(1)

Td = 2 min, Tc = 7+2 = 9 sec = 0.15 min Cycle rate Rc = 1/0.15 = 6.67 cycles/min

(a) Σ (mq) = 1(0.01) + 0.6(0.005) + 1(0.02) + 0.7(0.01) = 0.04

Tp = 0.15 + 0.04(2) = 0.23 min

Rp = 60/0.23 = 260.9 asbys/hr

(b) Pap = (1-0.01+1x0.01)(1-0.005+0.6x0.005)(1-0.02+1x0.02)(1-0.01+0.7x0.01)

= (1)(0.998)(1)(0.997) = 0.995

Pqp= 1 - 0.995 = 0.005

Rap = 260.9(0.995) = 259.6 good asbys/hr

(c) Station 2: fθ = 32(.25) = 8 components/min

Station 3: fθ = 20(.50) = 10 components/min

Station 4: fθ = 20(.25) = 5 components/min

Station 5: fθ = 15(1.0) = 15 components/min

The problem is that the feeder for station 4 is slower than the machine's cycle rate of 6.667

cycles/min

(d) If the machine operates at the cycle rate that is consistent with the feed rate of Station 4, then Tc

= 12 sec =

0.20 min

Tp = 0.20 + 0.04(2) = 0.28 min

Rp = 60/0.28 = 214.3 asbys/hr

Rap = 214.3(0.995) = 213.2 good asbys/hr

(2)

(a) Tc = 7 + 2 = 9.0 sec = 0.15 min

F = 0.02(1.0) + 0.01(0.6) + 0.015(0.8) + 0.02(1.0) + 0.012 = 0.070

Tp = 0.15 + 0.070(2.0) = 0.15 + 0.14 = 0.29 min

Rp = 1/0.29 = 3.45 asbys/min = 206.9 asbys/hr

(b) Pap = (1.0)(0.996)(0.997)(1.0) = 0.993

(c) Rap = 206.9(0.993) = 205.5 good asbys/hr

(d) E = 0.15/0.29 = 0.5172 = 51.7%

(3)

Solution : Tc = 1.0 min

Tp = 1.0 + 2(0.01)x3.5 + 1( 0.02) x 3.5 = 1.14 mins

Rp = 1 = 0.877 pcs /min x 60 = 52.65 pcs / hr

1.14

Cp = 0.12 + 3(0.17) + 3(0.10) = $ 0.93/mins

Cpc = 0.93x 1.14 = $1.062/piece

For the proposed line Tc = 36 secs = 0.6 mins

Tp = 0.6 + 2(0.01)3.5 + 2(0.02)3.5 = 0.81 mins

Rp = 1.234 pieces / min = 74.07 pieces/hr

Cp = 0.012 + 2(0.17) + 3(0.10) + 1(0.25) = $ 0.902/min

Cpc = 0.90 x 0.81 mins = $ 0.73062/piece

(4)

Solution : Tc = 1.0 min

Tp = 1.0 + 2(0.01)x3.5 + 1( 0.02) x 3.5 = 1.14 mins

Rp = 1 = 0.877 pcs /min x 60 = 52.65 pcs / hr

1.14

Cp = 0.12 + 3(0.17) + 3(0.10) = $ 0.93/mins

Cpc = 0.93x 1.14 = $1.062/piece

For the proposed line Tc = 36 secs = 0.6 mins

Tp = 0.6 + 2(0.01)3.5 + 2(0.02)3.5 = 0.81 mins

Rp = 1.234 pieces / min = 74.07 pieces/hr

Cp = 0.012 + 2(0.17) + 3(0.10) + 1(0.25) = $ 0.902/min

Cpc = 0.90 x 0.81 mins = $ 0.73062/piece

(5)

(a) See step 1. (b) See steps 1 through 4.

Step 1 Step 2

A B C D E F G H I J Rank A B C D E F G H I J

1 1 1 1 1 5 2 1 1 1 1 1

2 1 1 1 1 1 1 3 1 1 1 1

3 1 1 1 1 2 7 1 1 1 1

4 1 1 1 1 7 6 1 1 1 1

5 1 1 1 1 6 1 1 1 1 1

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6 1 1 1 1 4 5 1 1 1 1

7 1 1 1 1 3 4 1 1 1 1

Rank 3 8 9 6 1 10 4 2 5 7

Step 3 Step 4

E H A G I D J B C F Rank E H A G I D J B C F

2 1 1 1 1 1 1 2 1 1 1 1 1

3 1 1 1 1 2 3 1 1 1 1

7 1 1 1 1 3 7 1 1 1 1

6 1 1 1 1 5 4 1 1 1 1

1 1 1 1 1 6 6 1 1 1 1

5 1 1 1 1 7 1 1 1 1 1

4 1 1 1 1 4 5 1 1 1 1

Rank 1 2 3 4 5 6 7 8 9 10

Part families and machine groups: I = (E, H, A, G, I) and (2, 3, 7, 4)

II = (D, J, B, C, F) and (6, 1, 5)

Machine Cell Organization and Design