DAFTAR GAMBAR

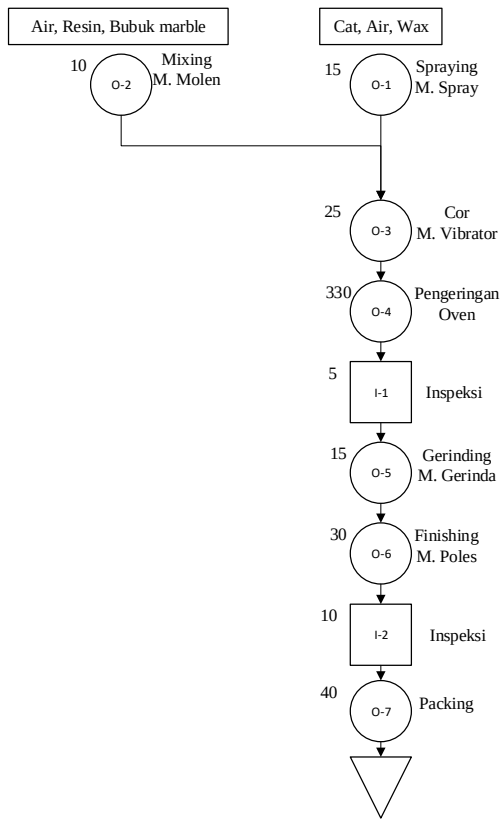
DAFTAR TABEL

LAMPIRAN

Operation Process Chart

Operation Process Chart

Nama Produk : *Bathub*
Dipetakan Oleh : Natanael Setyo Kristyadi
Dipetakan Tanggal : 15 Oktober 2023



Ringkasan		
Kegiatan	Jumlah	Waktu (Menit)
Operasi	7	465
Inspeksi	2	15
Total	9	480

Uji Keseragaman Data

1) Operator 1
   a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{148}{10} = 14{,}8$$

   b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1{,}48$$

   c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 9{,}97$$

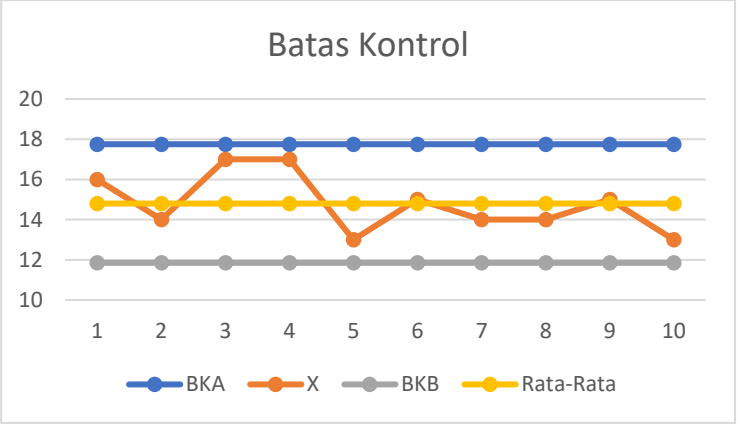
   d) Tingkat Kepercayaan

$$CL = 100\% - S = 90{,}03\% \approx 2$$

   e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 17{,}75$$

$$BKB = \bar{X} - K\sigma = 11{,}85$$



2) Operator 2
   a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{107}{10} = 10{,}7$$

   b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 0{,}82$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 7{,}69$

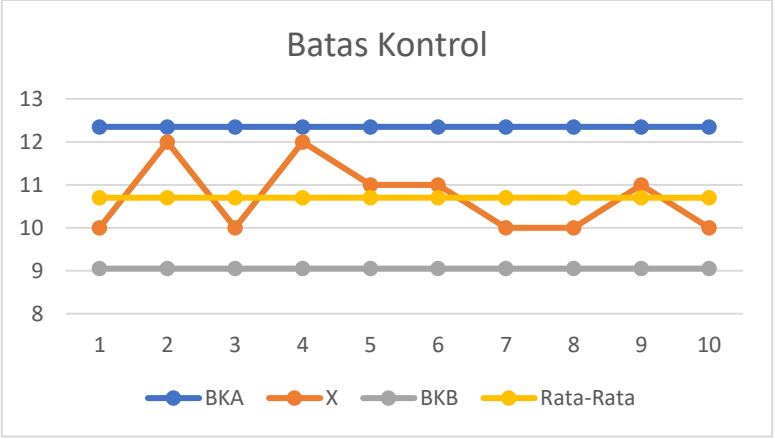
d) Tingkat Kepercayaan

$CL = 100\% - S = 92{,}31\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 12{,}35$

$BKB = \bar{X} - K\sigma = 9.05$



3) Operator 3

a) Nilai rata-rata

$\bar{X} = \frac{\sum x_i}{N}$

$\bar{X} = \frac{108}{10} = 10.8$

b) Standar deviasi

$s = \sqrt{\frac{\sum (x_i - \bar{X})^2}{N-1}} = 0.92$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 8{,}51$

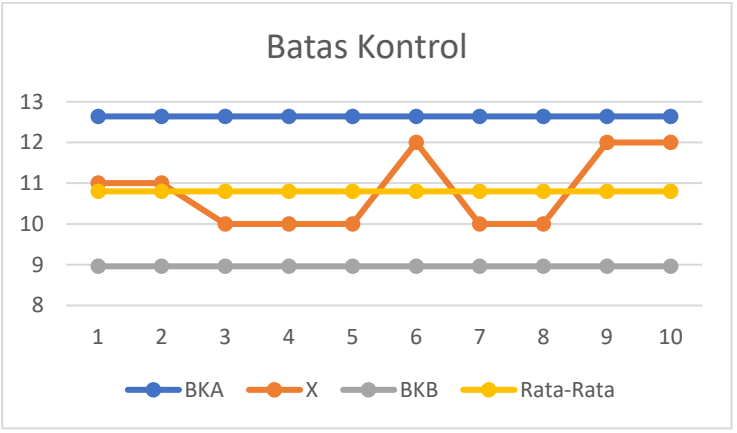
d) Tingkat Kepercayaan

$CL = 100\% - S = 91.49\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 12.64$

$BKB = \bar{X} - K\sigma = 8{,}96$



4) Operator 4

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{254}{10} = 25.4$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1.26$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 4.98$

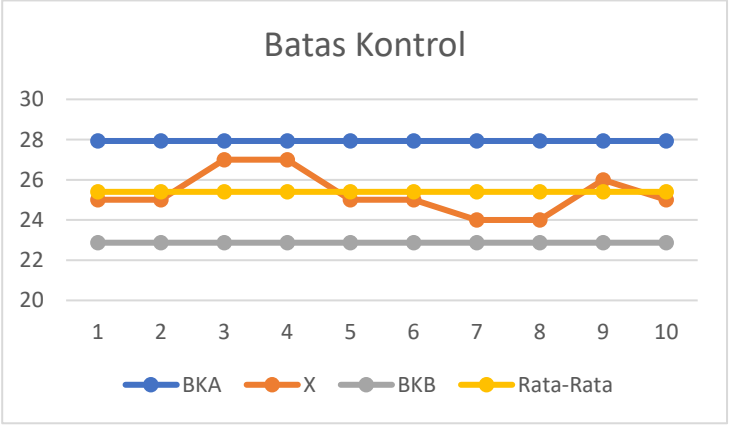
d) Tingkat Kepercayaan

$CL = 100\% - S = 95{,}02\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 27{,}93$

$BKB = \bar{X} - K\sigma = 22{,}87$



5) Operator 5

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{254}{10} = 25.4$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1.26$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4.98$$

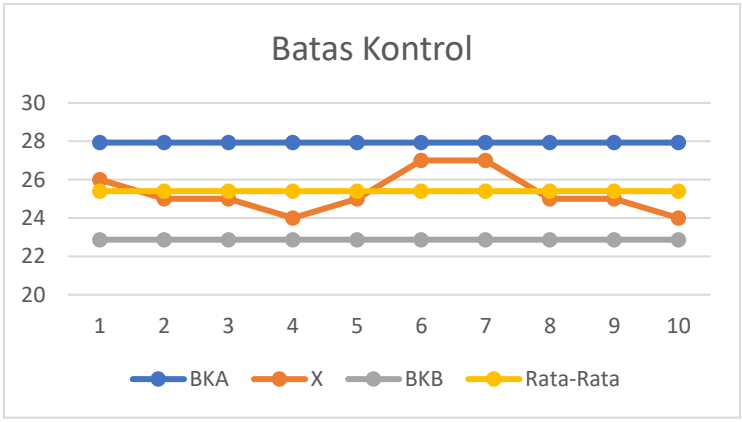
d) Tingkat Kepercayaan

$$CL = 100\% - S = 95{,}02\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 27.93$$

$$BKB = \bar{X} - K\sigma = 22{,}87$$



6) Operator 6

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{257}{10} = 25.7$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1.06$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4.12$$

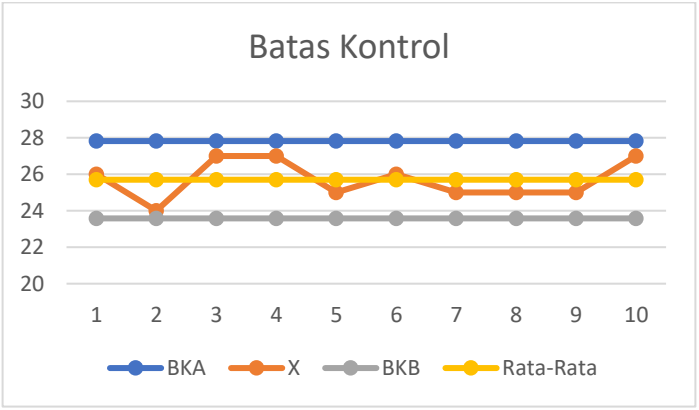
d) Tingkat Kepercayaan

$CL = 100\% - S = 95.88\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 27.82$

$BKB = \bar{X} - K\sigma = 23.58$



7) Operator 7

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{3345}{10} = 334.5$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 12.79$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 3.82$

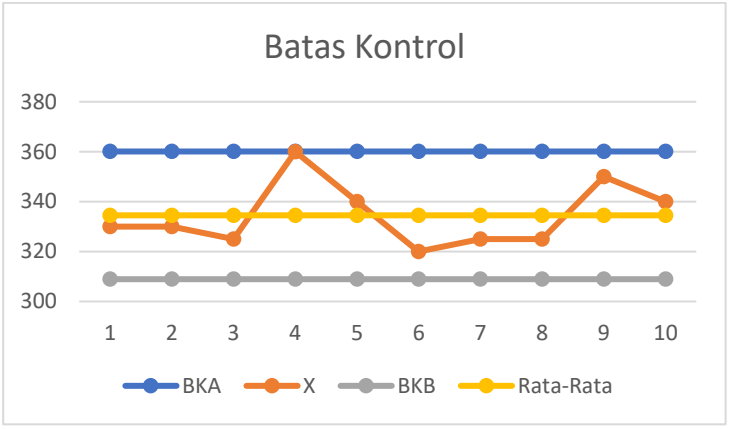
d) Tingkat Kepercayaan

$CL = 100\% - S = 96.18\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 360.08$

$BKB = \bar{X} - K\sigma = 308.92$



8) Operator 8

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{159}{10} = 15.9$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 1.37$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 8{,}62$

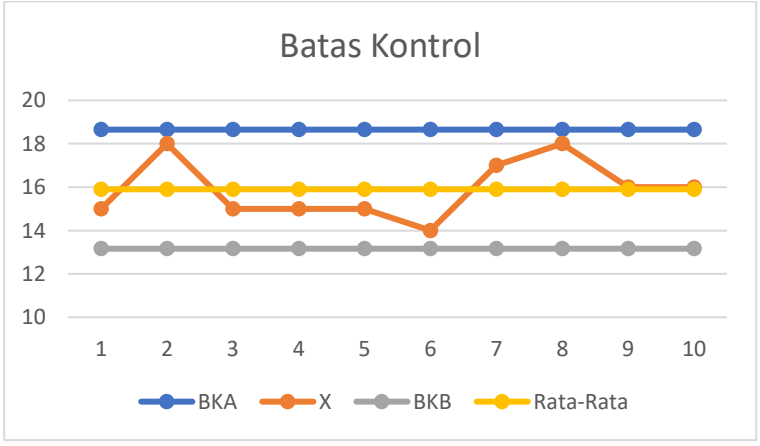
d) Tingkat Kepercayaan

$CL = 100\% - S = 91{,}38\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 18{,}64$

$BKB = \bar{X} - K\sigma = 13{,}16$



9) Operator 9

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{164}{10} = 16.4$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1.65$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 10.04$$

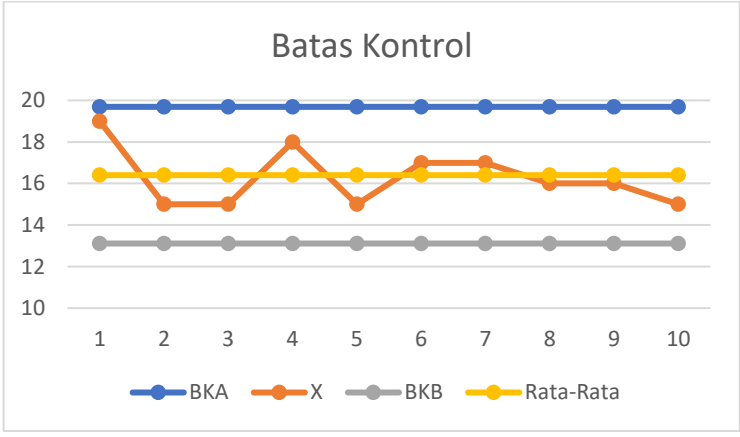
d) Tingkat Kepercayaan

$$CL = 100\% - S = 89.96\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 19.69$$

$$BKB = \bar{X} - K\sigma = 13.11$$



10) Operator 10

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{348}{10} = 34{,}8$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 2{,}78$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 7{,}99$$

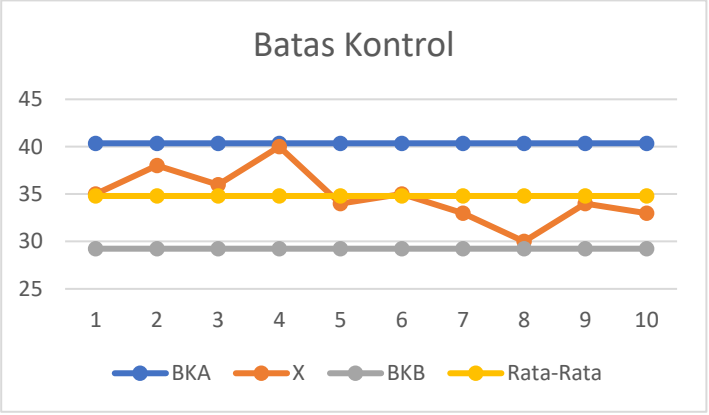
d) Tingkat Kepercayaan

$CL = 100\% - S = 92{,}01\% \approx 2$

e) Batas Kontrol

$BKA = \bar{\bar{X}} + K\sigma = 40{,}36$

$BKB = \bar{\bar{X}} - K\sigma = 29{,}24$



11) Operator 11

a) Nilai rata-rata

$$\bar{\bar{X}} = \frac{\sum x_i}{N}$$

$$\bar{\bar{X}} = \frac{337}{10} = 33{,}7$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{\bar{X}})^2}{N-1}} = 2{,}11$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{\bar{X}}} \times 100\% = 6{,}26$

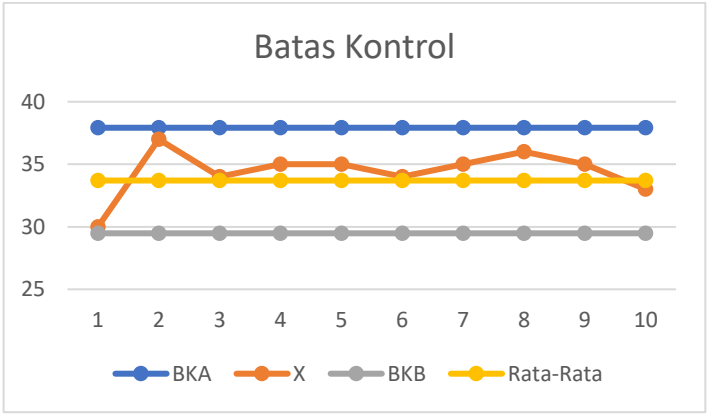
d) Tingkat Kepercayaan

$CL = 100\% - S = 93{,}74\% \approx 2$

e) Batas Kontrol

$BKA = \bar{\bar{X}} + K\sigma = 37.92$

$BKB = \bar{\bar{X}} - K\sigma = 29{,}48$



12) Operator 12

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{347}{10} = 34.7$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1.34$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 3{,}85$

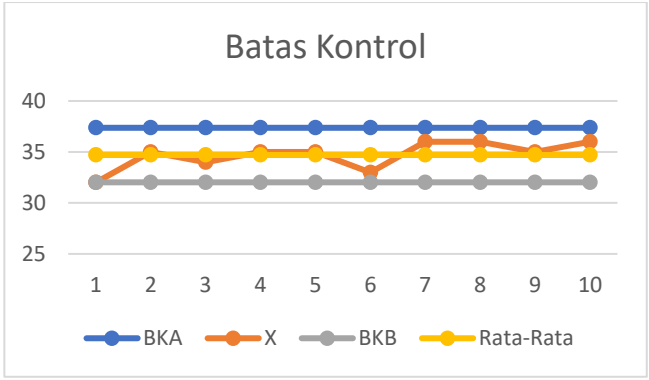
d) Tingkat Kepercayaan

$CL = 100\% - S = 96{,}15\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 37{,}37$

$BKB = \bar{X} - K\sigma = 32{,}03$



13) Operator 13

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{346}{10} = 34{,}6$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 1{,}51$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4{,}35$$

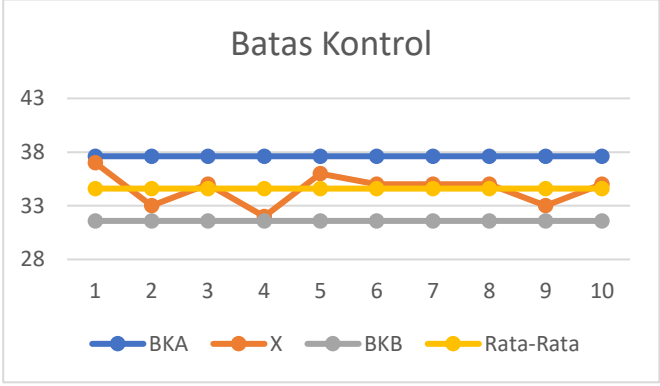
d) Tingkat Kepercayaan

$$CL = 100\% - S = 95{,}65\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 37{,}61$$

$$BKB = \bar{X} - K\sigma = 31{,}59$$



14) Operator 14

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{352}{10} = 35{,}2$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 2.15$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 6{,}11$$

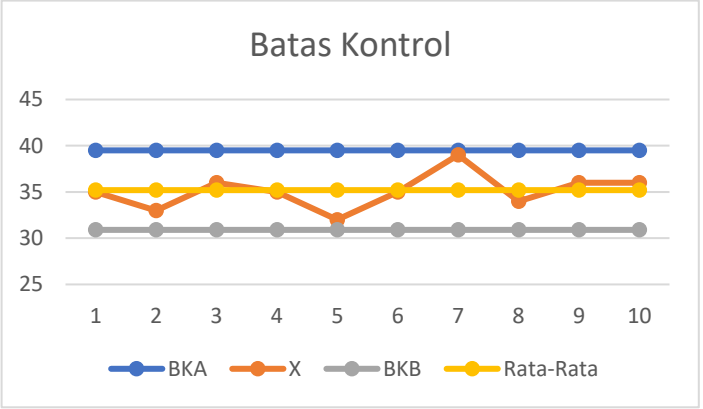
d) Tingkat Kepercayaan

$CL = 100\% - S = 93{,}89\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 39{,}50$

$BKB = \bar{X} - K\sigma = 30{,}90$



15) Operator 15

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{347}{10} = 34.7$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum (x_i - \bar{X})^2}{N-1}} = 1.25$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 3{,}61$

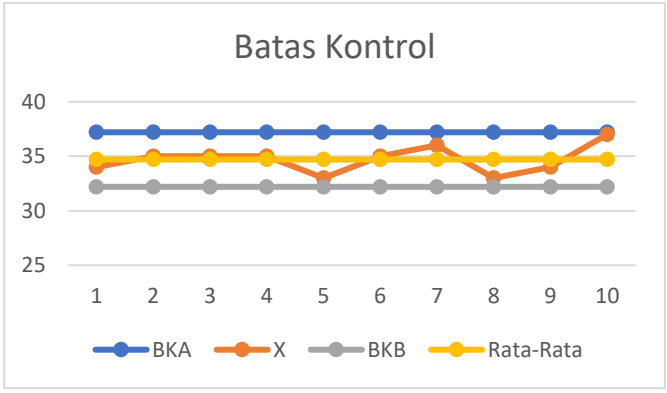
d) Tingkat Kepercayaan

$CL = 100\% - S = 96{,}39\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 37{,}20$

$BKB = \bar{X} - K\sigma = 32{,}20$



16) Operator 16

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{353}{10} = 35{,}3$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 2{,}06$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 5{,}83$$

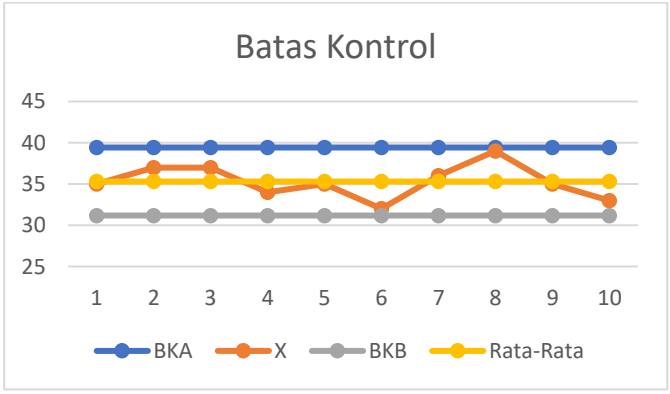
d) Tingkat Kepercayaan

$$CL = 100\% - S = 91{,}17\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 39{,}42$$

$$BKB = \bar{X} - K\sigma = 31{,}18$$



17) Operator 17

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{351}{10} = 35{,}1$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1{,}66$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4{,}74$$

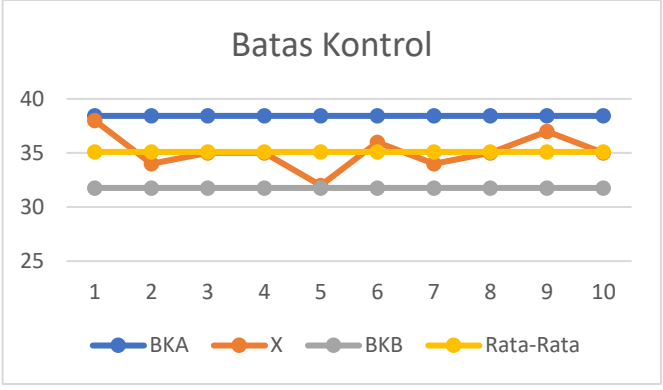
d) Tingkat Kepercayaan

$$CL = 100\% - S = 95{,}26\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 38{,}43$$

$$BKB = \bar{X} - K\sigma = 31{,}77$$



18) Operator 18

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{331}{10} = 33{,}1$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 2{,}23$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 6{,}75$$

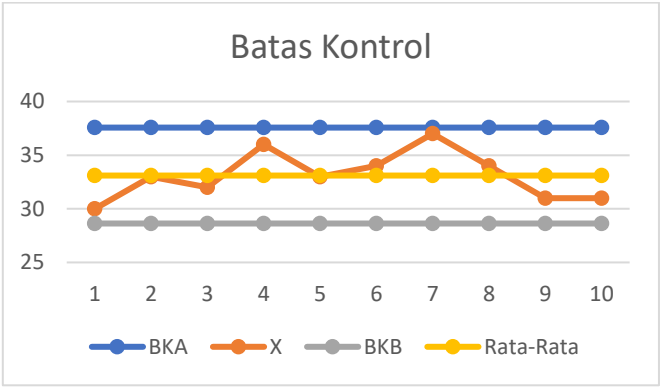
d) Tingkat Kepercayaan

$CL = 100\% - S = 93{,}25\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 37.57$

$BKB = \bar{X} - K\sigma = 28.63$



19) Operator 19

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{339}{10} = 33{,}9$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 2{,}18$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 6{,}44$

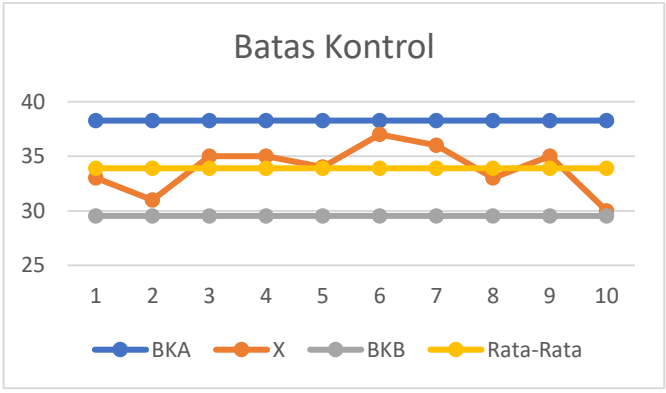
d) Tingkat Kepercayaan

$CL = 100\% - S = 93{,}56\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 38.27$

$BKB = \bar{X} - K\sigma = 29{,}53$



20) Operator 20

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{338}{10} = 33{,}8$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1{,}40$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4{,}14$$

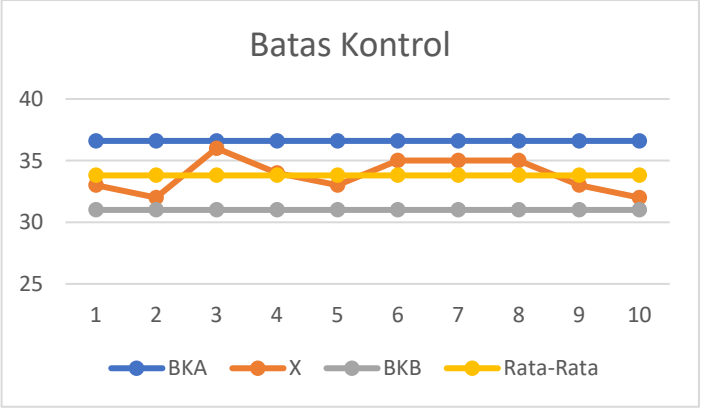
d) Tingkat Kepercayaan

$$CL = 100\% - S = 95{,}86\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 36{,}60$$

$$BKB = \bar{X} - K\sigma = 31{,}00$$



21) Operator 21

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{335}{10} = 33{,}5$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 1.84$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 5.50$$

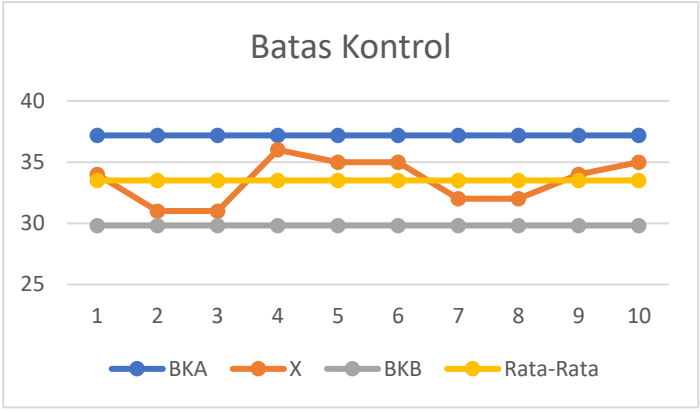
d) Tingkat Kepercayaan

$$CL = 100\% - S = 94{,}50\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 37{,}18$$

$$BKB = \bar{X} - K\sigma = 29{,}82$$



22) Operator 22

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{364}{10} = 36{,}4$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 1{,}51$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4{,}14$$

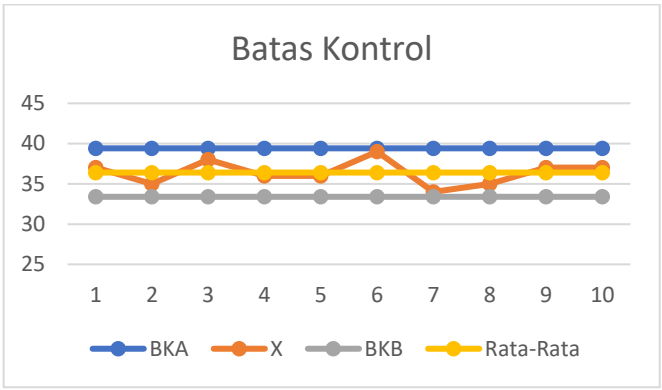
d) Tingkat Kepercayaan

$CL = 100\% - S = 95{,}86\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 39{,}41$

$BKB = \bar{X} - K\sigma = 33{,}39$



23) Operator 23

a) Nilai rata-rata

$$\bar{X} = \frac{\Sigma x_i}{N}$$

$$\bar{X} = \frac{111}{10} = 11.1$$

b) Standar deviasi

$$s = \sqrt{\frac{\Sigma(x_i - \bar{X})^2}{N-1}} = 1{,}73$$

c) Tingkat Ketelitian

$S = \frac{\sigma}{\bar{X}} \times 100\% = 15{,}58$

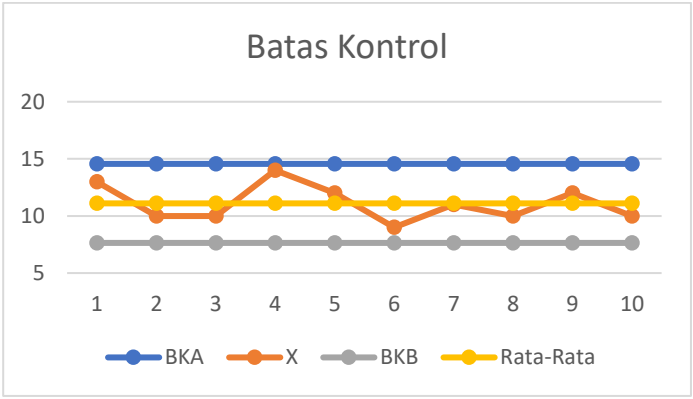
d) Tingkat Kepercayaan

$CL = 100\% - S = 84{,}42\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 14{,}56$

$BKB = \bar{X} - K\sigma = 7{,}64$



24) Operator 24

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{424}{10} = 42{,}4$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 2{,}80$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 6{,}60$$

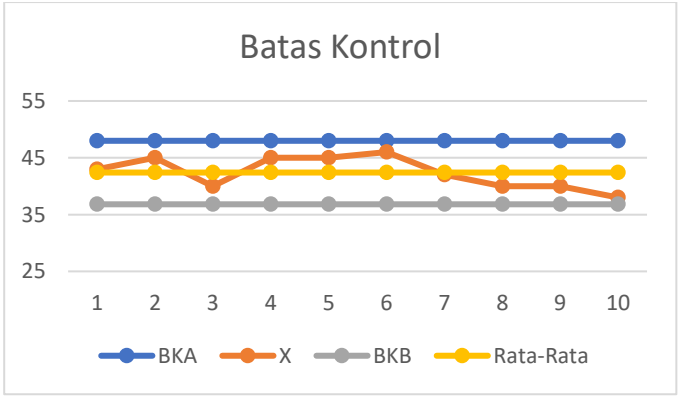
d) Tingkat Kepercayaan

$$CL = 100\% - S = 93{,}40\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 47{,}99$$

$$BKB = \bar{X} - K\sigma = 36{,}81$$



25) Operator 25

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{438}{10} = 43{,}8$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 2{,}25$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 5{,}14$$

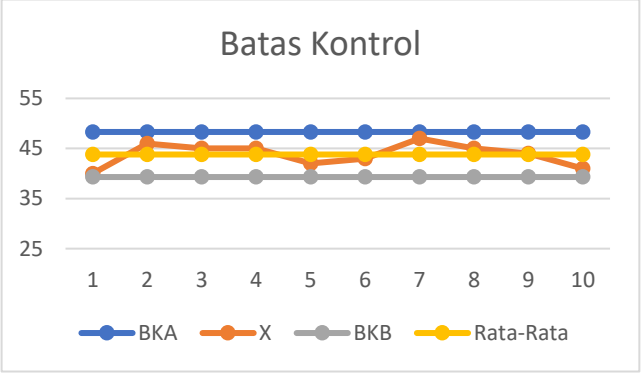
d) Tingkat Kepercayaan

$$CL = 100\% - S = 94{,}86\% \approx 2$$

e) Batas Kontrol

$$BKA = \bar{X} + K\sigma = 48{,}30$$

$$BKB = \bar{X} - K\sigma = 39{,}30$$



26) Operator 26

a) Nilai rata-rata

$$\bar{X} = \frac{\sum x_i}{N}$$

$$\bar{X} = \frac{443}{10} = 44{,}3$$

b) Standar deviasi

$$s = \sqrt{\frac{\sum(x_i - \bar{X})^2}{N-1}} = 1{,}83$$

c) Tingkat Ketelitian

$$S = \frac{\sigma}{\bar{X}} \times 100\% = 4{,}13$$

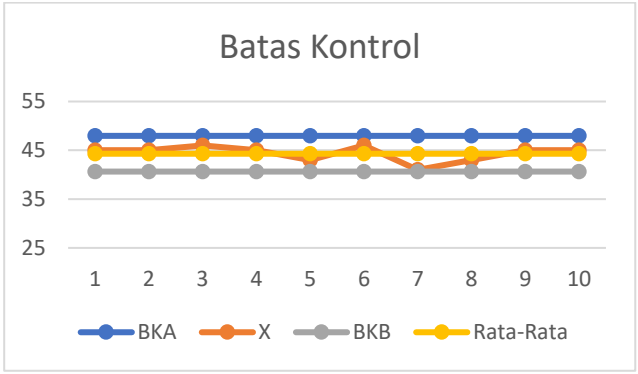
d) Tingkat Kepercayaan

$CL = 100\% - S = 95{,}87\% \approx 2$

e) Batas Kontrol

$BKA = \bar{X} + K\sigma = 47.96$

$BKB = \bar{X} - K\sigma = 40{,}64$



Uji Kecukupan Data

- Operator 1

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 2

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 3

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 4

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 5

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 6

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 7

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 8

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 9

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 10

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 11

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 12

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 13

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 14

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 15

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 16

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 17

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 18

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 19

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 20

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 21

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 22

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 23

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 24

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 25

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

- Operator 26

  $N' = (\frac{\frac{k}{s}\sqrt{N \times \sum xi^2 - (\sum x)^2}}{\sum xi})^2$

  $N' = \sqrt{1{,}897} = 3{,}6$ Karena nilai N' < N, dengan N = 10. Maka data telah dianggap cukup.

Kelonggaran/*Allowance Time*

- *Spraying*

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{31}{420} = 7\%$$

- Mixing

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{33{,}5}{420} = 8\%$$

- Cor

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{27}{420} = 6\%$$

- Oven

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{32}{420} = 8\%$$

- Gerinding

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{23{,}5}{420} = 6\%$$

- Finishing

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{30{,}7}{420} = 7\%$$

- QC

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{34}{420} = 8\%$$

- Packing

$$Allowance\ Time\ (\%) = \frac{Total\ waktu\ allowance\ time}{Jam\ kerja}$$
$$= \frac{51{,}7}{420} = 12\%$$

Perhitungan Waktu Normal

- *Spraying*
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 14,8 × 1,21
  = 17,91 menit/unit
- *Mixing*
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 10,75 × 1,23
  = 13,22 menit/unit
- Cor
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 334,5 × 1,25
  = 418,13 menit/unit
- Oven
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 16,15 × 1,23
  = 19,86 menit/unit
- *Gerinding*
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 14,8 × 1,21
  = 17,91 menit/unit
- *Finishing*
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 34,52 × 1,25
  = 43,15 menit/unit
- QC
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 11,1 × 1,24
  = 17,91 menit/unit
- *Packing*
  $Wn = \bar{X} \times Performance\ Rating\ \%$
  = 43,5 × 1,21
  = 52,64 menit/unit

Waktu Standar

- *Spraying*

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 17{,}91 \times \frac{100\%}{100\% - 7\%} = 19{,}05 \text{ menit/unit}$$

- *Mixing*

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 13{,}22 \times \frac{100\%}{100\% - 8\%} = 14{,}37 \text{ menit/unit}$$

- Cor

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 31{,}37 \times \frac{100\%}{100\% - 6\%} = 33{,}37 \text{ menit/unit}$$

- Oven

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 418{,}13 \times \frac{100\%}{100\% - 8\%} = 454{,}49 \text{ menit/unit}$$

- Gerinding

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 19{,}86 \times \frac{100\%}{100\% - 6\%} = 21{,}13 \text{ menit/unit}$$

- *Finishing*

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 43{,}15 \times \frac{100\%}{100\% - 7\%} = 46{,}40 \text{ menit/unit}$$

- QC

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 13{,}76 \times \frac{100\%}{100\% - 8\%} = 14{,}96 \text{ menit/unit}$$

- *Packing*

$$Waktu\ Standar\ (Ws) = Wn\ \times \frac{100\%}{100\% - \%allowance}$$
$$= 52{,}64 \times \frac{100\%}{100\% - 7\%} = 59{,}82 \text{ menit/unit}$$

Output Standar

- *Spraying*

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{19.26} \times 420 = 21{,}81$ unit

- *Mixing*

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{14{,}37} \times 420 = 29{,}23$ unit

- Cor

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{33{,}37} \times 420 = 12{,}59$ unit

- Oven

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{454{,}49} \times 420 = 0{,}92$ unit

- Gerinding

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{21{,}13} \times 420 = 19{,}88$ unit

- *Finishing*

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{46{,}40} \times 420 = 9{,}05$ unit

- QC

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{14{,}96} \times 420 = 28{,}07$ unit

- *Packing*

  $OS = \frac{1}{waktu\ standar} \times waktu\ kerja$

  $= \frac{1}{59{,}82} \times 420 = 7{,}02$ unit

Pembulatan Nilai Output Standar

- *Spraying*
  Karena pembulatan kebawah, maka terjadi overtime sebesar:
  $P(d) = \frac{21-21,81}{21} \times 100\% = -3,85\%$
  $P(r) = 100\% - (-3,85)\% = 103,85\%$ Overtime/lembur
  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:
  $P(d) = \frac{22-21,84}{22} \times 100\% = 0,86\%$
  $P(r) = 100\% - 0,86\% = 99,14\%$

- *Mixing*
  Karena pembulatan kebawah, maka terjadi overtime sebesar:
  $P(d) = \frac{29-29,23}{29} \times 100\% = -0,79\%$
  $P(r) = 100\% - (-0,75)\% = 100,75\%$ Overtime/lembur
  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:
  $P(d) = \frac{30-29,23}{30} \times 100\% = 2,5\%$
  $P(r) = 100\% - 2,5\% = 97,5\%$

- Cor
  Karena pembulatan kebawah, maka terjadi overtime sebesar:
  $P(d) = \frac{12-12,59}{12} \times 100\% = -4,31\%$
  $P(r) = 100\% - (-4,31)\% = 104,31\%$ Overtime/lembur
  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:
  $P(d) = \frac{13-12,59}{13} \times 100\% = 3,15\%$
  $P(r) = 100\% - 3,15\% = 96,85\%$

- Oven
  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:
  $P(d) = \frac{1-0,92}{1} \times 100\% = 8\%$
  $P(r) = 100\% - 8\% = 92\%$

- Gerinding
  Karena pembulatan kebawah, maka terjadi overtime sebesar:
  $P(d) = \frac{19-19,88}{19} \times 100\% = -4,63\%$
  $P(r) = 100\% - (-4,63)\% = 104,63\%$ Overtime/lembur
  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:

$P(d) = \frac{20-19,88}{20} \times 100\% = 0,6\%$

$P(r) = 100\% - 0,6\% = 99,4\%$

- *Finishing*

  Karena pembulatan kebawah, maka terjadi overtime sebesar:

  $P(d) = \frac{9-9,05}{9} \times 100\% = -0,5\%$

  $P(r) = 100\% - (-0,5)\% = 100,5\%$ Overtime/lembur

  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:

  $P(d) = \frac{10-9,05}{10} \times 100\% = 9,5\%$

  $P(r) = 100\% - 9,5\% = 90,5\%$

- QC

  Karena pembulatan kebawah, maka terjadi overtime sebesar:

  $P(d) = \frac{28-28,07}{28} \times 100\% = -0,25\%$

  $P(r) = 100\% - (-0,25)\% = 100,25\%$ Overtime/lembur

  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:

  $P(d) = \frac{29-28,07}{29} \times 100\% = 3,2\%$

  $P(r) = 100\% - 3,2\% = 96,8\%$

- *Packing*

  Karena pembulatan kebawah, maka terjadi overtime sebesar:

  $P(d) = \frac{7-7,02}{7} \times 100\% = -0,28\%$

  $P(r) = 100\% - (-0,28)\% = 100,28\%$ Overtime/lembur

  Karena pembulatan keatas, maka terjadi kelangkaan mesin dan operator sebesar:

  $P(d) = \frac{8-7,02}{8} \times 100\% = 12,25\%$

  $P(r) = 100\% - 12,25\% = 87,75\%$

Perhitungan Nilai TEC

- *Spraying*
  N = 0,74
  M = 19,26 menit
  N1 = 1 Operator
  L = 2
  K1 = Rp. 250/menit
  K2 = Rp. 300/menit

  $$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
  $$= \frac{(2+19{,}26)\times(250\times1+300)}{1}$$
  $$= Rp.\,11.693$$
  Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:
  $$P(d) = \frac{1-0{,}74}{1}\times 100\% = 26\%$$
  $$P(r) = 100\% - 26\% = 74\%$$

- *Mixing*
  N = 0,55
  M = 14,37 menit
  N1 = 1 Operator
  L = 2
  K1 = Rp. 250/menit
  K2 = Rp. 350/menit

  $$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
  $$= \frac{(2+14{,}37)\times(250\times1+350)}{1}$$
  $$= Rp.\,9.832$$
  Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:
  $$P(d) = \frac{1-0{,}55}{1}\times 100\% = 45\%$$
  $$P(r) = 100\% - 45\% = 55\%$$

- Cor
  N = 1,28
  M = 33,37 menit
  N1 = 1 Operator

N2 = 2 Operator
L = 2
K1 = Rp. 250/menit
K2 = Rp. 350/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
$$= \frac{(2+33{,}37)\times(250\times1+350)}{1}$$
$$= Rp.\,21.222$$

$$TEC - N_2 = (L+M)\times(K_1\times N_2+K_2)$$
$$= (2+33{,}37)\times(250\times2+350)$$
$$= Rp.\,30.064$$
$$TEC - N_1 < TEC - N_2$$

Karena pembulatan kebawah, maka terjadi overtime sebesar:

$P(d) = \frac{1-1{,}28}{1}\times 100\% = -28\%$

$P(r) = 100\% - (-28)\% = 128\%$ Overtime/lembur

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{2-1{,}28}{2}\times 100\% = 36\%$

$P(r) = 100\% - 36\% = 64\%$

- Oven

N = 1,74
M = 45,449 menit
N1 = 1 Operator
N2 = 2 Operator
L = 2
K1 = Rp. 250/menit
K2 = Rp. 400/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
$$= \frac{(2+45{,}449)\times(250\times1+400)}{1}$$
$$= Rp.\,30.672$$

$$TEC - N_2 = (L+M)\times(K_1\times N_2+K_2)$$
$$= (2+45{,}449)\times(250\times2+400)$$
$$= Rp.\,42.470$$

$$TEC - N_1 < TEC - N_2$$

Karena pembulatan kebawah, maka terjadi overtime sebesar:

$P(d) = \frac{1-1,74}{1} \times 100\% = -74\%$

$P(r) = 100\% - (-74)\% = 174\%$ Overtime/lembur

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{2-1,74}{2} \times 100\% = 13\%$

$P(r) = 100\% - 13\% = 87\%$

- Gerinding

  N = 0,81

  M = 21,13 menit

  N1 = 1 Operator

  L = 2

  K1 = Rp. 250/menit

  K2 = Rp. 300/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
$$= \frac{(2+21,13)\times(250\times1+300)}{1}$$
$$= Rp.12.721$$

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{1-0,81}{1} \times 100\% = 19\%$

$P(r) = 100\% - 19\% = 81\%$

- *Finishing*

  N = 1,78

  M = 46,4 menit

  N1 = 1 Operator

  N2 = 2 Operator

  L = 2

  K1 = Rp. 250/menit

  K2 = Rp. 300/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$
$$= \frac{(2+46,4)\times(250\times1+300)}{1}$$
$$= Rp.26.620$$

$$TEC - N_2 = (L + M) \times (K_1 \times N_2 + K_2)$$
$$= (2 + 46{,}4) \times (250 \times 2 + 300)$$
$$= Rp.\,38.720$$
$$TEC - N_1 < TEC - N_2$$

Karena pembulatan kebawah, maka terjadi overtime sebesar:

$P(d) = \frac{1-1{,}78}{1} \times 100\% = -78\%$

$P(r) = 100\% - (-78)\% = 178\%$ Overtime/lembur

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{2-1{,}78}{2} \times 100\% = 11\%$

$P(r) = 100\% - 11\% = 89\%$

- QC

N = 0,57
M = 14,96 menit
N1 = 1 Operator
L = 2
K1 = Rp. 250/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1)}{N_1}$$
$$= \frac{(2+14{,}96)\times(250\times 1)}{1}$$
$$= Rp.\,4.240$$

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{1-0{,}57}{1} \times 100\% = 43\%$

$P(r) = 100\% - 43\% = 57\%$

- *Packing*

N = 2,3
M = 59,82 menit
N1 = 2 Operator
N2 = 3 Operator
L = 2
K1 = Rp. 250/menit
K2 = Rp. 50/menit

$$TEC - N_1 = \frac{(L+M)\times(K_1\times N_1+K_2)}{N_1}$$

$$= \frac{(2+59{,}82)\times(250\times1+50)}{1}$$
$$= Rp.\,34.001$$

$$TEC - N_2 = (L + M) \times (K_1 \times N_2 + K_2)$$
$$= (2 + 59{,}82) \times (250 \times 2 + 50)$$
$$= Rp.\,49.456$$
$$TEC - N_1 < TEC - N_2$$

Karena pembulatan kebawah, maka terjadi overtime sebesar:

$P(d) = \frac{2-2{,}3}{2} \times 100\% = -15\%$

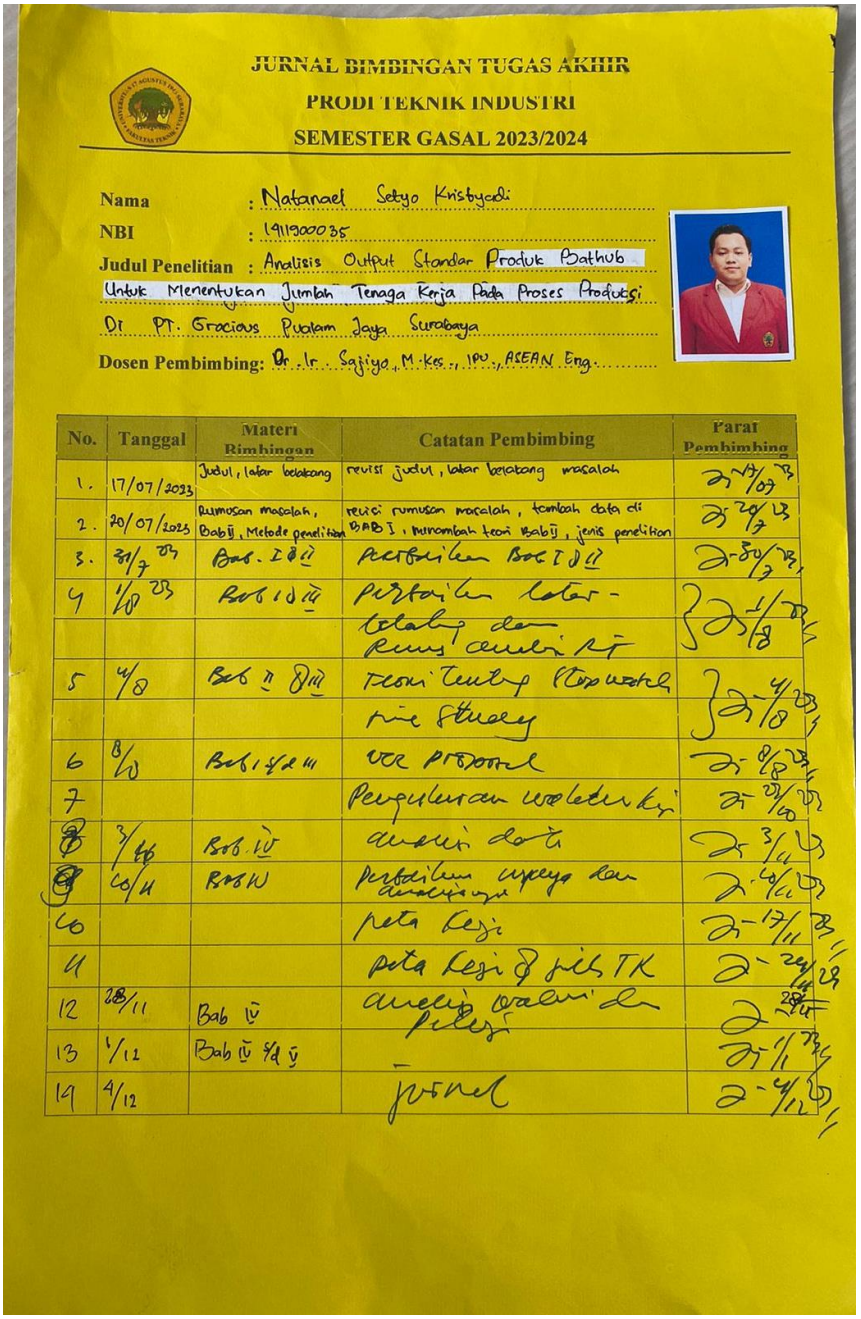
$P(r) = 100\% - (-15)\% = 115\%$ Overtime/lembur

Karena pembulatan keatas, maka terjadi kelangkaan mesin sebesar:

$P(d) = \frac{3-2{,}3}{3} \times 100\% = 23{,}3\%$

$P(r) = 100\% - 23{,}3\% = 76{,}7\%$

Kartu Bimbingan



JURNAL BIMBINGAN TUGAS AKHIR
PRODI TEKNIK INDUSTRI
SEMESTER GASAL 2023/2024

Nama : Nataneel Setyo Kristyadi
NBI : 191900035
Judul Penelitian : Analisis Output Standar Produk Bathub Untuk Menentukan Jumlah Tenaga Kerja Pada Proses Produksi Di PT. Gracious Puratam Jaya Surabaya
Dosen Pembimbing: Dr. Ir. Sajiyo, M.Kes., IPU., ASEAN Eng.

No.	Tanggal	Materi Bimbingan	Catatan Pembimbing	Paraf Pembimbing
1.	17/07/2023	Judul, latar belakang	revisi judul, latar belatang masalah	
2.	20/07/2023	Rumusan masalah, Bab II, Metode penelitian	revisi: rumusan masalah, tambah data di BAB I, menambah teori bab II, jenis penelitian	
3.	31/7	Bab. I & II	Perbaikan Bab I & II	
4	1/8	Bab I & II	Perbaikan latar belakang dan Rumusan masalah	
5	4/8	Bab II & III	Teori tentang Pengukuran kerja time study	
6	8/8	Bab I, II & III	ACC proposal	
7			Pengukuran waktu kerja	
8	3/11	Bab IV	analisa data	
9	10/11	Bab IV	perbaikan uraian dan analisa	
10			peta kerja	
11			peta kerja & jalur TK	
12	28/11	Bab IV	analisa dan pembahasan	
13	1/12	Bab IV & V		
14	4/12		jurnal	

No.	Tanggal	Materi Bimbingan	Catatan Pembimbing	Paraf Pembimbing
15	6/12		ACC Sidang	6/12

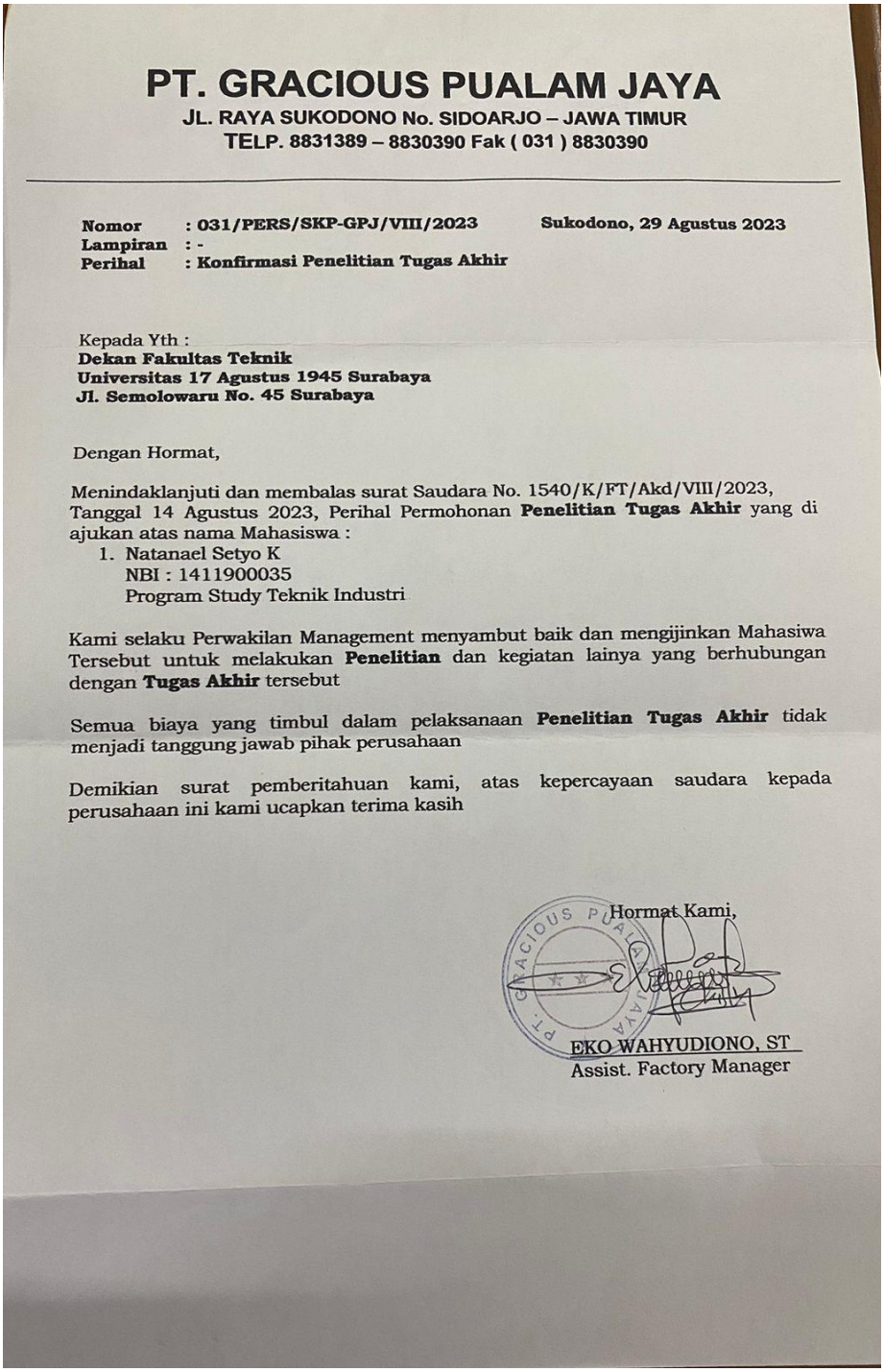
Surabaya, ...

Dosen Pembimbing

(Dr. Ir. Sajiyo, M.Kes., IPU., ASEAN Eng)

NPP : 29910.90.0197

Surat Ijin Penelitian



PT. GRACIOUS PUALAM JAYA
JL. RAYA SUKODONO No. SIDOARJO – JAWA TIMUR
TELP. 8831389 – 8830390 Fak (031) 8830390

Nomor : **031/PERS/SKP-GPJ/VIII/2023** **Sukodono, 29 Agustus 2023**
Lampiran : -
Perihal : **Konfirmasi Penelitian Tugas Akhir**

Kepada Yth :
Dekan Fakultas Teknik
Universitas 17 Agustus 1945 Surabaya
Jl. Semolowaru No. 45 Surabaya

Dengan Hormat,

Menindaklanjuti dan membalas surat Saudara No. 1540/K/FT/Akd/VIII/2023, Tanggal 14 Agustus 2023, Perihal Permohonan **Penelitian Tugas Akhir** yang di ajukan atas nama Mahasiswa :

1. Natanael Setyo K
   NBI : 1411900035
   Program Study Teknik Industri

Kami selaku Perwakilan Management menyambut baik dan mengijinkan Mahasiswa Tersebut untuk melakukan **Penelitian** dan kegiatan lainya yang berhubungan dengan **Tugas Akhir** tersebut

Semua biaya yang timbul dalam pelaksanaan **Penelitian Tugas Akhir** tidak menjadi tanggung jawab pihak perusahaan

Demikian surat pemberitahuan kami, atas kepercayaan saudara kepada perusahaan ini kami ucapkan terima kasih

Hormat Kami,

EKO WAHYUDIONO, ST
Assist. Factory Manager

Lembar Revisi Sidang TA

UNIVERSITAS 17 AGUSTUS 1945 SURABAYA
FAKUTAS TEKNIK
PROGRAM STUDI TEKNIK INDUSTRI

REVISI SIDANG TUGAS AKHIR

N A M A : Natanael Setyo Kristyadi
N B I : 1411900035
J U D U L : ANALISIS OUTPUT & STANDAR PRODUK BATHUB UNTUK MENENTUKAN JUMLAH TENAGA KERJA PADA PT. GRACIOUS PUALAM JAYA SURABAYA

BATAS BIMBINGAN REVISI : 1 Minggu setelah Sidang

NO	URAIAN	BAB	HALAMAN
	Kelengkapan apodex ? Kelengkapan alat !	13/12	03
1.	OPCnya direvisi ?	12/12	
2.	Abstraknya lengkapi dari 3 permasalahan diawal.		

NO	URAIAN	BAB	HALAMAN
1.	Tabel dilengkapi satuannya.	13/12/2023	
2.	Kesimpulan dijelaskan dari 13 pekerja menjadi 2 orang (kerja perhematan biayanya).		

Surabaya, 07 Desember 2023

Telah Direvisi, Dosen Penguji 1,	Dosen Penguji 2,	Mengetahui Dosen Pembimbing/Ketua Penguji,
12/12	13/12/2023	13/12
Istanyo Yuwono, ST., MM	~~Siti Muhimatul Khoiroh, ST., MT~~ Dr. Ir. Zainal Arief, MT	Dr. Ir. Sajiyo, M.Kes.,IPU.,ASEAN Eng

(Halaman ini sengaja dikosongkan)

BIOGRAFI

Penulis Bernama Natanael Setyo Kristyadi lahir di Sorong, 13 Juni 2001. Penulis merupakan anak tunggal. Penulis menempuh Pendidikan terakhir di SMA Negeri 1 Kabupaten Sorong, kemudian melanjutkan pendidikannya di Universitas 17 Agustus 1945 Surabaya – Program Studi Teknik Industri, penulis memiliki hobby bermain musik dan fotografi, semasa di bangku perkuliahan penulis aktif menjadi anggota di organinasi Unit Kegiatan Mahasiswa Kerohanian Kristen Katolik Universitas 17 Agustus 1945 Surabaya