DACUM Research Chart for Precision Machinist

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DACUM Research Chart for Precision Machinist

A Job Processe work order blueprint/ drawing Clarify job require- machine theat-treating) processes (e.g., plating, coating, hater, treatments) machine(s) to use B Develop Machining Processes B-1 Identify machine sequence (e.g., lathe, drillpress) B-2 Obtain tooling B-3 Fabricate special tools B-4 Determine feed & speed for machining operations B-5 Determine timensions C Obtain Materials C-1 Identify raw material type & size D-2 Duild part profile D-3 Install work- holding fexues B-4 Determine potentials B-5 Determine material D D-1 Layout part profile D-2 Build part profile D-3 Install work- holding device (e.g., fixture, vice, cluck) D-4 Securic holding device (e.g., fixture, vice, cluck) D-5 Verify realibration of measuring into work- holding device (e.g., fixture, vice, cluck) D-5 Securic maw material into work- holding device (e.g., fixture, vice, cluck) D-5 Verify realibration of measuring into work- holding device (e.g., fixture, vice, cluck) D-5 Verify re		Duties	<					Tasks ———		
B Machining Processes machine sequence (e.g., lathe, childpress) machine tooling special tools feed & speed for machining operations rough part dimensions C Obtain Raw Materials machine sequence (e.g., lathe, childpress) machine tooling special tools feed & speed for mashining operations rough part dimensions D Obtain Raw Materials C-1 Identify raw material type & size C-2 Complete raw material C-3 Transport raw material C-4 Receipt- material rough part dimensions D Perform Job D-1 Layout part profile D-2 Build holding fixtures D-3 Install work- holding device D-4 Secure raw material D-5 Verify calibration of measuring tools Manufacture Machine Parts* E-1 Position cuting tool E-2 Establish reference points/datum D-3 Install work- holding device (e.g., fixture, vice, chuck) D-4 Secure raw material D-5 Verify calibration of measuring tools F Manufacture Machine Parts* E-13 Prepare technical E-14 Devitor E-3 Determ drill machine part face F-4 Quital face portations F-3 Center drill machine part angles, (e.g., part honing or lapping F-14 Perform parting operation G-3 Machine drill machine part angles, (e.g., part angles, (e.g., part angles, (e.g., part angles, (e.g., poperations G-4 Machine frindar operations G-5 Perform grinding operation (e.g	A	Job		blueprint/		Clarify job require-	processes (e.g., plating, coating,			A-5 Identify machine(s) to use
C Raw Materials raw material type & size raw material requisition raw material site inspect raw material raw material material D Perform Job Setup D-1 Layout part profile D-2 Build work- holding fixtures D-3 Install work- holding device (e.g. fixture, vice, chuck) D-4 Secure raw material into work- holding device D-5 Verify calibration of measuring tools E Manufacture Machine Parts* E-1 Position cutting tool E-2 Establish reference points/datum E-3 Determine material to remove E-4 Secure raw material depth D-5 Verify calibration of measuring tools F Partis* E-19 Position cutting tool E-2 Establish reforence points/datum E-3 Determine material to remove E-4 Secure raw material depth E-5 Rough part IAW matchining processes F Perform F-14 Perform part face F-3 Center part chamfer F-4 Turm ID/OD (e.g., length, taper, threads) F-5 Drill holes in parts G Milling Machine Operations G-1 Perform griding operation (e.g., bolt circles, hole pattern) G-3 Machine part angles (e.g., taper, bevels, counter bore/ counter bore/ co	В	Machining	machine sequence (e.g.,	machine tooling				feed & speed for machining		
D Job Setup part profile work- holding holding device (e.g., fixture, vice, chuck) raw material into work- holding device raw material into work- holding device calibration of measuring itools E Manufacture Machine Parts* E-1 Position E-2 Establish reference points/datum E-3 Determine material to remove E-4 Set cut depth E-5 Rough part IAW machining processes F Perform Lathe Operations E-13 Prepare technical E-14 Participate in shop-specific training F-3 Center drill machine part shoring or lapping F-3 Center frituration F-4 Turn ID/OD (e.g., length, taper, threads) F-5 Drill holes in parts G Perform Operations F-13 Perform fly cut/milling operations F-14 Perform part honing or lapping F-14 Perform parting operations G-3 Machine counter bore/ counter bore/ counter bore/ countersink G-4 Machine part angles (e.g., taper, bevels, chamfers) G-5 Perform index milling operation H Perform Surface Grinder Operations H-1 Ring test grinding wheel H-3 Install grinding wheel H-4 Dress grinding wheel H-5 Perform grinding operation index milling I Sawing Operations I-1 Select saw blade (e.g., set tensions) I-4 Set drill I-5 Select torill I J-1 Select drill J-2 Sharpen theickness) I-3 Center tensions) I-4 S	С	Raw	raw material	raw material	te	raw material to		inspect raw		
E Machine Parts* cutting tool reference points/datum material to remove depth part IAW machining processes F Perform Lathe Operations E-13 Prepare technical reports E-14 Participate in shop-specific training F-3 Center drill machine part shop-specific training F-4 Turn ID/OD (e.g., length, taper, threads) F-5 Drill holes in parts F Perform Milling Machine Operations F-13 Perform part honing or lapping F-14 Perform parting operations G-3 Machine counter bore/ counter bore/ countersink G-4 Machine part angles (e.g., taper, bevels, chamfers) G-5 Perform index milling H Perform Surface Grinder Operation H-1 Ring test grinding wheel H-2 Balance grinding wheel H-3 Install grinding wheel H-4 Dress grinding wheel H-5 Perform index milling I Peerform Sawing Operations I-1 Select artill J-2 Sharpen I-3 Mount saw blade (e.g., pitch, rake, thickness) I-4 Set drill J-2 Sharpen I-3 Center J-4 Set drill J-4 Set drill J-5 Select tool	D	Job		work- holding	hol (e.g	lding device g., fixture, vice,		raw material into work-		calibration of measuring
F Perform F-1 Machine part face Participate in shop-specific training F-3 Center drill machine parts F-4 Turn ling/OD (e.g., length, taper, lineads) F-5 Drill holes in parts F Lathe Operations F-13 Perform part honing or lapping F-14 Perform parting operations G-3 Machine counter bore/ counter bore/ counter bore/ countersink G-4 Machine grinding drilling operation G-5 Perform index milling G Perform Surface Grinder Operation G-1 Perform fly cut/milling operation G-2 Perform drilling operation G-3 Machine counter bore/ countersink G-4 Machine grinding operation G-5 Perform index milling H Perform Surface Grinder Operation I-1 Ring test grinding wheel H-2 Balance grinding wheel H-3 Install grinding wheel H-4 Dress grinding wheel H-5 Perform grinding operation (e.g., topsurface, grooves, radius) I Sawing Operations I-1 Select saw weld saw blade I-3 Mount saw blade (e.g., set tensions) I-4 Break in saw blade I-5 Select tool were station J-1 Select drill J-2 Sharpen mere station J-4 Set drill bit tensions) J-4 Set drill bit tensions	E	Machine		reference		material to				part IAW machining
FLathe Operationspart facepart chamferdrill machine partsID/OD (e.g., length, taper, threads)in partsGPerform Milling Machine OperationsG-1 Perform fly cut/milling operationG-2 Perform drilling operation (e.g., bolt circles, hole pattern)G-3 Machine counter bore/ countersinkG-4 Machine part angles (e.g., taper, bevels, millingG-5 Perform index millingHPerform Surface Grinder OperationH-1 Ring test grinding wheelH-2 Balance grinding wheelH-3 Install grinding wheelH-4 Dress grinding wheelH-5 Perform grinding operation (e.g., topsurface, grooves, radius)IPerform Sawing OperationsI-1 Select saw blade (e.g., pitch, rake, thickness)I-2 Cut & weld saw bladeI-3 Mount saw blade (e.g., set guides, set tensions)I-4 Break in saw bladeI-5 Cut parts profile (e.g., miter, angles, radius)Perform blade (e.g., pitch, rake, thickness)J-2 Sharpen drill bit drill bitJ-3 Center drill bit drill bitJ-4 Set drill drill bit bit rotion			technical reports	Participate in shop-specific						
GPerform Milling Machine OperationsG-1 Perform fly cut/milling operationG-2 Perform drilling operation (e.g., bolt circles, hole pattern)G-3 Machine counter bore/ counter bore/ countersinkG-4 Machine part angles (e.g., Perform index millingHPerform Surface Grinder OperationH-1 Ring test grinding wheelH-2 Balance grinding wheelH-4 Dress grinding wheelH-5 Perform grinding operation (e.g., topsurface, grooves, radius)IPerform Sawing OperationsI-1 Select saw pitch, rake, thickness)I-2 Cut & weld saw blade guides, set tensions)I-4 Break in saw bladeI-5 Cut parts profile (e.g., miter, angles, radius)Perform sawing OperationsI-1 Select drill pitch, rake, thickness)I-2 Sharpen drill bitI-3 Center drill partJ-4 Set drill dathsJ-5 Select tool bit ration	F	Lathe				drill machine	;	ID/OD (e.g., length, taper,		
GMilling Machine Operationsfly cut/milling operationdrilling operation (e.g., bolt circles, hole pattern)counter bore/ countersinkpart angles (e.g., taper, bevels, chamfers)Perform index millingHPerform Surface Grinder OperationH-1 Ring test grinding wheelH-2 Balance grinding wheelH-3 Install grinding wheelH-4 Dress grinding wheelH-5 Perform grinding operation (e.g., topsurface, grooves, radius)IPerform Sawing OperationsI-1 Select saw blade (e.g., pitch, rake, thickness)I-2 Cut & weld saw bladeI-3 Mount saw blade (e.g., set guides, set tensions)I-4 Break in saw bladeI-5 Cut parts profile (e.g., miter, angles, radius)Perform D : U DJ-1 Select drillJ-2 Sharpen drill bitJ-3 Center drill partJ-4 Set drill drill partJ-5 Select tool bit ratation			part honing or	parting	n					
HGrinder Operationgrinding wheelgrinding wheelgrinding wheelgrinding wheelgrinding wheelgrinding operation (e.g., topsurface, grooves, radius)IPerform Sawing OperationsI-1 Select saw blade (e.g., pitch, rake, thickness)I-2 Cut & weld saw bladeI-3 Mount saw blade (e.g., set guides, set tensions)I-4 Break in saw bladeI-5 Cut parts profile (e.g., miter, angles, radius)Perform DJ-1 Select drill pross teolingJ-2 Sharpen drill bitJ-3 Center drill partJ-4 Set drill denthsJ-5 Select tool bit rotation	G	Milling Machine	fly cut/milling	drilling opera (e.g., bolt cire	ation cles,	n counter bore/		part angles (e.g taper, bevels,		., Perform index
ISawing Operationsblade (e.g., pitch, rake, thickness)weld saw bladeblade (e.g., set guides, set tensions)saw bladeprofile (e.g., miter, angles, radius)Perform D : 'U DJ-1 Select drill pross toolingJ-2 Sharpen drill bitJ-3 Center drill partJ-4 Set drill bit rotation	н	Grinder						grinding gri wheel (e.		nding operation g., topsurface,
D 'U D pross tooling drill bit drill part donths bit rotation	Ι	Sawing	blade (e.g., pitch, rake,			blade (e.g., set guides, set				profile (e.g., miter, angles,
Operations	J	Drill Press								

*Tasks in this duty apply to the lathe, milling machine, surface grinder, saw, and drill press.

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A-6 Identify machine tooling									
C-6 Saw raw material	C-7 Mar excess ra material		C-8 Restock excess raw material						
D-6 Verify calibration of equipment daign stock materials		D-8 Set up cutting tools into machine	D-9 Top off cutting fluids	D-10 Set machine controls (e.g., feed, speed)	D-11 Set up machine guard	3			
E-6 Adjust E-7 Take in- feed & speeds measurements		E-8 Troubleshoot machine tooling issues	E-9 Perform finishing operations	E-10 Deburr finished part	eburr E-11 Polish E-12 V				
part groves knurling pl		F-8 Machine phonographic finish	F-9 Perform tapping operation	F-10 Cut key ways	F-11 Grind part profiles	F-12 Burnish part profiles			
G-6 Perform milling machine finishing operation (e.g., tapping, burnishing, reaming) G-7 Perform pocket milling (e.g., holes, slots, circles, groves)			G-8 Perform boring operation						
J-6 Perform dri operations (e.g. bore, ream, cou bore/sink)	, tap, inter	finishin (e.g., ch	form drill press g operations hamfering, spot honing)	AcronymsIAWIn Accordance WithID/ODInside Diameter/Outside DiameterMSDSMaterial Safety Data SheetsOEMOriginal Equipment ManufacturerOSHAOccupational Safety & Health AdministrationPMPreventative MaintenancePPEPersonal Protective EquipmentQAQuality AssuranceTIRTotal Indicator Runout					

	Duties		← Tasks →							
K	Perform Bench Work		K-1 Perform filing operations (e.g., thread, flat, round)		K-2 Perform hand grinding operations (e.g., disc, orbital, belt)		K-3 Perform layout operations (e.g., scribe lines, arcs, bolt circles)		K-4 Perform lapping operations	
			K-5 Perform hand drilling operations	h	-6 Perform and tapping perations		Hand d tool bits			
L	Perform Precision Measurements		L-1 Perform thread measurements	sı	-2 Perform urface finish neasurements	L-3 Perform height measurements		L-4 Perform angular measurements		L-5 Perform gear measurements
		_	L-6 Perform inside dimension measurements	o di	-7 Perform utside imension leasurements	mat	Perform erial Iness test	L-9 Perform runout measuremen		
Μ	Maintain Shop Equipment		M-1 Perform equipment PM (e.g., daily, monthly)		1-2 Inspect and tools	M-3 Perform equipment calibration		M-4 Maintain equipment cleanliness	M-5 Maintain equipment fluid levels (e.g., hydraulic, coolant)	
			M-6 Perform lockout/tagout procedures	e	1-7 Inspect quipment uards					

General Knowledge and Skills

Knowledge of tooling geometry Time management skills Decision making skills Learning skills Fabrication skills Drafting skills Knowledge of part handling techniques Knowledge of special processes (e.g. plating, heat treating, coating) Regulatory knowledge (OSHA, EPA) Knowledge of shop rules Knowledge of machine safety Basic math knowledge MSDS knowledge Machine-specific knowledge Material knowledge Knowledge of cutting tools

Communication skills Troubleshooting skills Interpersonal skills Problem solving skills Blueprint reading skills Organizational skills Mechanical knowledge Precision measuring skills Analytical skills Computer knowledge Knowledge of tooling materials Metallurgical knowledge Knowledge of trade theory Technical writing skills Knowledge of grinding wheels Knowledge of work holding devices Knowledge of hand tool usage

Worker Behaviors

Persistent Knowledgeable Creative Team Player Good listener Able to compromise Open-minded Attentive Consistent Positive Honest Trustworthy Able to follow directions Detail-oriented Safety-oriented

Mature Dependable Punctual Ambitious Organized Good listener Sense of humor Self-starter Patient Able to handle stress Team player Adaptable Healthy Loyal Willing to help others

Tools, Equipment, Supplies and Materials

Laptop/computer PPE Mobile phone Machinery's Handbook Microsoft Office software Equipment-specific technical manuals Scientific calculator Emory cloth Shop rags/gloves Drill bits Parting tool Carbide inserts Knurling tool Taps & dies Rollaround toolbox Reamers Hand tools (e.g. Allen wrenches, rubber mallet, ball peen hammer) Counter bore/sink Measuring tools: Micrometers Indicator Tape measure Vernier calipers Depth micrometers Protractors Precision squares Combination squares Angle finder Steel scales

Heat treat oven Hardness tester Extractors Profilometer Refractormeter Gauge blocks Pin gauges Thread pitch gauges Radius gauges Broom Coal shovel Pedestal grinder Horizontal lathe Key seater Vertical mill Shop press Magnetic drill Vertical turret lathe Horizontal boring mill Blanchard grinder Broach Metal brake Band saw Shim stock Files Rubber mat Sand blaster Digital readouts Oxyacetylene torches Flashlight

Future Trends and Concerns

Perception of the trade unchanged Competitive wages Good job security Improved working conditions Industry competition Foreign competition Struggling economy Growing material/product costs Lack of skilled trades candidates Regulatory challenges Cost of energy Infrastructure Succession planning Nano technology