Machine User Guide

Department of Electrical, Computer & Biomedical Engineering

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I. Personal Protective Equipment (PPE) Legend

PERSONAL PROTECTIVE EQUIPMENT (PPE) CHART	
Face Shield / Safety Glasses with side shields	
Dust Mask	
Respirator	
 Ear Plugs / Ear Muffs	
Gloves	
Closed-Toe Foot Wear (no heels)	
Lab Coat / Protective Apron	 

1.0 Bench Shear

Machine name	Bench Shear
Manufacturer name	Di-Acro
Model number	Spartan Shear #24
Location of item	ENG 419 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

1.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT
Always wear the required PPE when using this machine.

1.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are guards/hold-down bars in place and in good working order?			
2	Is the shear secure and level?			
3	Is the area around the shear free of slip/trip hazards?			
4	Has the debris/material from previous operations been removed?			
5	Are the blades surfaces free of defects?			
6	Is the shear sufficient for the material being sheared?			
7	Does the lever move smoothly without obstruction and free of grease/oil?			
8	Are you sheering silver, copper, brass or nickel and **not steel, rods, wire or bar stock?**			
9	Is the material clean and dry?			
	Comments/Corrective Action:			

1.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines

- Equipment Specific Standard Operating Procedure

1.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

1.3.2 Equipment Specific Standard Operating Procedure (SOP)

<table>
<tr><th colspan="3">Before Shearing</th></tr>
<tr><th>Standard Operating Procedure</th><th>Figures</th><th>Hazard Awareness</th></tr>
<tr><td rowspan="2">1. Put on your PPE.
2. Identify the desired area(s) to be sheared.
3. Support long pieces to be sheared.
4. Place the material between the hold-down bar and the table. Take extreme caution at this point as it is a pinch point (See Figure 1).</td><td> 
Figure 1</td><td>● Pinch point</td></tr>
<tr><td colspan="2">Precaution
● Ensure table area and the area under the hold-down bar is free of debris prior to shearing. Clutter contributes to accidents</td></tr>
</table>

Shearing

Standard Operating Procedure	Figures	Hazard Awareness
5. Keep fingers as far away from the blade as possible. 6. There is a guide on the right side to measure length of cut (See Figure 2). 7. Pull down the lever to engage the hold-down bar and the shear blade (See Figure 3).	 **Figure 2**	● Pinch point
	 **Figure 3**	**Precaution** ● Do not pry or twist the work piece when cutting

After Shearing

Standard Operating Procedure
8. Remove the sheared material from the table using gloves or a brush. 9. Remove the waste from the surrounding area. 10. Place debris in the scrap box, beneath the shear table. 11. Clean the area upon completion of the task. 12. Sweep the floor surrounding the shear.

1.4 Maintenance and Repair

1.4.1 Inspection Checklist

DAILY	✔
Ensure guards are in place and in good working order.	
Machine is secured and balanced	
Ensure the area around the shear free of slip/trip hazards.	
Ensure the debris/material from previous operations has been removed.	
Ensure that blades are sharp and free of defects. Re-sharpen if necessary.	
Ensure that the lever moves smoothly without obstruction and is free of grease/oil.	
WEEKLY	✔
Adjust and lubricate cutter and moving parts, if necessary.	
Ensure that the bottom shear blade is located so that its upper edge is flush with the top of the base casting and shear table. Adjust if necessary.	
MONTHLY	✔
Ensure that the protective guards/hold-down bar clearance is kept to a minimum – just enough to feed material. Adjust if necessary.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

1.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:

Any changes or updates made to this document must be recorded and maintained

2.0 Drill Press

Machine name	Drill Press
Manufacturer name	Swiss Instruments Ltd.
Model number	B15S
Location of item	ENG 419 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

2.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

Always wear the required PPE when using this machine.

2.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located (button/switch/cord)?			
3	Are guards in place and in good working order?			
4	Is the drill press secure and level?			
5	Is the area around the drill press free of slip/trip hazards?			
6	Are flammable/combustible materials removed from the immediate work area?			
7	Has the debris/material from previous operations been removed?			
8	Are all tools/wrenches removed from the table?			
9	Are the drill bits and chuck free of defects?			
10	Does the table adjustment setting and pinion handle move freely without obstruction?			
11	Is the clamp or vise in good condition, suitable to secure the work piece?			
	Comments/Corrective Action:			

2.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

2.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

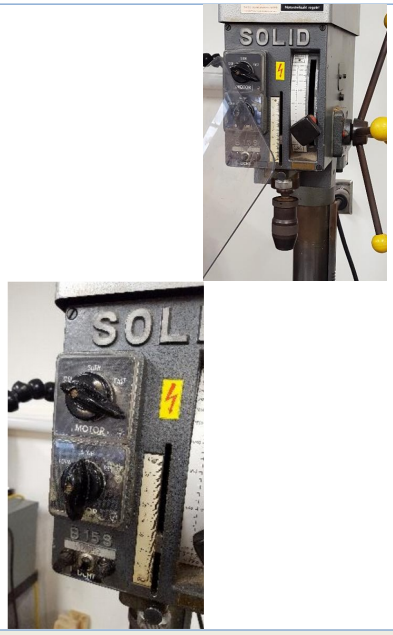
j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

2.3.2 Equipment Specific Standard Operating Procedure (SOP)

Before Drilling

Standard Operating Procedure	Figures	Hazard Awareness
1. Always wear PPE 2. Clear the table and work area before operating the drill press 3. Insert the drill bit securely into the chuck. This drill press does not have a chuck key (See Figure 1). 4. Ensure that the appropriate table height is set for the task, use the handle to raise or lower the table. Tighten the lock handle to keep the table from moving mid-operation (See Figure 2). 5. Set the depth stop of the drill press to clear no more than 3/4” below the material. This is to avoid drilling into the table (See Figure 4). 6. Mark the location to be drilled or use the center punch if necessary. 7. Keep the drill bit clean and sharp to reduce breakage. 8. Place a backing board beneath the work piece on the table. To avoid damage to the table, drill bit, and material. 9. Use a clamp or vise to secure the material to the table to prevent the material from spinning. 10. The drill press also has a speed adjuster and is able to spin both	 **Figure 1**  **Figure 2**  **Figure 3**	● Burns ● Cuts ● Entanglement ● Bit breakage **Precaution** ● Do not wear gloves ● Ensure that long shirt sleeves are rolled up to the elbows ● Drill presses turn clockwise or counter-clockwise when cutting, therefore the work piece has a tendency to spin in the direction of the drill

clockwise and counter-clockwise (See Figure 4).	 **Figure 4**	

Drilling		
Standard Operating Procedure	**Figures**	**Hazard Awareness**
11. Turn on the power button (See Figure 5). 12. Ensure to use recommended speed level based on material being drilled. The lab technician will set the speed. 13. Use the hand feed lever, to slowly lower the spindle towards the material to begin drilling process (See Figure 6). 14. Ensure your hand is kept away from the drill location. Drill bit contact will result in a serious puncture wound. 15. Ensure to clear accumulated chips regularly, when drilling the hole. Ensure that adequate eye glass	 **Figure 5**	• Bit breakage • Dust/Debris • Puncture **Precaution**

protection is worn due to risk of flying debris or dust.

16. Turn off the machine when jams occur, before raising the drill bit.
17. Add lubrication to the drill bit if necessary.
18. Release the pressure using hand feed lever, once the drill breaks/cuts through material
19. Raise the hand feed lever to the starting position and repeat as necessary.

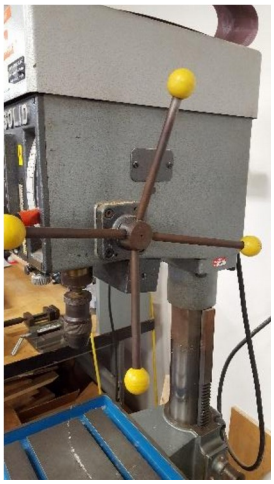


Figure 6

- Do not hold materials by hand when drilling
- Do not leave the machine running unattended
- Do not make any adjustments, speed level changes while the machine is drilling

After Drilling

Standard Operating Procedure	Figures	Hazard Awareness
20. Turn off the drill after operation 21. Ensure that the spindle comes to a complete stop on its own 22. Remove the clamp or vise and work piece 23. Remove the drill bit from the chuck 24. Clean up debris and dust using a brush (See Figure 7). 25. Ensure all work area is cleaned including the floor. 26. Place PPE, drill bits, cutting tools in the appropriate storage areas	 **Figure 7**	• Burns • Entanglement • Cuts • Debris/Dust

Precaution

- Do not touch the bit or work piece immediately as it may be extremely hot, resulting in burns

2.4 Maintenance and Repair

2.4.1 Lockout/Tagout (LOTO) Procedure

<table>
<tr><th colspan="3">Lockout/Tag-out Procedure</th></tr>
<tr><th>Equipment/Machine Name</th><th>Location</th><th>Total # of energy isolation devices/locks (EID)</th></tr>
<tr><td>Drill Press</td><td>ENG 419</td><td>1</td></tr>
<tr><td colspan="3">ONLY PROPERLY TRAINED AND AUTHORIZED PERSONNEL SHALL PERFORM LOCKOUT/TAG-OUT PROCEDURE BEFORE SERVICING THIS MACHINE.</td></tr>
<tr><td>Energy Source</td><td colspan="2">Electrical</td></tr>
<tr><td>Location</td><td colspan="2">Plug at the end of cord</td></tr>
<tr><td>Type of EID/lock to be used</td><td colspan="2">Plastic clamshell and padlock</td></tr>
<tr><td>Procedure for locking and tagging
1. Stop machine
2. Unplug cord
3. Install clamshell on plug
4. Lock and tag</td><td colspan="2" rowspan="2"> 
</td></tr>
<tr><td>Verification Procedure
1. To confirm lock-out, start machine
2. Visually confirm that machine will not start
3. If the system fails verification procedure or cannot be locked out, stop and contact your supervisor</td></tr>
<tr><td colspan="2">LOTO Procedure Number: A-xxxxxxx</td><td>Revision Number:</td></tr>
<tr><td colspan="2">Approved by:</td><td>Date:</td></tr>
</table>

2.4.2 Inspection Checklist

DAILY	✔
Ensure that the power cords are free of frays and damage.	
Ensure that guards are in place and in good working order.	
Ensure that the drill press is secure and level.	
Ensure that the area around the drill press is free of slip/trip hazards.	
Ensure that flammable/combustible materials are removed from the immediate work area.	
Ensure that debris/material from previous operations is removed.	
Ensure that tools/wrenches are removed from the table.	
Ensure that the drill bits and chuck are free of defects; ensure that the teeth are not worn down, since this may restrict tightening and securing of the work piece. Check the fingers [pieces] that come in contact with the drill bit, to ensure that there are no cracks and that they close evenly. Replace the chuck if necessary.	
Ensure that the table adjustment setting and pinion handle move freely without obstruction.	
Ensure that the quill and chuck assembly move smoothly via the pinion handles and return to the start position easily and promptly.	
Ensure that the clamp or vise is available, in good condition, suitable to secure the work piece.	
Ensure that drill bits are clean and sharp.	
Ensure use of proper cutting fluid (if applicable) for the material being drilled.	
WEEKLY	✔
Lubricate if necessary.	
Ensure that the levers on the tabletop and the column are free from defects (stripped levers or bolts). Replace or adjust if necessary.	
Grease all points.	
MONTHLY	✔
Ensure that the belts are not cracked or broken. If necessary replace.	
The pulleys have closed bearings - ensure that they are running smoothly.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

2.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
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Revisions Approved by:	Date of Approval:

Any changes or updates made to this document must be recorded and maintained

3.0 Hand Drill

Machine name	Hand Drill
Manufacturer name	DeWalt
Model number	DC759
Location of item	ENG 418 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

3.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

Always wear the required PPE when using this machine.

3.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Is the power cord free of frays and damage?			
2	Is the drill secure with no loose parts?			
3	Is the work area free of slip/trip hazards?			
4	Are flammable/combustible materials removed from the immediate work area?			
5	Has the debris/material from previous operations been removed?			
6	Are all tools/wrenches removed from the work area?			
7	Are the drill, chuck and bit free from cracks and defects?			
8	Are all screws securely tightened?			
9	Are you aware of the direction of rotation?			
10	Is the work piece free from nails, wires or other foreign objects? (the drill may be thrown and hit someone or the tool can react dangerously, resulting in injury).			
11	If using a hammer drill, have you selected the ‘action mode’? (to safely drill different types of materials).			
12	If using a hammer drill, have you selected the speed setting?			
	Comments/Corrective Action:			

3.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

3.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

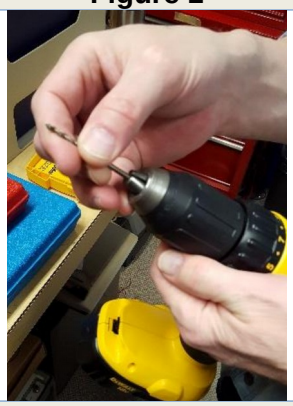
h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

3.3.2 Equipment Specific Standard Operating Procedure (SOP)

<table>
<tr><th colspan="3">Before Using Hand Drill</th></tr>
<tr><th>Standard Operating Procedure</th><th>Figures</th><th>Hazard Awareness</th></tr>
<tr>
<td rowspan="4">1. Always wear PPE.
2. Clear work area before operating the hand drill
3. Mark the locations to be drilled.
4. Use a clamp or vise to secure the workpiece. Avoid holding the work piece by hand if possible to prevent personal injury (See Figure 1).
5. Insert the drill bit into the chuck and tighten the chuck by hand (See Figure 2).
6. Select the direction of the rotation by using the reverse switch (See Figure 3).</td>
<td> 
Figure 1</td>
<td>● Personal Injury</td>
</tr>
<tr>
<td>Precaution</td>
</tr>
<tr>
<td> 
Figure 2</td>
<td>● Do not overreach –keep proper footing /balance for better control of the tool
● A clamp or vise is used to prevent the workpiece from spinning.
.</td>
</tr>
<tr>
<td> 
Figure 3</td>
<td></td>
</tr>
</table>

Using the Hand Drill

Standard Operating Procedure	Figures	Hazard Awareness
7. Turn on the hand drill (See Figure 4). 8. Hold the hand drill firmly and place the drill bit at the desired location to be drilled. Use both hands to hold the power tool when drilling a larger hole. 9. Pull the trigger to begin drilling the work piece; be careful not to accidently start drilling when holding or carrying the hand drill. 10. Apply enough pressure once the drill breaks or cuts through work piece. Applying too much force to the drilling process can result in the drill bit slipping off the screw. 11. Use lubricate on the drill bit on to prevent burns when drilling hard materials. 12. Release the trigger when the drill bit is jammed and disconnect the drill. Ensure the direction of the rotation is on reverse to remove bit slowly. 13. Use the lock button for continuous drilling. Ensure the drill can be turned off in an emergency.	 **Figure 4**	● Overheating drill bit ● Personal injury

Precaution
● Do not direct the hand drill towards yourself or anyone in the work area ● Avoid applying too much pressure to the drill to maintain control ● Do not overheat the drill bit when cutting hard surfaces

After using the Hand Drill

Standard Operating Procedure
14. Release the trigger to turn off the hand drill. 15. Turn the chuck counterclockwise to remove the drill bit 16. Place the power tool in the appropriate storage areas 17. Remove the work piece and loosen the clamp or vise. 18. Use a brush to remove chips from the work area. 19. Clean the drill bit and sweep the surrounding area

3.4 Maintenance and Repair

3.4.1 Inspection Checklist

DAILY	✔
Ensure that the power cord is free of frays and damage.	
Ensure that the drill is secure with no loose parts.	
Ensure that the drill, chuck and bit are free from cracks and defects.	
Ensure that all screws are securely tightened. Tighten if required.	
WEEKLY	✔
Clean all drill parts.	
MONTHLY	✔
Lubricate moving parts to prevent rusting and minimize friction related wear.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

3.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:
Any changes or updates made to this document must be recorded and maintained	

4.0 Handheld Rotary Tool

Machine name	Handheld Rotary Tool
Manufacturer name	Altocraft
Model number	PT-DGE40
Location of item	ENG 418 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

4.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT


RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT
Always wear the required PPE when using this machine.

4.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located (button/switch/cord)? The tool has an attachment plug and receptacle (plug/socket combination) for cord connection and so it may be used to disable the machine in the event of an emergency.			
3	Is the work area free of slip/trip hazards?			
4	Are flammable/combustible materials removed from the immediate work area?			
5	Has the debris/material from previous operations been removed?			
6	Is the tool free of defects and securely in place?			
7	Is the shaft lock button in good condition?			
8	Is the appropriate rotary tool accessory selected for the task? (drill bits, abrasive wheels, wire brushes, polishers, engraving cutter, router buts and attachments.			
9	Is the rotary tool accessory free of defects, damage and debris?			
10	Has the speed of the rotary tool been adjusted?			
	Comments/Corrective Action:			

4.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

4.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

4.3.2 Equipment Specific Standard Operating Procedure (SOP)

Before Using the Rotary Tool

Standard Operating Procedure	Figures	Hazard Awareness
1. Put on required PPE. 2. Secure the work piece with a clamp/vise. Never work free hand as this can lead to loss of control and injury. 3. Attach the rotary tool accessory onto the tool. Ensure the accessory is tightened properly (See Figure 1). 4. Never change the tool accessory when it is in motion. 5. Set the speed of the tool. Refer to the manufacturer manual to determine the proper speed based on the material being worked and the type of accessory being used. 6. Before using the tool on a work piece, test run it first to ensure it is not out of balance or vibrating and is at the right speed for the job. 7. Place the power cord out of the way of the tool.	 **Figure 1**	• Personal injury

Precaution

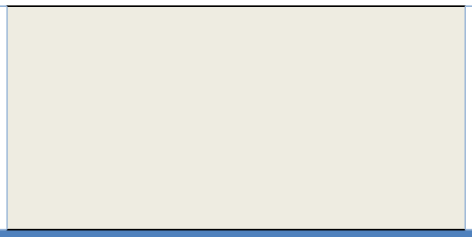
- Keep work areas well lighted and clean
- Check the tool bits for any damage prior to work

Using the Rotary Tool

Standard Operating Procedure	Figures	Hazard Awareness
8. Keep hands away from the rotation area to prevent injury. 9. Hold the tool firmly by the insulated gripping handle. 10. Grip it either like a pencil between your thumb and forefinger for the best control in close work (See Figure 2). 11. Or hold it in a “golf grip” method when using the rotary tool for grinding a flat surface or using cutoff wheel (See Figure 3). 12. Do not cover the air vents, this will block the airflow and cause the motor to overheat. 13. Ensure that the rotary accessory is not contacting the work piece before the switch is turned on. This can cause kickback to occur. 14. Allow the rotary tool to attain full speed before proceeding to work. 15. Apply the rotary tool to the work piece in a slow and steady manner. Only apply light pressure on the tool. 16. Do not push on the tool. Allow the accessory to do the work. 17. Make series of passes with the tool until you reach the desired result. 18. Keep hands as far away from rotating parts as possible and never allow your hands to pass directly over the spinning bit. 19. Be careful of sparks, dust or debris that eject from the	 **Figure 2**	● Sparks/Dust/Debris ● Overheating ● Personal Injury ● Kickback
	 **Figure 3**	**Precaution** ● When grinding, allow cooling periods to prevent damage to work piece or grinder ● Applying excessive pressure may cause overloading of the motor

work piece.

20. Do not overwork the tool for long periods as it could get very hot. Allow cooling periods.



After Using the Rotary Tool

Standard Operating Procedure

21. Release the switch lever to stop the rotary tool.
22. Disconnect when not in use. Never leave the tool running unattended.
23. Remove the accessory tool and put away the tool.
24. Do not touch the work piece immediately following operation as it may be hot.
25. Clean the tool. Never clean while it is in motion.
26. Sweep the floor surrounding the work area.

4.4 Maintenance and Repair

4.4.1 Inspection Checklist

DAILY	✔
Ensure that the power cords are free of frays and damage.	
Ensure that tool is secure with no loose parts	
Ensure that the area around the saw is free of slip/trip hazards.	
Ensure that the debris/material from previous operations are removed.	
Check the tool for any visual defects.	
Ensure the lock-off lever in good condition (this prevents the switch lever from being accidentally pulled).	
Ensure the rotary tool accessory is free of defects, damage and debris. Replace if necessary.	
WEEKLY	✔
Inspect the rotary tool brushes. If the brush is less than 1/8'' long and the end surface of the brush rough or pitted they should be replaces. Replacing the brushes can improve speed and eliminate excessive noise and loss of power.	
Lubricate the flex shaft after every 25-30 hours of use.	
MONTHLY	✔
Clean and lubricate the tool.	
Clean the tool with compressed air to remove dust and debris built up from small openings.	
ANNUALLY	✔
Inspect entire tool and perform maintenance as required.	

4.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:
Any changes or updates made to this document must be recorded and maintained	

5.0 Heat Gun

Machine name	Heat Gun
Manufacturer name	Mastercraft
Model number	054-0206-0
Location of item	ENG 417 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

5.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

Always wear the required PPE when using this machine.

5.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located (button/switch/cord)? The tool has an attachment plug and receptacle (plug/socket combination) for cord connection and so it may be used to disable the machine in the event of an emergency.			
3	Is the work area free of slip/trip hazards?			
4	Are flammable/combustible materials removed from the immediate work area?			
5	Has the debris/material from previous operations been removed?			
6	Is the tool free of defects and securely in place?			
7	Is the material ready to be heated?			
8	Is the heat gun nozzle properly secured?			
9	Is the ventilation system turned on?			
	Comments/Corrective Action:			

5.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

5.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

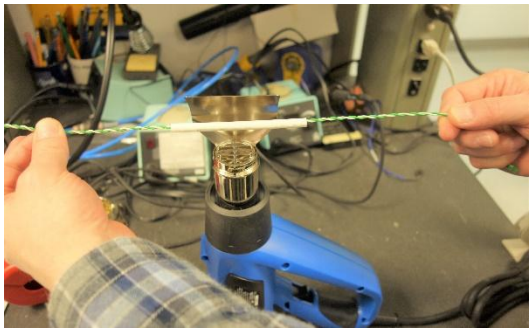
j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

5.3.2 Equipment Specific Standard Operating Procedure (SOP)

<table>
<tr><th colspan="3">Before Using the Heat Gun</th></tr>
<tr><th>Standard Operating Procedure</th><th>Figures</th><th>Hazard Awareness</th></tr>
<tr><td rowspan="2">1. Put on required PPE.
2. Ensure there is proper ventilation.
3. Place the power cord out of the way of the tool.
4. Ensure that the hand does not pass over the nozzle of the heat gun. Once on, the material of the heat gun becomes extremely hot (See Figure 1).</td><td> 
Figure 1</td><td>● Burns</td></tr>
<tr><td colspan="2">Precaution
● The heat gun should be placed in an upright position
● The nozzle of the heat gun will become extremely hot</td></tr>
</table>

Using the Heat Gun

Standard Operating Procedure	Figures	Hazard Awareness
5. Never direct the hot airflow toward anyone or yourself. 6. Plug in and turn on the heat gun. 7. Turn on the heat gun by sliding the switch. The heat gun will be switched on to its lowest temperature setting at “1” (See Figure 2). 8. Switch to the suitable temperature setting by sliding the switch. The heat gun has 3 temperature settings ranging from “1” to “3”. “3” being the highest temperature (See Figure 3). 9. Allow the heat gun to reach full heating power. 10. Place the wire directly in the nozzle of the heat gun (See Figure 4). 11. Do not touch the heat gun nozzle as it becomes extremely hot during use. 12. Move the wire side-to-side so that the surface is evenly heated. 13. Let the material cool	 **Figure 2**  **Figure 3**  **Figure 4**	● Burns **Precaution** ● Ensure that the material being heated is suitable to reach very high temperatures

After Using the Heat Gun

Standard Operating Procedure

14. Turn off the heat gun.
15. Disconnect the heat gun. Never leave it running unattended.
16. Clean the work space.

5.4 Maintenance and Repair

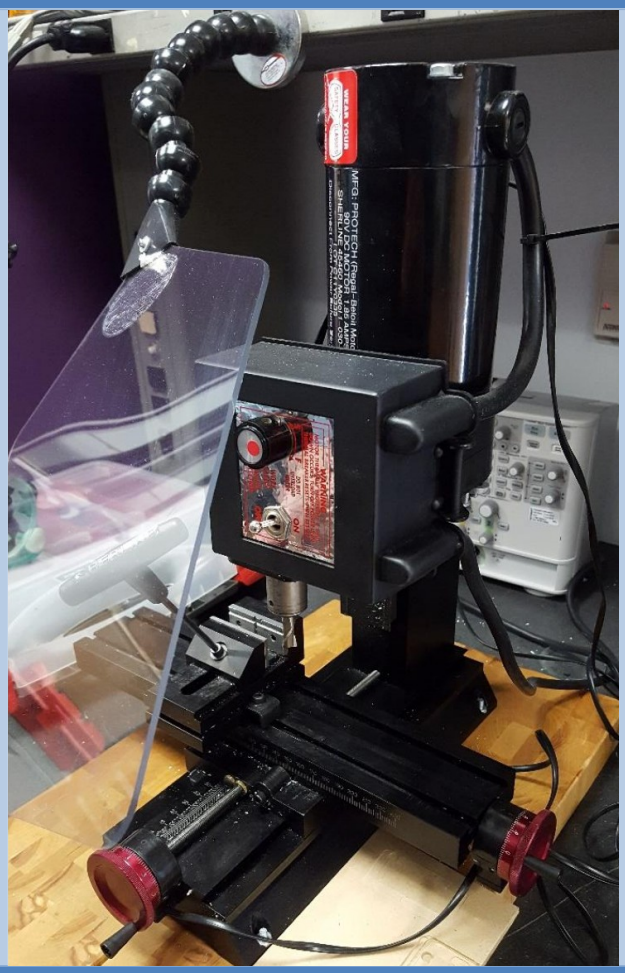
5.4.1 Inspection Checklist

DAILY	✔
Ensure that the power cords are free of frays and damage.	
Ensure that tool is secure with no loose parts	
Ensure that the area around the saw is free of slip/trip hazards.	
Ensure that the debris/material from previous operations are removed.	
Check the tool for any visual defects.	
Keep the heat gun clean and in good repair for maximum performance.	
Keep the tool clean, dry and free of oil and grease.	
Inspect the nozzle of the heat gun and ensure it is not obstructed in any way.	
WEEKLY	✔
Clean the heat gun- use mild soap and a damp cloth to clean the tool	
MONTHLY	✔
Blow dust out of the motor area, using an air compressor or dust vacuum,	
Check all bearings for excessive heat or loose shafts-replace if necessary.	
ANNUALLY	✔
Inspect the wire and plug for any damage. Ensure there are no bends or crimps in the cord.	
Inspect entire machine and perform maintenance as required.	

5.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:
Any changes or updates made to this document must be recorded and maintained	

6.0 Mini Milling Machine



Machine name	Mini Milling Machine
Manufacturer name	Sherline
Model number	5410
Location of item	ENG 417 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

6.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT
 
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT
 
Always wear the required PPE when using this machine.

6.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located?			
3	Are guards in place and in good working order?			
4	Are flammable/combustible materials removed from the immediate work area?			
5	Is the area around the machine free of slip/trip hazards?			
6	Has the debris/material from previous operations been removed?			
7	Are the chucks and cutters free of defects?			
8	Does the table adjustment setting and pinion handle move freely without obstruction?			
9	Is the clamp or vise in good condition, suitable to secure the work piece?			
10	Are the cutter and arbor clear of debris before mounting?			
11	Are you using a correctly ground cutter for the material being milled?			
12	Are you using the proper cutter feed rate? Do not use an excessively heavy cut or feed as it can cause the cutter to break			
13	Are the fingers (pieces) that come in contact with the cutter free from defects and close evenly?			
14	Is the work piece free of nails, screws and other foreign objects?			
15	Is the dust collection system on?			

	Comments/Corrective Action:			

6.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

6.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

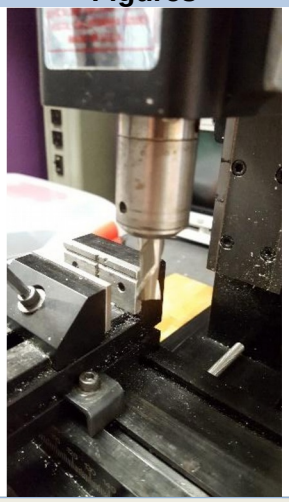
h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

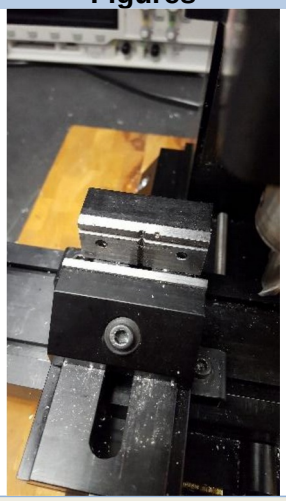
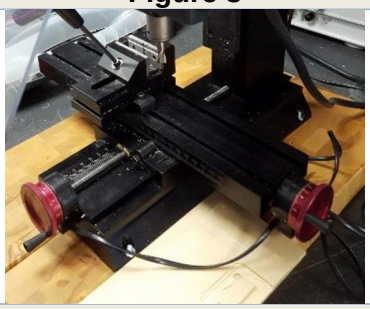
j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

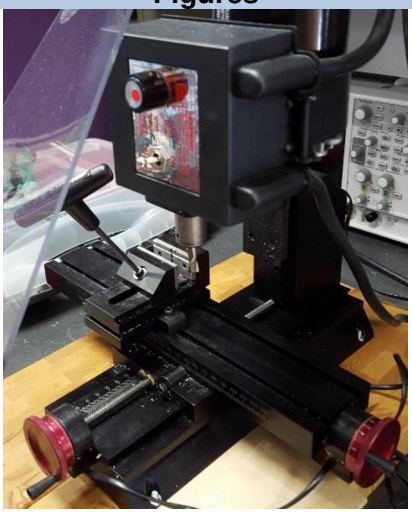
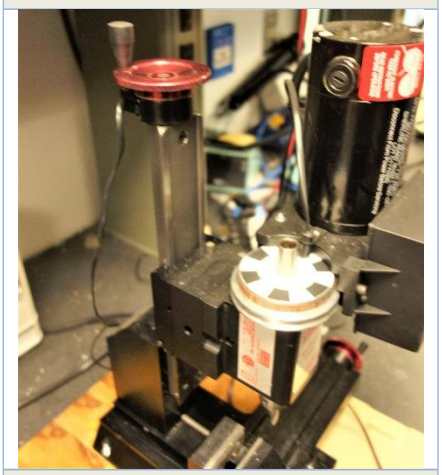
6.3.2 Equipment Specific Standard Operating Procedure (SOP)

Installing the Cutter		
Standard Operating Procedure	**Figures**	**Hazard Awareness**
1. Put on your PPE. 2. Do not wear gloves when operating the milling machine. 3. Move bed as far as possible from chuck while setting up to avoid hand injuries. 4. Hold cutters with a cloth or gloves to avoid being cut while inserting them. 5. Mount the cutter in to the chuck and tighten (See Figure 1). 6. Use an allen key to further secure the cutter (See Figure 2). 7. Remove the key before operating the milling machine.	 **Figure 1**  **Figure 2**	• Entanglement • Hand injury **Precaution** • Failure to remove the chuck key before machine operation will result in chuck key being ejected at user • Ensure the cutter being used is appropriate for the material being used

Before Milling

Standard Operating Procedure	Figures	Hazard Awareness
8. Use a clamp/vise to secure the work piece to the table and prevent it from spinning and causing injury (See Figure 3). 9. Never work free hand as this can result in serious injury. 10. Lock all feeds other than the one you are using. 11. Tighten the motor locking lever. 12. The milling table can be moved side to side along the horizontal or vertical axis's by loosening the table clamp handle. Adjust as desired (See Figure 4).	 **Figure 3**  **Figure 4**	● Hand Injury **Precaution** ● Setting the desired depth of the mill is necessary so that you do not over-mill the material

Milling

Standard Operating Procedure	Figures	Hazard Awareness
13. Turn on the milling machine and allow it to reach full speed (See Figure 5). 14. Use the speed change hand wheel to choose RPM (See Figure 6). 15. Keep hands and rags away and don't reach over/near the revolving cutter. Items may get entangled with the spinning cutter. 16. Move the spindle handle down to bring the cutter head down (See Figure 7). 17. Start to mill the work piece. 18. Be careful of dust, debris or sparks that may be a result of milling. 19. Never adjust the workpiece when the machine is in operation. 20. If anything unexpected occurs, immediately disable the equipment by shutting it off.	 **Figure 5**  **Figure 6**  **Figure 7**	● Dust/Debris/Sparks ● Entanglement ● Hand injury **Precaution** ● The motor is thermally protected, if shut-down occurs, turn off the power until the thermal breaker resets, then restart

After Milling

Standard Operating Procedure

21. Turn off the machine when not in use.
22. Let the spindle stop on its own accord. Never try to stop the spindle with your hand.
23. Loosen the clamp/vise to remove the workpiece.
24. Do not touch the cutter immediately. After cooling period, remove the cutter from the chuck using a cloth or gloves to avoid being cut.
25. Use a brush to remove cuttings only after the cutters have stopped moving. Never by hand (See Figure 8).
26. Clean the machine. Never clean while it is in motion.
27. Sweep the floor surrounding the machine.

Figures

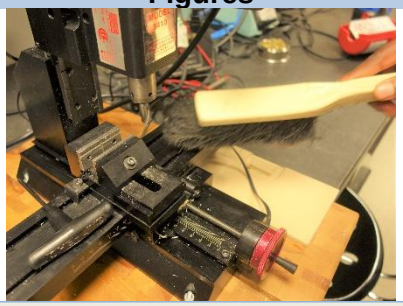


Figure 8

Hazard Awareness

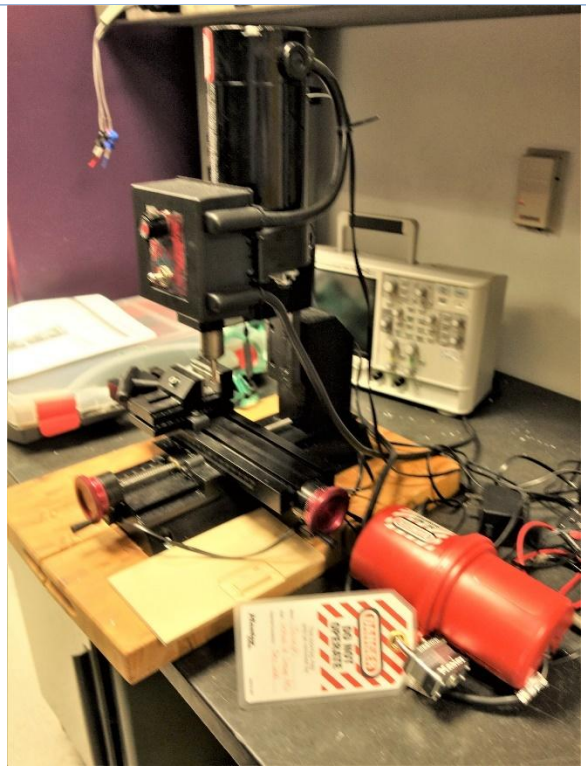
- Cuts
- Burns

Precaution

- Do not touch the cutter immediately as it may be hot

6.4 Maintenance and Repair

6.4.1 Lockout/Tagout (LOTO) Procedure

<table>
<tr><th colspan="3">Lockout/Tag-out Procedure</th></tr>
<tr><th>Equipment/Machine Name</th><th>Location</th><th>Total # of energy isolation devices/locks (EID)</th></tr>
<tr><td>Mini Milling Machine</td><td>ENG 417</td><td>1</td></tr>
<tr><td colspan="3">ONLY PROPERLY TRAINED AND AUTHORIZED PERSONNEL SHALL PERFORM LOCKOUT/TAG-OUT PROCEDURE BEFORE SERVICING THIS MACHINE.</td></tr>
<tr><td>Energy Source</td><td colspan="2">Electrical</td></tr>
<tr><td>Location</td><td colspan="2">Plug at the end of cord</td></tr>
<tr><td>Type of EID/lock to be used</td><td colspan="2">Plastic clamshell and padlock</td></tr>
<tr><td>Procedure for locking and tagging
1. Stop machine
2. Unplug cord
3. Install clamshell on plug
4. Lock and tag</td><td colspan="2" rowspan="3">  </td></tr>
<tr><td>Verification Procedure</td></tr>
<tr><td>1. To confirm lock-out, start machine
2. Visually confirm that machine will not start
3. If the system fails verification procedure or cannot be locked out, stop and contact your supervisor</td></tr>
<tr><td colspan="2">LOTO Procedure Number: A-xxxxxxx</td><td>Revision Number:</td></tr>
<tr><td colspan="2">Approved by:</td><td>Date:</td></tr>
</table>

6.4.2 Inspection Checklist

DAILY	✔
Ensure that the power cords are free of damage.	
Machine is secured and balanced	
Ensure the area around the cutter is free of slip/trip hazards.	
Ensure the debris/material from previous operations has been removed.	
Ensure that the chuck (worn teeth may restrict tightening and securing of the material) and cutters are free of defects.	
Ensure that the fingers [pieces] that come in contact with the cutter are free from defects and close evenly.	
Ensure that the table adjustment setting and pinion handle move freely without obstruction.	
Ensure that the clamp/vise is in good condition, suitable to secure the work piece and that bolts used to hold down work clear the tooling.	
Ensure that table stops are secured.	
Ensure that handles on all feed screws are in neutral.	
WEEKLY	✔
Clean the machine. Remove cutting tools from spindle when cleaning.	
Clean wet surfaces and oil them after working with coolant.	
Lubricate the machine if necessary.	
MONTHLY	✔
Ensure that the belts are not cracked or broken. If necessary replace.	
Ensure pulleys are running smoothly.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

6.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:

Any changes or updates made to this document must be recorded and maintained

7.0 Table Saw

Machine name	Table Saw
Manufacturer name	Rexon
Model number	RXW-10
Location of item	ENG 410 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

7.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

Always wear the required PPE when using this machine.

7.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located? The saw's attachment plug may be used to disable the machine in the event of an emergency.			
3	Are guards in place and in good working order?			
4	Is the saw secure and level?			
5	Is the area around the saw free of slip/trip hazards?			
6	Has the debris/material from previous operations been removed?			
7	Are tools/wrenches removed from the table?			
8	Is the blade height and angle set using the hand wheels?			
9	Does the fence move smoothly and is it free of defects?			
10	Does the fence move smoothly and is it free of defects?			
11	Is the fence locking handle operating correctly (clamping the fence to the guide rail).			
12	Are you using the miter gauge (fitted with an auxiliary wood facing) or the wooden guide if crosscutting?			
13	Is the work piece dry, with a flat surface facing down, or a suitable support is being used?			
14	Is the work piece free of nails, foreign objects and debris?			

15	If cutting long stock, does it not interfere with other people in the area?			
16	Is the dust collection system turned on?			
	Comments/Corrective Action:			

7.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

7.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

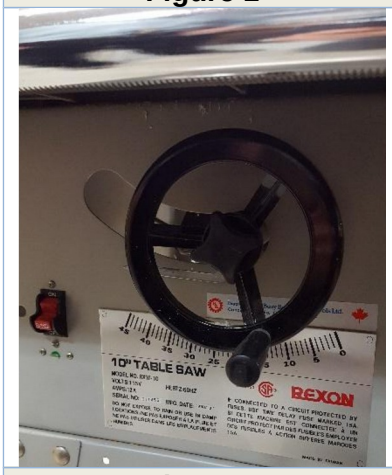
h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

7.3.2 Equipment Specific Standard Operating Procedure (SOP)

Before Sawing		
Standard Operating Procedure	**Figures**	**Hazard Awareness**
1. Put on your PPE. 2. Adjust and lock the fence to assist in parallel or repetitive cuts. Positioning the fence also reduces guesswork and helps measure the thickness of the cut (See Figure 1). 3. Ensure that the proper blade is installed for the specific operation. 4. Adjust the blade by raising, lowering, or changing the angle of the blade by using the blade raising hand wheels (See Figure 2 & 3). 5. The blade should be set only slightly higher (3mm at most) than the height of the work piece to prevent serious injury if your hand slips. 6. Use the ruler on the fence guide to indicate a witness line to view the distance between the fence and the blade 7. If the fence is not parallel to the miter gage slots, adjust it so that it is (see Figure 4). 8. When ripping or when the stock exceeds 3ft, place a work support at the saw rear (to prevent the work piece falling off the table and possibly causing injury). 9. Before turning on the power, ensure that the blade is free. (Never start the machine with stock touching the blade). 10. Turn on the power to the table	 **Figure 1**  **Figure 2**  **Figure 3**	● Laceration ● kickback **Precaution** ● Position your body so that it is NOT in line with the blade to prevent injury by flying sawdust, woodchips or the work piece. ● Avoid kickback by: - Keeping blade sharp - Keeping fence parallel to blade - Using guard for every possible operation - Pushing stock pass the saw blade before release

saw and allow it to reach full speed before feeding the work piece.

11. Ensure the guard is adequately placed over the blade (See Figure 5).
12. Extreme caution must be exercised to avoid cuts from the blade's sharp teeth (see Figure 6).

Figure 4

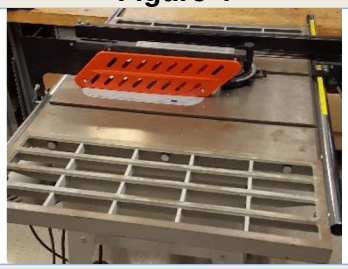


Figure 5

Figure 6

Sawing - Ripping (length-wise cuts through a board)

Standard Operating Procedure	Figures	Hazard Awareness
13. Place the work piece flat onto the table so that the stock is adequately supported. 14. Use a push stick/holding fixture for narrow ripping cuts and/ or pieces less than 4” wide, except when it interferes with the guard, to prevent contacting the blade (See Figure 7). 15. Push work along the fence, against the direction of rotation of the blade (See Figure 8). 16. Maintain firm control and forward movement until the cut is complete where the stock passes the saw blade. Do not reach over the blade to retain the cut-off stock. 17. If the material gets jammed, turn off the machine and notify the studio technician. Do not use again until the issue is resolved. 18. Turn off the power once the cut is complete. 19. Leave the cut-off stock on the table and do not retain it until the blade has come to a complete stop.	 **Figure 7**  **Figure 8**	● Laceration ● Kickback ● Burns **Precaution** ● it is unsafe to cut wood that is unsupported by the table and could result in the stock being thrown by the blade, resulting in injury

Sawing - Crosscutting

Standard Operating Procedure

13. If using the miter gauge, set it in a groove (See Figure 9).
14. Ensure the miter gauge is fitted with an auxiliary wood face for added safety. Change the angle of the miter gauge depending on the angle of the cut that is needed (see Figure 10).
15. Clamp the work piece to the guide/miter gauge where possible. Using the handle, advance both slowly towards the blade (See Figure 11).
16. Ensure the clearance between the blade guard and the workpiece is not more than 0.25 inches
17. Never hold the free piece being cut.
18. Be careful when bevel cutting (blade tilted). Use the groove that does not cause interference of your hand or miter gauge with the blade guards. Once the wood is cut, give it a little sideways shift to move it slightly away from the blade.
19. Never use the fence as a cut off gauge when crosscutting work pieces the same length. Instead, a block of wood can be clamped to the miter gauge and used as a stop block (See Figure 10).

Figures

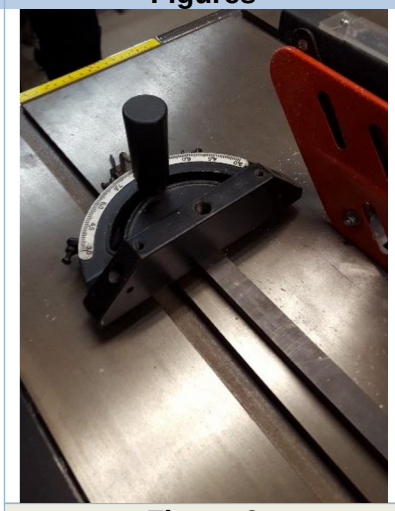


Figure 9

Figure 10

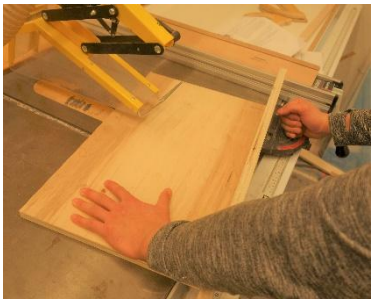


Figure 11

Hazard Awareness

- Laceration
- Kickback
- Burns

Precaution

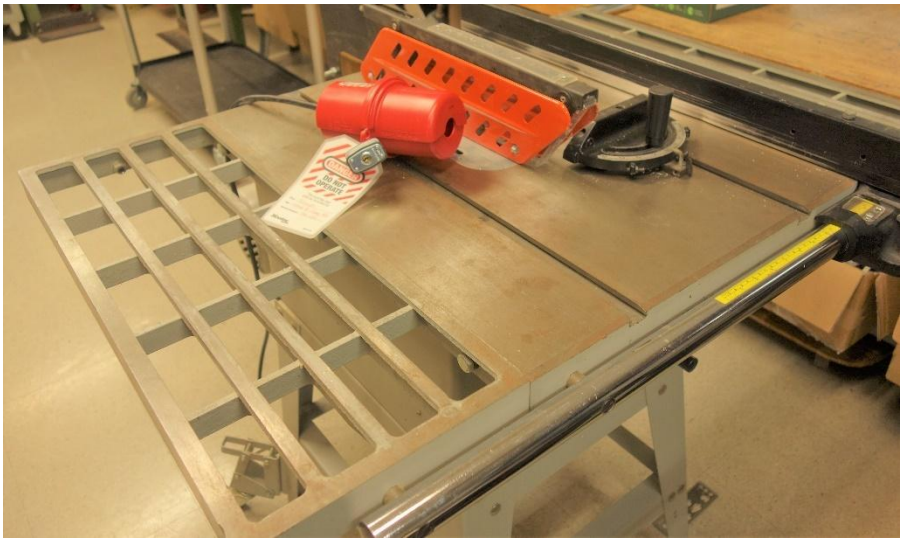
- Clamping the workpiece to the miter gauge eliminates the tendency for the work piece to creep away or toward the blade. This is safer as the hands are not required to come close to the blade.
- A stop block should always be positioned in front of the blade as this block allows the cut-off piece to move freely along the table without binding between the fence and the blade, therefore reducing the possibility of kickback and injury.
- Do not pick up any cut-off work while the saw is running

After Sawing

Standard Operating Procedure	Figures	Hazard Awareness
20. Turn off the table saw and disconnect the machinery from the power source when not in use. 21. Allow the saw to stop on its own accord after turning the power off. Never try to stop the saw with your hand. 22. Always lower the blade to the lowest position when finished (See Figure 12). 23. Remove the chips from the surrounding area with a brush, never by hand (See Figure 13). 24. Clean the table saw and area upon completion of the task. Do not clean the machine while it is in motion 25. Sweep the floor surrounding the table saw.	 **Figure 12**  **Figure 13**	• Burns • laceration **Precaution** • Do not touch the sawed wood immediately as it is hot

7.4 Maintenance and Repair

7.4.1 Lockout/Tagout (LOTO) Procedure

Lockout/Tag-out Procedure		
Equipment/Machine Name	***Location***	***Total # of energy isolation devices/locks (EID)***
Table Saw	ENG 419	1
ONLY PROPERLY TRAINED AND AUTHORIZED PERSONNEL SHALL PERFORM LOCKOUT/TAG-OUT PROCEDURE BEFORE SERVICING THIS MACHINE.		
Energy Source	Electrical	
Location	Plug at the end of cord	
Type of EID/lock to be used	Plastic clamshell and padlock	
Procedure for locking and tagging		
1. Stop machine 2. Unplug cord 3. Install clamshell on plug 4. Lock and tag		
Verification Procedure		
4. To confirm lock-out, start machine 5. Visually confirm that machine will not start 6. If the system fails verification procedure or cannot be locked out, stop and contact your supervisor		
LOTO Procedure Number: A-xxxxxxx	**Revision Number:**	
Approved by:	**Date:**	

7.4.2 Inspection Checklist

DAILY	✔
Ensure that guards are in place and in good working order.	
Ensure that the saw is secure.	
Ensure that the area around the saw is free of slip/trip hazards.	
Ensure that flammable/combustible materials are removed from the immediate work area.	
Ensure that debris/material from previous operations has been removed.	
Ensure that the tabletop is smooth and polished.	
Ensure that the blade and teeth are sharp, properly set and free of defects and debris so that they will cut freely without having to force the work piece.	
Ensure that the blade height and angle hand wheels are moving smoothly and free of damage.	
Ensure that the fence is moving smoothly and free of damage.	
Ensure that the fence locking handle is operating correctly (clamping the fence to the guide rail).	
Ensure that the fence is positioned parallel to the blade and miter gauge slots, 90 degrees to the table (and level with the table) and is secure.	
Ensure that the dust collection system is operating sufficiently.	
Ensure the spreader and anti-kickback mechanism are functional at all times.	
WEEKLY	✔
Ensure that the table insert is level with the table.	
Ensure that the blade is square and that all blade adjustment knobs are tightened and locked.	
Lubricate and clean the moving surfaces with a Teflon based lubricant.	
MONTHLY	✔
Protect the table and fence with a wax coat.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

7.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
Approval by:	Date:
Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:
Any changes or updates made to this document must be recorded and maintained	

8.0 Vertical Belt Sander

Machine name	Vertical Belt Sander
Manufacturer name	Hammond
Model number	400-W
Location of item	ENG 419 245 Church Street, Toronto, ON. M5B 1E9

DO NOT USE THIS MACHINE UNLESS YOU ARE TRAINED IN ITS SAFE USE!

8.1 Personal Protective Equipment (PPE) Requirements

REQUIRED PERSONAL PROTECTIVE EQUIPMENT


RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

Always wear the required PPE when using this machine.

8.2 Pre-use Inspection Checklist

	Check	Y	N	N/A
1	Are the power cords free of frays and damage?			
2	Do you know where the emergency stop feature is located (button/switch/cord)? If the sander has an attachment plug and receptacle (plug/socket combination) for cord connection, it may be used to disable the machine in the event of an emergency.			
3	Are guards in place and in good working order?			
4	Is the sander secure and level?			
5	Is the area around the sander free of slip/trip hazards?			
6	Are flammable/combustible materials removed from the immediate work area?			
7	Has the debris/material from previous operations been removed?			
8	Are all tools/wrenches removed from the table?			
9	Are the sanding surfaces free of defects? Examine the face of the belt and disc; ensure surfaces are not showing backing, nicks or cuts on the surface or edge, or damage due to ceasing or poor handling.			
10	Are all lock knobs and handles tight so they do not loosen during operation (caused by vibrations)?			
11	Is the dust collection system is on?			
12	If sanding small flat surfaces or convex edges, are you using the disc sander?			
	Comments/Corrective Action:			

8.3 Standard Operating Procedure (SOP)

This procedure is outlined as follows:

- General Safety Guidelines
- Equipment Specific Standard Operating Procedure

8.3.1 General Safety Guidelines

Before using the machine, perform the following general safety checks:

a) Seek permission from the technician or supervisor to operate the machine or equipment.

b) Make sure you understand all of the instructional material and/or faculty and technician instruction before operating this equipment. Failure to follow safety instruction and warnings may result in serious personal injury, fire or property damage. If you have any questions or uncertainties, please ask your technician before use.

c) Ensure that the appropriate PPE is used, while operating the machine or equipment.

d) Long hair, scarves, loose clothing, jewelry and ties pose an entanglement hazard. Please make sure these are all constrained prior to operating the equipment.

e) Keep electrical power cords away from heat, water, oil, sharp edges, or moving parts to prevent electrical shock or a trip hazard.

f) Report any defective machinery, equipment or unsafe condition to your technician or supervisor.

g) Ensure the machine or equipment is properly maintained and in good operational condition. Maintenance and repairs on the machine or equipment is conducted by your technician or supervisor.

h) Do not remove or make ineffective any machine guards.

i) Ensure you know where the emergency stops for your equipment are prior to use and within reach during operation. In the absence of an emergency stop, ensure that the power switch is within reach.

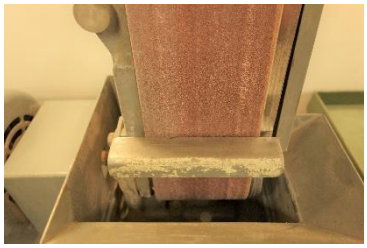
j) Ensure you are not working with the machine or equipment while tired or under the influence of drugs, alcohol, or medication.

k) Always maintain good housekeeping practices.

8.3.2 Equipment Specific Standard Operating Procedure (SOP)

<table>
<tr><th colspan="3">Before Sanding</th></tr>
<tr><th>Standard Operating Procedure</th><th>Figures</th><th>Hazard Awareness</th></tr>
<tr><td rowspan="2">1. Always wear PPE.
2. Clear the table and work area before operating the machine.
3. Adjust the belt for proper tension (See Figure 1).
4. Keep a distance 1/16 between the disc and the edge of the table to prevent a pinch point hazard.</td><td> 
Figure 1</td><td>● Entanglement
● Pinch point hazard</td></tr>
<tr><td colspan="2">Precaution
● Do not wear gloves and roll up long sleeves as it can pose an entanglement hazard by sander belt
● Avoid making any adjustments while the machine is operating</td></tr>
</table>

Sanding

Standard Operating Procedure	Figures	Hazard Awareness
5. Turn on the power switch and allow the machine to reach full speed before sanding (See Figure 2). 6. Use both hands to hold the work piece securely onto the belt. Pinch point and entanglement hazard can result by working too closely to the belt. 7. Work with a backstop to support the work piece (See Figure 3). 8. Achieve external curves using the flat surface of the belt. 9. Place the belt in vertical position for end sanding. The work piece should be along the belt. 10. Be careful when sanding thin pieces with the backstop installed. 11. Allow the material to cool down.	 **Figure 2**  **Figure 3**	● Entanglement ● Pinch point ● Kickback **Precaution** ● Keep hands and fingers away from the sanding belt to prevent pinch point and entanglement hazards to the operator ● Materials are hot after sanding; it is important to have materials cooled regularly

After Sanding

Standard Operating Procedure	Hazard Awareness
12. Turn off the belt sander after operation 13. Ensure the sanding belt comes to a stop before cleaning 14. Clean the surface of the belt and the surrounding area of wood dust. . 15. Return PPE, apparatus, equipment to the original location or storage area. 16. Housekeeping should occur after each job 17. Turn off the main power and lock out the panel.	• Entanglement • Pinch point **Precaution** • Do not leave the machine running unattended

8.4 Maintenance and Repair

8.4.1 Lockout/Tagout (LOTO) Procedure

Lockout/Tag-out Procedure		
Equipment/Machine Name	***Location***	***Total # of energy isolation devices/locks (EID)***
Vertical Belt Sander	ENG 419	1
ONLY PROPERLY TRAINED AND AUTHORIZED PERSONNEL SHALL PERFORM LOCKOUT/TAG-OUT PROCEDURE BEFORE SERVICING THIS MACHINE.		
Energy Source	Electrical	
Location	Plug at the end of cord	
Type of EID/lock to be used	Plastic clamshell and padlock	
Procedure for locking and tagging 1. Stop machine 2. Unplug cord 3. Install clamshell on plug 4. Lock and tag		
Verification Procedure 1. To confirm lock-out, start machine 2. Visually confirm that machine will not start 3. If the system fails verification procedure or cannot be locked out, stop and contact your supervisor		
LOTO Procedure Number: A-xxxxxxx	**Revision Number:**	
Approved by:	**Date:**	

8.4.2 Inspection Checklist

DAILY	✔
Ensure that power cords are free of frays and damage.	
Ensure that guards are in place and in good working order.	
Ensure that the sander is secure and level.	
Ensure that the area around the sander free of slip/trip hazards.	
Ensure that debris/material from previous operations has been removed.	
Ensure that tools/wrenches are removed from the table.	
Ensure that the sanding surfaces are free of defects; not showing backing, curling, buckling, nicks or cuts, or damage due to ceasing or poor handling-replace if necessary-when installing a new disc, be certain it is centered on the drive wheel and position the disc drive so that it is no more than 1/16” away from the table. When installing a new belt, check the tracking.	
Ensure that the belt moves downwards and the disc is rotating clockwise.	
Ensure that lock knobs and handles are tight.	
WEEKLY	✔
Lightly apply paste wax on the surfaces.	
Use regular soap, a mild solvent or kerosene to clean surfaces.	
Use a vacuum to clean the motor.	
Clean the drums to prevent tracking problems and slippage of the belt.	
Clean the dust chute and tracking system to avoid major accumulation of dust.	
Clean the dust collection bag.	
Clean the drive disc surface using naphtha or a similar non-flammable solvent that will dry film-free.	
Blow out all air passages with dry compressed air –use all required PPE.	
To clean cast iron tables of rust, apply WD-40 and polish the table surface with a medium Scotch-Brite Blending Hand Pad, degrease and apply wax.	
Check drums for scrolling, signs of wear, or looseness. Observe the tracking by turning the belt by hand-ensure it runs centered on the belt wheels. Tighten or replace parts as required.	
Lightly apply paste wax on the surfaces.	
MONTHLY	✔
Check the gap between the edge of the table and the face of the disc-it should be positioned at a maximum of 1/16 inch. Adjust if necessary to prevent pinch points.	
Check all bearings for excessive heat or loose shafts-replace if necessary.	
ANNUALLY	✔
Inspect entire machine and perform maintenance as required.	

8.5 Document Control

Initially Created by: Integrated Risk Management	Date: December 2016
Consultation: ▪ Department Safety Officers ▪ Technicians ▪ Program Chairs and faculty	Date: November 2016
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Review and Revisions Made by:	Date Revised:
Changes Made *(indicate sections):*	
Revisions Approved by:	Date of Approval:
Any changes or updates made to this document must be recorded and maintained	