 96,08\%$$

- Bulan November 2017 :

$$\text{Rate Of Quality Product} = \frac{9655 - 326}{9655} \times 100\% = 96,62\%$$

- Bulan Desember 2017 :

$$\text{Rate Of Quality Product} = \frac{11056 - 543}{11056} \times 100\% = 95,08\%$$

Nilai Rata – rata *Rate Of Quality Product*

$$\begin{aligned} \text{Nilai Rata – rata } \text{Rate Of Quality Product} &= \frac{\text{Total Jumlah Data}}{N (\text{Jumlah Data})} \\ &= 1151,94/12 = 95,99\% \end{aligned}$$

Jadi nilai rata – rata *Rate Of Quality Product* selama bulan Januari 2017 sampai dengan bulan Desember 2017 adalah sebesar 95,99%.

LAMPIRAN IV

Perhitungan *Overall Equipment Effectiveness* (OEE)

Setelah nilai *availability*, *performance efficiency*, dan *rate of quality product* pada mesin *hydraulic press* diperoleh maka dilakukan perhitungan nilai *Overall Equipment Effectiveness* (OEE) untuk mengetahui besarnya efektivitas penggunaan mesin *hydraulic press* di PT. Elang Jagad.

Perhitungan *Overall Equipment Effectiveness* (OEE) adalah perkalian nilai-nilai *availability*, *performance efficiency*, dan *rate of quality product* yang sudah diperoleh.

$OEE = (Availability \times Performance \text{ Efficiency} \times rate \text{ Of Quality Product}) \times 100\%$

$$OEE = \left(\frac{A}{100} \times \frac{P.E}{100} \times \frac{Q.R}{100} \right) \times 100 \%$$

Dimana :

A = *Availability*

P.E = *Performance Efficiency*

Q.R = *Quality Rate*

Untuk perhitungan OEE mesin *hydraulic press* bulan Januari 2017 sampai dengan bulan Desember 2017 adalah:

- Bulan Januari 2017 :

$$\begin{aligned} OEE &= \left(\frac{74,18}{100} \times \frac{89,04}{100} \times \frac{92,52}{100} \right) \times 100 \% \\ &= 61,12 \% \end{aligned}$$

- Bulan Februari 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{77,40}{100} \times \frac{74,03}{100} \times \frac{96,47}{100} \right) \times 100 \% \\ &= 55,28 \% \end{aligned}$$

- Bulan Maret 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{83,42}{100} \times \frac{93,84}{100} \times \frac{97,59}{100} \right) \times 100 \% \\ &= 76,40 \% \end{aligned}$$

- Bulan April 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{77,01}{100} \times \frac{60,68}{100} \times \frac{95,78}{100} \right) \times 100 \% \\ &= 44,76 \% \end{aligned}$$

- Bulan Mei 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{82,09}{100} \times \frac{59,23}{100} \times \frac{96,73}{100} \right) \times 100 \% \\ &= 47,04 \% \end{aligned}$$

- Bulan Juni 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{\quad}{100} \times \frac{\quad}{100} \times \frac{\quad}{100} \right) \times 100 \% \\ &= 50,25 \% \end{aligned}$$

- Bulan Juli 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{\quad}{100} \times \frac{\quad}{100} \times \frac{\quad}{100} \right) \times 100 \% \\ &= 30,5 \% \end{aligned}$$

- Bulan Agustus 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{81,73}{100} \times \frac{66,69}{100} \times \frac{95,36}{100} \right) \times 100 \% \\ &= 51,98 \% \end{aligned}$$

- Bulan September 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{73,54}{100} \times \frac{75,26}{100} \times \frac{96,87}{100} \right) \times 100 \% \\ &= 53,62 \% \end{aligned}$$

- Bulan Oktober 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{64,27}{100} \times \frac{78,77}{100} \times \frac{96,08}{100} \right) \times 100 \% \\ &= 48,62 \% \end{aligned}$$

- Bulan November 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{76,46}{100} \times \frac{77,36}{100} \times \frac{96,62}{100} \right) \times 100 \% \\ &= 57,16 \% \end{aligned}$$

- Bulan Desember 2017 :

$$\begin{aligned} \text{OEE} &= \left(\frac{79,46}{100} \times \frac{77,98}{100} \times \frac{95,08}{100} \right) \times 100 \% \\ &= 58,92 \% \end{aligned}$$

Nilai Rata – rata OEE

$$\begin{aligned} \text{Nilai Rata – rata OEE} &= \frac{\text{Total Jumlah Data}}{\text{N (Jumlah Data)}} \\ &= 652,50 / 12 \\ &= 54,37 \% \end{aligned}$$

Jadi nilai rata – rata OEE selama bulan Januari 2017 sampai dengan bulan Desember 2017 adalah sebesar 54,37%.

LAMPIRAN V

Perhitungan RPN failure sebagai berikut :

- RPN (target produksi tidak sesuai) = $S * O * D$
= $7 * 5 * 4$
= 140

- RPN (*downtime losses*) = $S * O * D$
= $8 * 6 * 6$
= 288

- RPN (*idling and minor stoppages*) = $S * O * D$
= $5 * 6 * 5$
= 150

- RPN (*Reduced speed*) = $S * O * D$
= $7 * 5 * 8$
= 280

- RPN (*defect losses*) = $S * O * D$
= $6 * 5 * 5$
= 150

- Bulan Mei 2017 :

$$Availability = \frac{380,11}{463} \times 100\% = 82,09\%$$

- Bulan Juni 2017 :

$$Availability = \frac{364,09}{438} \times 100\% = 83,12\%$$

- Bulan Juli 2017

$$Availability = \frac{300,44}{407} \times 100\% = 73,81\%$$

- Bulan Agustus 2017 :

$$Availability = \frac{371,07}{454} \times 100\% = 81,73\%$$

- Bulan September 2017 :

$$Availability = \frac{291,97}{397} \times 100\% = 73,54\%$$

- Bulan Oktober 2017 :

$$Availability = \frac{239,09}{372} \times 100\% = 64,27\%$$

- Bulan November 2017 :

$$Availability = \frac{311,98}{408} \times 100\% = 76,46\%$$

- Bulan Desember 2017 :

$$Availability = \frac{354,42}{446} \times 100\% = 79,46\%$$

Nilai Rata – rata *Availability*

$$\text{Nilai Rata – rata } Availability = \frac{\text{Total Jumlah Data}}{N (\text{Jumlah Data})}$$

$$= 926,54 / 12 = 77,21$$

Jadi nilai rata – rata *Availability* selama bulan Januari 2017 sampai dengan bulan Desember 2017 adalah sebesar 77,21 %.