

Company name / logo	PROCESS SHEET (ROUTING)	Sheet no.	
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Product / assembly	Qty per product	Part name	Drawing no.	Drawing revision
Parts per stock piece	Material (grade and standard)	Material condition / heat treatment	Stock form and size	Stock weight [kg]
Batch size n [pcs]	Material per batch [kg]	Machine hour rate [per h]	Issue date	Work order no. (optional)

Op. no.	Dept.	Work centre / machine	Operation description	Fixtures and workholding	Cutting tools	Gauges and inspection	Op. sheet / NC program	Labour grade	Insp.	Setup [min]	Run time [min/pc]	Total = setup + n·run [min]	Notes
10													
20													
30													
40													
50													
60													
70													
80													
90													
100													
110													
120													
130													
140													

White cells are filled in by the process engineer, grey cells are labels, green cells are calculated. Number operations in steps of 10 (10, 20, 30...) so new ones can be inserted. Every re-clamping is a separate setup.	Total setup [min]	0.0	
	Total run time per piece [min]	0.0	
	Batch time = $\Sigma \text{setup} + n \cdot \Sigma \text{run}$ [min]		
	Time per piece incl. setup share [min]		
	Machining cost per piece		

Prepared by	Checked by	Time study	Approved by
name / date / signature	name / date / signature	name / date / signature	name / date / signature

Revision record				
Rev.	Description of change	Change notice no.	Date	Signature

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Part name	Drawing no.	Op. no.	Operation
Work centre / machine	Material	Fixture / workholding	NC program

Operation sketch: part in machining position, machined surfaces in heavy line, operation dimensions with tolerances, locating and clamping symbols

Step	Step description	Tool	Gauge	vc [m/min]	n [rpm]	f [mm/rev]	ap [mm]	Passes	L [mm]	tm [min]
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Total machining time tm [min]										0.00

Prepared by	Checked by	Time study	Approved by
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Company name / logo	PROCESS SHEET (ROUTING) – EXAMPLE		Sheet no.	
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Product / assembly	Qty per product	Part name	Drawing no.	Drawing revision
Gearbox G-12	1	Stepped shaft	DWG-045	B
Parts per stock piece	Material (grade and standard)	Material condition / heat treatment	Stock form and size	Stock weight [kg]
1	C45 (1.0503) to EN 10083-2	hot rolled, quench and temper by subcontractor	bar Ø45 x 185 mm	2.31
Batch size n [pcs]	Material per batch [kg]	Machine hour rate [per h]	Issue date	Work order no. (optional)
50	115.5	180	2026-10-03	

[illegible]

White cells are filled in by the process engineer, grey cells are labels, green cells are calculated. Number operations in steps of 10 (10, 20, 30...) so new ones can be inserted. Every re-clamping is a separate setup.	Total setup [min]	185.0	
	Total run time per piece [min]	22.0	
	Batch time = $\Sigma \text{setup} + n \cdot \Sigma \text{run}$ [min]	1285.0	
	Time per piece incl. setup share [min]	25.7	
	Machining cost per piece	77.10	

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Revision record				
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Company name / logo	OPERATION SHEET - EXAMPLE	Sheet no.	
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Part name	Drawing no.	Op. no.	Operation
Stepped shaft	DWG-045, rev. B	20	Turn - setup I (side A)
Work centre / machine	Material	Fixture / workholding	NC program
CNC lathe (Machining)	C45 (1.0503) to EN 10083-2, bar Ø45 × 185 mm	Three-jaw chuck, hard jaws, stick-out 105 mm	O2001

Operation sketch: part in machining position, machined surfaces in heavy line, operation dimensions with tolerances, locating and clamping symbols

Step	Step description	Tool	Gauge	vc [m/min]	n [rpm]	f [mm/rev]	ap [mm]	Passes	L [mm]	tm [min]
1	Face side A to length 182.5 mm	PCLNR 2525M12, CNMG 120408	caliper 0-200	220	1550	0.25	2.50	1	24.5	0.06
2	Centre drill	centre drill A3.15	-	25	2500	0.06		1	8	0.05
3	Rough turn Ø30 journal to Ø31 over 45 mm	PCLNR 2525M12, CNMG 120408	caliper 0-200	220	1750	0.30	2.33	3	47	0.27
4	Rough turn Ø35 journal to Ø36 over 20 mm	PCLNR 2525M12, CNMG 120408	caliper 0-200	220	1750	0.30	2.25	2	22	0.08
5	Rough turn Ø42 collar to Ø43 over 35 mm	PCLNR 2525M12, CNMG 120408	caliper 0-200	220	1590	0.30	1.00	1	37	0.08
6										
7										
8										
9										
10										
Total machining time tm [min]										0.55

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name / date / signature	name / date / signature	name / date / signature	name / date / signature

PROCESS SHEET (ROUTING) / OPERATION SHEET

Purpose	The process sheet (routing) describes how a part is machined, operation by operation. The operation sheet breaks one operation down into steps. In one-off and small-batch work the process sheet alone is usually enough.
Header	Product, part, drawing number and revision, material with standard (e.g. C45 / 1.0503 to EN 10083-2), condition, stock, weight, parts per stock piece and batch size. Material per batch is calculated.
Operations	One operation = one work centre. Start the description with the process verb (turn, mill, grind). Subcontracting and heat treatment get their own number, without times.
Tooling	Fixtures, cutting tools and gauges in separate columns - this is how the tool room and inspection plan their work.
Times	Setup - time per batch; run time - time per piece (machining + handling + allowances). The total column and the sums are calculated.
Cost	Enter the machine hour rate and the sheet calculates the machining cost per piece: $(\Sigma \text{run} + \Sigma \text{setup}/n) \times \text{rate} / 60$. Add material and subcontracting separately.
Revisions	Every change to the sheet gets a new revision and an entry in the revision record. The sheet always refers to a specific drawing revision.
Op. sheet / NC program	Reference to the operation sheet and the NC program number for the operation - links the routing to the rest of the documentation.
Labour grade	Skill or pay grade required for the operation - the basis of the labour rate.
Insp.	X marks an inspection point: after this operation the part is checked by quality (e.g. first article, critical dimensions).
Source	Field layout based on process planning textbooks (M. Feld) and SME, Realistic Cost Estimating for Manufacturing. Template: metronq.com/en/blog/process-sheet
About MetronQ	A process sheet tells you how long a part takes. MetronQ tells you what it costs: the engine measures the part geometry and prices it with your machines, rates and material prices, with setup for every clamping. metronq.com/en