

Problem solving

Performance management

1. Calculating normal and standard times

On average, a task takes 22 minutes for a worker whose performance level (P) is judged to be 90%.

a) *Compute the normal time.* $T_n = \dots\dots\dots$ mins

b) *Calculate the performance level of worker 'j' who performs the same task in 19 minutes.*
 $P_j = \dots\dots\dots$ %

c) *How fast may the same task be performed by a worker with a performance level of 130%-os?*
 $T_{obs} = \dots\dots\dots$ mins

d) *Calculate the standard time if the total time allowance (A_{PFD}) is 15%.*
 $T_{std} = \dots\dots\dots$ mins

Solution

- a) $T_n = 22.00 \cdot 0.90 = 19.80$ mins.
- b) $P_j = 19.80 / 19.00 = 104.21\%$
- c) $T_{obs} = 19.80 / 1.30 = 15.23$ mins
- d) $T_{std} = 19.80 (1.00 + 0.15) = 22.77$ mins

2. Calculating normal and standard times

4 workers are employed in a workshop. The time need for a given task is measured for all of them. 1st worker: 15 mins; 2nd worker: 16 mins; 3rd worker 20 mins; 4th worker: 10 mins. The performance of the 1st worker is considered to be 100%.

- a) *Determine the normal time (T_n) of the task.*
- b) *Compute the performance rate for all the workers (P_i) based on the normal time.*
- c) *Calculate the standard time (T_{std}) if the personal time allowance is 5%, the fatigue time allowance is 7% and the delay allowance is 5%.*
- d) *How many times will it take to repeat the task 20 times for a worker with 100% performance?*

SOLUTION

a) $T_n = 15$ mins.

b) $T_n = T_{\text{obs}}(P)$ so that $P_1 = 15/15 = 100\%$, $P_2 = 15/16 = 94\%$, $P_3 = 15/20 = 75\%$, $P_4 = 15/10 = 150\%$.
Where T_{obs} is the observed task time and P_i is the performance rate of worker 'j'..

c) $T_{\text{std}} = T_{\text{obs}}(P)(1+A_{\text{PFD}}) = T_n(1+A_{\text{PFD}})$, where $A_{\text{PFD}} = (0.05 + 0.07 + 0.05) = 0.17$. Thus $T_{\text{std}} = 17.55$ mins.
Where A_{PFD} (personal, fatigue, and delay allowance) is the sum of the 3 allowances.

d) Total time for 20 repetitions = $20(T_{\text{std}}) = 351$ minutes.

3. Calculating normal and standard times

1st worker: 16 mins; 2nd worker: 15 mins; 3rd worker 15 mins; 4th worker: 18 mins. The average of the four workers' observed task times is assigned to the 100% performance level.

a) Determine the normal time (T_n) of the task.

b) Compute the performance rate for all the workers (P_i) based on the normal time.

c) Calculate the standard time (T_{std}) if the personal time allowance is 5%, the fatigue time allowance is 7% and the delay allowance is 3%.

d) How many minutes does it need for each of the four workers to perform the given task 25 times?

e) Calculate the standard time for the 25 repetitions.

SOLUTION

a) $T_n = (16+15+15+18)/4 = 16$ mins.

b) $P_1 = 16/16 = 100.00\%$, $P_2 = 16/15 = 106.67\%$, $P_3 = 16/15 = 106.67\%$, $P_4 = 16/18 = 88.89\%$.

c) $T_{\text{std}} = T_{\text{obs}}(P)(1+A_{\text{PFD}}) = T_n(1+A_{\text{PFD}})$, where $A_{\text{PFD}} = (0.05 + 0.07 + 0.03) = 0.15$. Thus $T_{\text{std}} = 18.40$ mins.

d) Total time for 205 repetitions for a worker is $25(T_{\text{obs}})(1 + A_{\text{PFD}})$. Thus, for worker 1 it is $25(16)(1.15) = 460$ mins; for worker 2 and 3 it is 431.25 mins; for worker 4 it is 517.50 mins.

e) $25(T_{\text{std}}) = 25(18.40) = 460$ mins = 7 hrs 40 mins

4. Calculating normal and standard times

1st worker: 100 mins; 2nd worker: 120 mins; 3rd worker 90 mins; 4th worker: 110 mins. The mean of the four workers' observed task times is assigned to the 100% performance level.

a) Determine the normal time (T_n) of the task.

b) Compute the performance rate for all the workers (P_i) based on the normal time.

c) Calculate the standard time (T_{std}) if the personal time allowance is 5%, the fatigue time allowance is 7% and the delay allowance is 10%.

d) Calculate the standard time for 200 repetitions.

e) How many minutes does it need for each of the four workers to perform the given task 200 times?

f) Calculate the normal time, the standard time and the performance rates of all the four employees if the normal time is increased to the work performance of the fastest working employee.

SOLUTION

a) $T_n = (100+120+90+110)/4 = 105$ mins.

b) $P_1 = 105/100 = 105.00\%$, $P_2 = 105/120 = 87.50\%$, $P_3 = 105/90 = 116.67\%$, $P_4 = 105/110 = 95.45\%$.

c) $T_{std} = 105(1.22) = 128.10$ minutes = 2 hours and 8.1 minutes

d) $200(128.10) = 25,620$ minutes

e) 1st: $200(100)(1.22) = 24,400$ mins; 2nd: $200(120)(1.22) = 29,280$ mins; 3rd: $200(90)(1.22) = 21,960$ mins; 4th: 26,840 mins

f) $T_n = T_{obs(3rd)} = 90$ mins; $T_{std} = 90(1.22) = 109.8$; $P_1 = 90/100 = 90.00\%$, $P_2 = 90/120 = 75.00\%$, $P_3 = 90/90 = 100.00\%$, $P_4 = 90/110 = 81.82\%$.