

Time Study and Standard Work

How-to guide: what the workbook does, how to use it and what every number means.

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Time Study and Standard Work

Turn stopwatch readings into normal and standard times per element, check the study size, and compare the standard work combination with takt time.

For: Industrial and manufacturing engineers, work-study and lean practitioners, team leaders and apparel production engineers setting standard minutes.

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Quick start

1. On Setup, type the operation, the available time and demand per shift (they give takt) and your PF&D allowance.
2. On Study, list the elements in order with their type (Manual, Machine or Walk), then type up to ten stopwatch readings per element in seconds.
3. Rate each manual and walk element against your normal pace (100% = normal); machine elements are not rated.
4. Read the Check column: it says when an element needs more cycles or has an outlier reading.
5. Open the Dashboard: standard cycle against takt, operator utilisation, standard minutes per unit and the combination chart.

What is in the workbook

Start Here	Read this first: what the workbook does and how to use it.
Setup	The operation studied, takt time inputs and the PF&D allowance.
Study	One row per element in work order: type, stopwatch readings in seconds and the rating.
Dashboard	Standard cycle against takt, operator work and the standard work combination, from the study.
Method	How every number is calculated, with assumptions, limits and sources.
Verify	Self-check: the workbook's formulas recomputed on fixed inputs against an independent reference.

What each number means

Quantity	How it is calculated	Units
Cycles	Number of readings typed for the element.	-
Mean, min, max	Of the element's readings.	s
Normal time	Mean x rating for manual and walk elements; the mean for machine elements (not rated).	s

Quantity	How it is calculated	Units
Allowance	The Setup PF&D allowance for manual and walk elements; 0 for machine elements.	%
Standard time	Normal time x (1 + allowance).	s
Start	Sum of the standard times of the elements with a lower number (where the element starts in the cycle).	s
Cycles needed	$(40 \times \sqrt{n \times \text{sum of } x^2 - (\text{sum of } x)^2} / \text{sum of } x)^2$, rounded up: cycles for 95% confidence that the mean is within +/-5% (the classic sample-size formula found in work-study textbooks).	cycles
Takt time	Available minutes per shift x 60 / demand per shift.	s/unit
Standard cycle	Sum of all standard times (elements in sequence, as the live calculator assumes).	s
Operator work time	Standard time of manual + walk elements.	s
Operator utilisation	Operator work time / takt.	%
Gap to takt	Takt - standard cycle; negative when the cycle runs over takt.	s
Standard minutes (SAM)	Standard cycle / 60.	min/unit
Observed cycle	For each studied cycle, the sum of the element readings in that column.	s

Assumptions, limitations, sources and the self-check (the Verify sheet, which recomputes the workbook's formulas on fixed test inputs) are in the workbook. The last page shows the Dashboard with the example data for Fenwick Controls, a fictional business.

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Engineering estimates for planning and improvement work. Verify the results against your own process, data and standards before you rely on them.

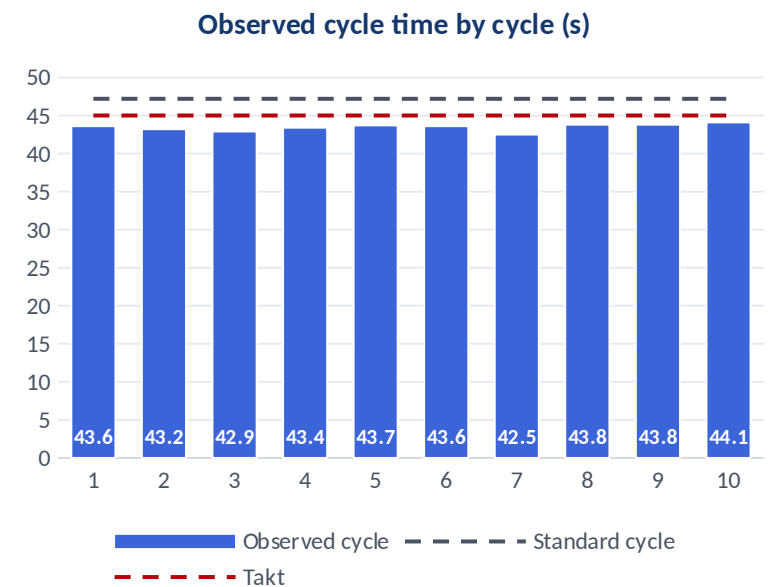
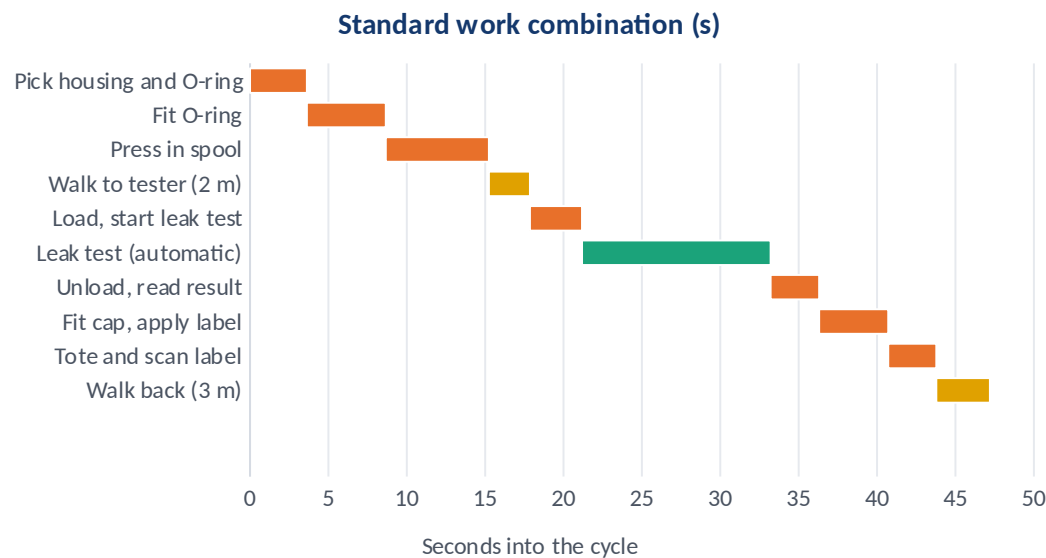
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Standard cycle against takt, operator work and the standard work combination, from the study.

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Valve cartridge assembly and leak test, station 3 (example). Analyst: R. Osei (example). Takt 45 s from 450 min and 600 units per shift.

STANDARD CYCLE TIME (S)	GAP TO TAKT (S)	OPERATOR UTILISATION	STANDARD MINUTES PER UNIT (SAM)
47.2	-2.2	78.1%	0.787
Takt 45.0	Takt - standard cycle; negative = over takt	Manual + walk time / takt	Standard cycle / 60
Near target			



Orange = manual, green = machine (automatic), yellow = walk. Each element starts where the one before it ends. Observed cycles exclude rating and allowance; the standard cycle includes both.