

Machine Shop Tool Risk Assessment

From: EH&S Machine Shop Safety policy [http://www.stonybrook.edu/EHSD0411/\\$FILE/EHSD0411.pdf](http://www.stonybrook.edu/EHSD0411/$FILE/EHSD0411.pdf)

This list is not all-inclusive. Not all hazards will apply to a particular machine. Always refer to the manufacturer's instruction manual for specific information.

Hazard Class	1	2	3	4	5
Power	Low power hand/small bench tools (2-4 amp @ 120 VAC, <9V cordless)	Medium power tools (1/4 to ½ hp; <10 amp @120 VAC; 14-18V cordless; specialized enclosed NC-computer tools)	Powerful portable and small benchtop tools (>1/2 hp; 10-15 amps @ 120 VAC; 24-36V portable, pneumatics, hydraulics)	Light industrial tools (typically benchtop; <1/2 hp, pneumatics, hydraulics)	Large industrial tools (manual and NC-controlled)
Common Examples	<ul style="list-style-type: none"> • Dremel tool • Cordless drill under 18V • Palm Sander • Soldering iron/gun • Heat gun • Hot melt glue gun • Sewing machine • 3D printer 	<ul style="list-style-type: none"> • Jig Saw • 3/8" hand drill • Corded devices <1/3 hp • 18-24V cordless drill • Laser cutter/engraver • Thermal foam cutter 	<ul style="list-style-type: none"> • Circular saw • Belt sander • Framing nailer • ½ hp geared drill • Reciprocating saw • >18V cordless tool • Chop/miter saw • Router • Mini-lathe • Angle grinder • Printing press 	<ul style="list-style-type: none"> • Small bandsaw • Small drill press • Small/benchtop milling machine • Small/benchtop lathe • Belt/disc sander • Horizontal saw • Scroll saw • Planer/jointer • Bench grinder • SawStop style tablesaw 	<ul style="list-style-type: none"> • Full sized milling machine • Full sized metal lathe • Table saw (non-SawStop) • Radial arm saw • Large drill press • Large band saw • Surface grinder • Large jointer/planer • Shaper/moulder • Power shear
Potential Injuries	Cuts Abrasions Minor burns Minor struck-by flying objects Electric shock	<i>As for Class 1, plus:</i> Lacerations Punctures Minor crushing injuries Eye injuries	<i>As for Class 2, plus:</i> Severe bleeding Minor amputations	<i>As for Class 3, plus:</i> Minor entanglement	<i>As for Class 4, plus:</i> Immediately life threatening injury or death
Potential Severity	Low: First Aid	Low: First Aid or minor injury requiring emergency room visit	Medium: Immediate emergency room visit Permanent disability or disfigurement	High: Immediate emergency room visit Permanent disability or disfigurement	Highest: Serious injury or death
Risk Reduction Mitigation Method - Tools	Grounded power cords or double insulated tools 3D printers: Enclosure interlocks Lock-out unauthorized users	Grounded power cords or double insulated tools Laser Cutter/engraver; thermal foam cutter: Enclosure interlocks Lock-out unauthorized users	<i>As for Class 2, plus:</i> Relevant tool guarding Bracing/clamping of work	<i>As for Class 3, plus:</i> E-stops or equivalent	<i>As for Class 4</i>

Task	Hazard	Danger Zone	Risk Reduction Methods
Workpiece clamping	Crushing	Between fixed and moving part including work clamping (chuck or tailstock) and tool magazine	<p>Safeguarding:</p> <p><i>Guards:</i> Fixed, interlocked, adjustable, moveable</p> <p><i>Devices:</i> Movable barrier devices; Light curtains/beam device; Two-hand operating lever, trip and control device; Safety mat device</p> <p><i>Awareness:</i> Barriers; Signals; Safety signs</p> <p><i>Other measures:</i> Safe-distance guarding</p> <p>Equipment:</p> <p>Emergency Stop device (palm or push button)</p> <p>Safety blocks, locking pins or limiting pins</p> <p>Slide locks</p> <p>Work holding equipment</p> <p>Process malfunction, detection & monitoring equipment</p> <p>Safety interface/relay modules</p> <p>Shields</p> <p>Enabling devices</p> <p>Hold-to-run controls</p> <p>Measures for isolation and energy dissipation</p> <p>Information and Training:</p> <p>Signage</p> <p>Instruction</p> <p>Operating Manuals</p> <p>Safe Work Procedures</p> <p>Supervision</p> <p>Permit-to-work system</p> <p>Personal Protective Equipment</p>
Whipping bar stock	Crushing	Either end of spindle	
Moving axis	Shearing	Between tool/spindle and table	
Spindle or tool running or cutting	Cutting or severing	At spindle or tool	
Part feeding	Entanglement	By moving part including bar feed and tool magazine	
Rapid travel of table or spindle head	Drawing in or trapping	Envelope of movement of workpiece on table axes or tool in spindle head	
Moving or rotating tool	Impact	At spindle or tool	
	Stabbing or puncture	At sharp tool faces	
Maintenance or repair	Electrical contact (direct or indirect)	Direct or indirect contact with normally live parts	
		Electrical noise	
		Electrostatic discharge	
		Arc flash hazard	
		Improper wiring or grounding	
		Liquid or wet locations	
		Overvoltage or overcurrent	
Control system failure: <ul style="list-style-type: none"> • Modification of control system • Defect or failure of one or several components of the control system • Variation or failure in power supply to control system • Inappropriate selection, design or location or control devices 	Crushing Shearing Cutting Severing Entanglement Trapping Impact Puncture Electrical contact	Dropping or ejection of a mobile part of the machine or of a workpiece clamped by the machine	
		Failure to stop moving parts	
		Machine action resulting from defeating or failure of safeguarding devices	
		Uncontrolled speed change	
		Unintended or unexpected start-up	

This list is not all-inclusive. Not all hazards will apply to a particular machine. Always refer to the manufacturer's instruction manual for specific information.

Based on Yale EH&S Student Shop Safety Policies & Procedures, ANSI B11.0 and B11.6