

Seminar exercises

Work measurement

- **Work measurement:** determining how long it should take to do a job element (task)
- **Stopwatch time study:** development of a time standard based on observations of one worker doing a task (or even single motions) several times

Definitions

- **Observed time** (T_{obs}): the average of the recorded times.
- **Normal time** (T_n): the time necessary to do a task for a worker whose performance is 100% ($P = 1$). Practically, it is the observed time adjusted for worker performance. $T_n = T_{obs}(P)$
- **Allowance fraction/ratio** (A_{PFD}): time of unavoidable factors as a percentage of the task time. $A_{PFD} = A_P + A_F + A_D$
 - P: personal time
 - F: fatigue
 - D: unavoidable delay (machine issues, talkint to the supervisor, waiting for input etc.)
- **Standard time** (T_{std}): The sustainable time it should take a qualified worker ($P = 1$) to complete the task under the given work conditions. $T_{std} = T_n (1 + A_{PFD})$

Same typical allowance percentages

- Constant allowances:
 - Personal: 5
 - Basic fatigue: 4
- Variable allowances:
 - Standing: 2
 - Abnormal position: 0-7
 - Use of force or muscular energy: 0-22
 - Bad light: 0-5
 - Atmospheric conditions (heat, humidity): 0-10
 - Close attention (fine or exacting work): 0-5
 - Noise level: 0-5
 - Mental strain (comply work): 1-8
 - Monotony: 0-4
 - Tediousness: 0-5