

Manual Machinist

FF13 Engineering, maintenance and production · ISCO-08 7223 · CBS 0741 Metalworkers and construction workers · seniority medior · Also known as: Turner Miller, Conventional Machinist

Machines metal parts on conventional lathes and milling machines, often for small batches and custom work with no CNC programme.

The manual machinist machines parts by hand on conventional machines, often for one-off or small batches where a CNC programme would not pay off. Unlike the CNC machinist, this role centres on manual precision rather than programming. Selection often tests experience with conventional machines, while the ability to change over quickly for small batches without measurement errors is rarely tested.

Key figures for this profile

25 skills · 6 competencies to measure · 5 knockout skills · centre of gravity: Execution, craft, safety and sustainability 40%, Professional knowledge domains 24%, Cognitive ability and problem solving 13%

1 Competencies to measure

These are the behavioural and ability constructs in this profile. Each one shows which hrmforce questionnaire measures it.

Competencies to measure	Target level	hrmforce instrument	Assessment method	Behavioural anchor at target level
Safety awareness Competency (50-framework): Discipline Knockout	 N4	Big Fifty, Competency Check	Situational Judgement Test	Recognises unsafe situations in own process, intervenes and addresses colleagues without bringing the work to a halt.

Competencies to measure	Target level	hrmforce instrument	Assessment method	Behavioural anchor at target level
Hand-eye coordination Competency (50-framework): Accuracy Knockout	 N4	Work sample test	Simulation	Positions moving material to size, adjusts the movement to what is visible and keeps pace with the process.
Discipline and keeping commitments Competency (50-framework): Discipline	 N3	Big Fifty, 15PF, 360 Feedback	Personality questionnaire	Commits only to what is feasible, tracks own commitments and informs those involved as soon as a deadline comes under pressure.
Spatial ability	 N3	Ability Scan	Cognitive ability test	Derives the build up of the end product from a two dimensional drawing and reports where parts do not fit.
Demonstrating ownership Competency (50-framework): Results-Orientation	 N3	Big Fifty, 360 Feedback, Competency Check	360-degree feedback	Repairs mistakes in own process unprompted, informs stakeholders and adjusts the working method to prevent a repeat.
Managing workload pressure Competency (50-framework): Stress resilience	 N3	Big Fifty, Competency Check, Pulse Survey	Structured interview	Cuts or shifts tasks independently when busy on the basis of importance, records this and discusses consequences with clients.

2 Full skill profile

Every skill in this profile, sorted by weight. The behavioural anchor under each skill belongs to the target level.

T	Skill	Target level	Weight	Knockout	Assessment method	hrmforce instrument
K	Technical understanding Independently explains the behaviour of an installation during a fault and traces the problem back to a technical principle.		5	yes	Knowledge test	Ability Scan, Knowledge test (client-specific)
G	Safety awareness Recognises unsafe situations in own process, intervenes and addresses colleagues without bringing the work to a halt.		5	yes	Situational Judgement Test	Big Fifty, Competency Check
V	Mechanical maintenance Independently diagnoses a machine fault, replaces the defective parts and sets the machine within tolerance.		5	yes	Work sample test	Work sample test, Knowledge test (client-specific)
V	Recognising and resolving machine faults Traces the cause of a fault systematically, resolves recurring defects personally and records the solution found.		5	yes	Work sample test	Work sample test, Knowledge test (client-specific)
A	Hand-eye coordination Positions moving material to size, adjusts the movement to what is visible and keeps pace with the process.		4	yes	Simulation	Work sample test

T	Skill	Target level	Weight	Knockout	Assessment method	hrmforce instrument
V	Setting up and changing over production equipment Changes over between product types independently, determines the settings and reduces changeover time without loss of quality.	 N4	4	no	Work sample test	Work sample test
V	Problem analysis Splits a recurring complaint into possible causes, tests these with own data and names the most likely cause.	 N3	4	no	Assessment centre	Competency Check, Ability Scan
V	Quality control Draws up a control plan for the own process, measures the quality and discusses the outcomes with those involved.	 N3	4	no	Work sample test	Competency Check, Work sample test
G	Discipline and keeping commitments Commits only to what is feasible, tracks own commitments and informs those involved as soon as a deadline comes under pressure.	 N3	4	no	Personality questionnaire	Big Fifty, 15PF, 360 Feedback
V	Electrical engineering work Independently locates a fault in a control system, measures voltage and continuity and repairs it within the safety standard.	 N3	4	no	Certificate or diploma	Knowledge test (client-specific), Work sample test

T	Skill	Target level	Weight	Knockout	Assessment method	hrmforce instrument
V	Reading and applying technical drawings Independently derives the correct dimensions from several drawings, spots contradictions and puts them to the designer.	 N3	4	no	Knowledge test	Knowledge test (client-specific), Work sample test
V	Operating machines Operates several machines independently, adjusts operating values to product condition and keeps output within the standard.	 N3	4	no	Work sample test	Work sample test, Knowledge test (client-specific)
V	Performing preventive maintenance Executes the full maintenance schedule of an installation, adapts frequency to wear and reports emerging defects.	 N3	4	no	On-the-job observation	Work sample test, Knowledge test (client-specific)
A	Spatial ability Derives the build up of the end product from a two dimensional drawing and reports where parts do not fit.	 N3	3	no	Cognitive ability test	Ability Scan
V	working in teams Divides work with colleagues, shares information others need without being asked, and adjusts own planning to fit team goals.	 N3	3	no	360-degree feedback	Big Fifty, 360 Feedback, Competency Check
G	Demonstrating ownership Repairs mistakes in own process unprompted, informs stakeholders and adjusts the working method to prevent a repeat.	 N3	3	no	360-degree feedback	Big Fifty, 360 Feedback, Competency Check

T	Skill	Target level	Weight	Knockout	Assessment method	hrmforce instrument
V	Working with digital devices and applications Selects the appropriate device and application for each task and fixes common disruptions without support from others.	 N3	3	no	Work sample test	Knowledge test (client-specific), Work sample test
V	Measurement and calibration Independently selects the right instrument for a tolerance requirement, weighs measurement uncertainty and passes or rejects the product.	 N3	3	no	Work sample test	Work sample test, Knowledge test (client-specific)
K	Applying materials knowledge Explains how moisture, heat or load affects a material and selects processing and auxiliary substances accordingly.	 N3	3	no	Knowledge test	Knowledge test (client-specific)
V	Using personal protective equipment correctly Determines per task which protective equipment is needed, checks it before use and instructs new colleagues in its use.	 N3	3	no	On-the-job observation	Knowledge test (client-specific), Work sample test
G	Managing workload pressure Cuts or shifts tasks independently when busy on the basis of importance, records this and discusses consequences with clients.	 N3	2	no	Structured interview	Big Fifty, Competency Check, Pulse Survey

T	Skill	Target level	Weight	Knockout	Assessment method	hrmforce instrument
V	Professional currency and specialist literature Tracks sources and guidelines structurally, weighs their quality and adapts the own working method to new insights.	 N3	2	no	Portfolio or evidence	Portfolio, Knowledge test (client-specific)
V	Guiding on the job Works alongside a new colleague, points out deviations in the operation and reports progress to the practice trainer.	 N2	2	no	On-the-job observation	360 Feedback, Competency Check
V	Applying workplace organisation and 5S Tidies tools and material to the designated place after the shift and keeps the workplace clean.	 N2	2	no	On-the-job observation	Work sample test
V	Business reporting Fills in an existing report template with the correct figures and describes per section what has been done.	 N2	1	no	Work sample test	Work sample test, Competency Check

3 Levels per seniority

The same profile with the job family seniority adjustment applied. Target levels are clamped to 1 to 5.

Skill	junior	medior	senior
Technical understanding	N3	N4	N5
Safety awareness	N3	N4	N5
Mechanical maintenance	N2	N3	N4
Recognising and resolving machine faults	N2	N3	N4
Hand-eye coordination	N3	N4	N5
Setting up and changing over production equipment	N3	N4	N5
Problem analysis	N2	N3	N4
Quality control	N2	N3	N4
Discipline and keeping commitments	N2	N3	N4
Electrical engineering work	N2	N3	N4
Reading and applying technical drawings	N2	N3	N4
Operating machines	N2	N3	N4
Performing preventive maintenance	N2	N3	N4
Spatial ability	N2	N3	N4
working in teams	N2	N3	N4
Demonstrating ownership	N2	N3	N4
Working with digital devices and applications	N2	N3	N4
Measurement and calibration	N2	N3	N4
Applying materials knowledge	N2	N3	N4
Using personal protective equipment correctly	N2	N3	N4
Managing workload pressure	N2	N3	N4
Professional currency and specialist literature	N2	N3	N4
Guiding on the job	N1	N2	N3

Skill	junior	medior	senior
Applying workplace organisation and 5S	N1	N2	N3
Business reporting	N1	N2	N3

4 The proficiency scale

Level	Label	Autonomy	Complexity	Scope	Depth of knowledge
N1	Guided	works under supervision and follows instruction	routine, one variable at a time	own task	basic understanding of terminology
N2	Applying	works independently within set frameworks	familiar situations with limited variation	own role	working knowledge, applies standard approach
N3	Proficient	sets own approach and seeks input proactively	several variables, some ambiguity	own team or process	thorough knowledge, weighs alternatives
N4	Advanced	directs others and decides on the approach	complex, with conflicting interests	several teams or a department	in-depth knowledge, advises others
N5	Leading	sets the standard and the policy	strategic, under high uncertainty	organisation, value chain or profession	authority, advances the profession

5 Behavioural anchors per skill

Anchors sit at N1, N3 and N5. N2 and N4 are deliberately not anchored: raters interpolate between them, following the O*NET convention.

Skill	N1	N3	N5
Technical understanding Understands how machines, structures and installations work, recognises causes of failure and explains them using technical and physical principles.	Names the parts of a simple machine and explains, using the manual, what function each part has.	Independently explains the behaviour of an installation during a fault and traces the problem back to a technical principle.	Develops technical guidelines for the field and is consulted internally and externally on design and failure questions.
Safety awareness Continuously watches for unsafe situations and actions at work, addresses others about them and chooses the safe working method even under time pressure.	Follows the safety rules of the workplace and checks back when in doubt about an operation.	Recognises unsafe situations in own process, intervenes and addresses colleagues without bringing the work to a halt.	Sets the safety standard for the organisation, makes safety discussable at every level and steers behaviour and culture.

Skill	N1	N3	N5
Mechanical maintenance Carries out preventive and corrective maintenance on machines and tools, adjusts or replaces parts and records the work done.	Carries out a maintenance round under supervision using a checklist and reports deviations to the maintenance technician.	Independently diagnoses a machine fault, replaces the defective parts and sets the machine within tolerance.	Develops the maintenance concept for the machine park, sets intervals based on failure data and trains technicians.
Recognising and resolving machine faults Establishes where the cause of a fault lies, resolves simple defects personally and calls in maintenance for more complex failures.	Reports a fault together with its visible characteristics and shuts down the machine according to instruction.	Traces the cause of a fault systematically, resolves recurring defects personally and records the solution found.	Analyses fault patterns across installations, structurally improves the design or setting and trains fault teams in this.
Hand-eye coordination Aligns hand and arm movements with what the eyes see and keeps the movement precisely on course while machining or positioning workpieces.	Follows a marked line or indication by hand and keeps the tool in the direction pointed out.	Positions moving material to size, adjusts the movement to what is visible and keeps pace with the process.	Masters operations in which sight and movement change constantly, defines the working method for these and assesses others on it.
Setting up and changing over production equipment Sets machines and moulds for an order and carries out the changeover to a next product within the required time and tolerance.	Carries out a prepared setting according to the setup sheet and has the first products checked.	Changes over between product types independently, determines the settings and reduces changeover time without loss of quality.	Redesigns changeover processes for several lines, sets the setup standard and justifies the investment in aids.
Problem analysis Breaks a problem into parts, separates causes from effects and states which information is needed to move forward.	States precisely what deviates in a malfunction and which data are missing, and puts this to the supervisor.	Splits a recurring complaint into possible causes, tests these with own data and names the most likely cause.	Traces persistent organisational problems back to a few root causes and sets the analysis method that other teams will use.
Quality control Tests products, data or services against defined requirements, records deviations and sets corrections or improvements in motion.	Checks a product or file on the prescribed points according to instruction and records deviations.	Draws up a control plan for the own process, measures the quality and discusses the outcomes with those involved.	Sets up the quality system for several departments, chooses the measurement standards and accounts for results to client and regulator.

Skill	N1	N3	N5
Discipline and keeping commitments Sticks to agreements, procedures and commitments even without supervision, and reports in good time when a commitment turns out to be unachievable.	Arrives at the agreed time with the agreed work and reports any delay to the supervisor.	Commits only to what is feasible, tracks own commitments and informs those involved as soon as a deadline comes under pressure.	Anchors the standard for reliable follow through in working agreements and addresses anyone at any level who lets that standard slip.
Electrical engineering work Installs, measures and repairs electrical installations and control systems according to diagrams and safety rules, and makes the installation safe to work on.	Installs electrical components under supervision according to the diagram and uses the prescribed protective equipment.	Independently locates a fault in a control system, measures voltage and continuity and repairs it within the safety standard.	Draws up the company's electrical work instructions and safety rules and reviews installation designs for compliance with standards.
Reading and applying technical drawings Reads construction and installation drawings with dimensions and symbols and translates them into workable operations or production instructions.	Points out on a drawing the dimensions, symbols and views that belong to the own work.	Independently derives the correct dimensions from several drawings, spots contradictions and puts them to the designer.	Sets drawing conventions and information standards for projects and judges whether delivered drawing sets are workable.
Operating machines Operates production machines, processing machines or transport equipment according to work instructions and intervenes when the process threatens to run outside set values.	Starts and stops a machine according to the work instruction and alerts the operator at any deviation.	Operates several machines independently, adjusts operating values to product condition and keeps output within the standard.	Determines how machines are operated across the organisation, draws up operating protocols and decides on replacing or modifying installations.
Performing preventive maintenance Carries out scheduled cleaning, lubrication, inspections and replacements on machines and records the findings and the actions completed.	Carries out a fixed maintenance point according to the checklist and then signs off the completion.	Executes the full maintenance schedule of an installation, adapts frequency to wear and reports emerging defects.	Designs maintenance policy for the machine park, sets intervals based on data and accounts for the costs.

Skill	N1	N3	N5
Spatial ability Imagines how objects, spaces or drawings look after rotating, folding or assembling them and uses that mental image in the work.	Points out the right route on a floor plan and names which side lies left or right of the entrance.	Derives the build up of the end product from a two dimensional drawing and reports where parts do not fit.	Thinks complex three dimensional set ups through in advance, predicts clashes between parts and sets the drawing conventions for the field.
working in teams Contributing to a team result by dividing tasks, sharing information, keeping agreements and involving colleagues in the work at hand.	Carries out an own task within the team as agreed and reports to the team lead when something does not work.	Divides work with colleagues, shares information others need without being asked, and adjusts own planning to fit team goals.	Designs collaboration agreements for several teams in the organisation, evaluates them against results and revises them on the basis of data.
Demonstrating ownership Takes on the outcome of own work, does not point at circumstances or others and initiates repair actions when something falls short.	Reports an own mistake to the supervisor and asks which repair step should be taken first.	Repairs mistakes in own process unprompted, informs stakeholders and adjusts the working method to prevent a repeat.	Takes public responsibility for outcomes across the chain and organises that mistakes are used organisation wide to improve.
Working with digital devices and applications Uses computers, mobile devices and standard applications to carry out work tasks, adjusts settings and resolves simple usage problems without help.	Opens and uses the prescribed applications for own tasks and asks for help whenever an unfamiliar message appears.	Selects the appropriate device and application for each task and fixes common disruptions without support from others.	Defines organisation wide which digital workplace facilities are used and guides their introduction across all teams.
Measurement and calibration Takes measurements with measuring equipment, judges whether results fall within tolerance and keeps equipment calibrated and traceable.	Measures with calliper and dial gauge under supervision and notes the result on the measurement form.	Independently selects the right instrument for a tolerance requirement, weighs measurement uncertainty and passes or rejects the product.	Sets up the organisation's calibration management, writes measurement instructions and accounts for traceability during external audits.

Skill	N1	N3	N5
Applying materials knowledge Knows the properties and behaviour of the materials used and on that basis selects processing, auxiliary substances and storage method for an assignment.	Names the most used materials and their prescribed processing and picks the correct material for the job.	Explains how moisture, heat or load affects a material and selects processing and auxiliary substances accordingly.	Assesses new materials for applicability and sustainability, advises on material choice in the organisation and maintains the knowledge base.
Using personal protective equipment correctly Selects the protective equipment matching task and hazard, puts it on correctly and checks it for function, fit and shelf life.	Wears the prescribed protective equipment at the workplace and asks for replacement when damage is visible.	Determines per task which protective equipment is needed, checks it before use and instructs new colleagues in its use.	Sets protective equipment policy, selects suppliers on standards and wearing comfort and tracks compliance across the chain.
Managing workload pressure Keeps an overview when the volume of work rises, chooses what goes ahead and what does not, and puts the consequences to stakeholders.	Tells the supervisor that the work does not fit the available time and follows the choice that is made.	Cuts or shifts tasks independently when busy on the basis of importance, records this and discusses consequences with clients.	Redistributes work and capacity across departments in cases of structural overload and sets norms for sustainable workload distribution.
Professional currency and specialist literature Follows developments in the own profession through literature, guidelines and networks and works relevant new insights into own practice.	Reads the professional information received and names which part matters for the own work.	Tracks sources and guidelines structurally, weighs their quality and adapts the own working method to new insights.	Assesses the state of the field, weighs conflicting research and determines which guidelines the organisation will follow from now on.
Guiding on the job Guides a colleague or trainee during real work, gives targeted feedback on what was observed and builds up independence step by step.	Works alongside a new colleague, points out deviations in the operation and reports progress to the practice trainer.	Agrees with the person guided which tasks go solo, observes purposefully and discusses two concrete learning points afterwards.	Sets up workplace guidance for the organisation, trains the guides and keeps the quality of their coaching in view.

Skill	N1	N3	N5
Applying workplace organisation and 5S Arranges the workplace so that material, tools and information have fixed places, maintains that state and improves the layout step by step.	Tidies tools and material to the designated place after the shift and keeps the workplace clean.	Applies the five steps of 5S at own workplace, makes deviations visible and sustains the standard reached.	Rolls out workplace organisation across departments, links it to improvement goals and sustains compliance through audits.
Business reporting Bringing findings, figures and recommendations together in a report that leads the reader to a decision or next step in one reading.	Fills in an existing report template with the correct figures and describes per section what has been done.	Builds a report from question to conclusion, separates fact from interpretation and phrases recommendations with a named owner.	Sets the reporting line for the whole organisation, tests the quality of steering information and accounts for outcomes to board and regulator.

6 Assessment methods and validity

The validities are the corrected meta-analytic estimates from Sackett, Zhang, Berry and Lievens (2022) in the Journal of Applied Psychology, which replace the older Schmidt and Hunter (1998) figures. The spread matters as much as the mean: with a high SD, validity varies strongly by context.

Assessment method	rho	SD	What it is
Knowledge test	0.40	0.13	Test of declarative job knowledge, usually assembled per client.
Situational Judgement Test	0.12	0.11	Scenario with response options, scored on knowledge or behavioural tendency.
Work sample test	0.33	0.09	The candidate performs a representative work sample under standardised conditions.
Simulation	-	-	Simulated work situation, usually digital, with standardised scoring.
Assessment centre	0.29	0.09	Multiple exercises, multiple assessors, dimension-wise scoring.
Personality questionnaire	0.40	0.15	Self-report of behavioural preferences. At hrmforce the Big Fifty and the 15PF.
Certificate or diploma	-	-	Formal proof of completed education or examination.
On-the-job observation	-	-	Structured workplace observation with a form based on behavioural anchors.
Cognitive ability test	0.41	0.14	Standardised test of verbal, numerical or abstract reasoning.
360-degree feedback	-	-	Multiple raters around the person rate behaviour against behavioural anchors.
Structured interview	0.42	0.19	Behaviour-based interview with fixed questions and a rating scale per question.
Portfolio or evidence	-	-	A collection of prior work or results, assessed against fixed criteria.

7 Assessment instruments for this job

hrmforce instrument	Skills	What it measures
Work sample test	14	Representative work sample under standardized conditions
Knowledge test (client-specific)	12	Professional knowledge test, customized for each client

hrmforce instrument	Skills	What it measures
Competency Check	8	Behavioral-Level Competency Assessment
Big Fifty	5	Personality questionnaire, 150 items, 25 factors
360 Feedback	4	Multiple assessments based on behavioral anchors
Ability Scan	3	Aptitude Test: Verbal, Numerical, and Abstract Reasoning Skills
15PF	1	Personality Profile, a shorter alternative to the Big Fifty
Pulse Survey	1	Periodic measurement at the team and organizational levels
Portfolio	1	Evaluation of prior work against fixed criteria

8 How to use this profile

1. Agree the profile with the hiring manager before the first candidate is measured. Weights shifted afterwards make the outcome indefensible.
2. Choose the assessment method per skill from the Assessment method column. Combine at most three methods per candidate.
3. Calibrate the assessors in a two-hour session using the anchors in chapter 5. Anchors without rater training deliver little.
4. Fill in the match calculator and discuss the gaps in the development conversation. Type A and type G are selection criteria, not one-quarter development goals.

Source: hrmforce Skills Framework 2.0, version 2.0.0, built 2026-09-08. Crosswalks to ESCO v1.2.1, O*NET 31.0, Lightcast Open Skills, SFIA 9, DigComp 3.0, EntreComp, LifeComp, GreenComp, AILit, WEF Future of Jobs 2025, ISCO-08 and the Dutch CBS occupational classification BRC 2014 edition 2025. This profile is a starting point, not a standard: align it with your own organisation before selecting on it.