



College of Architecture Engineering and Design

Engineering Workshop Health & Safety Guidelines Catalog



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Introduction

The aim of model making workshop is to provide a proper safe area provided with suitable equipment and machines to allow student construct building models. Building model is built to study aspects of an architectural design or to communicate design ideas. To keep the workshop in operation safe work practice (SWP) should be implemented to prevent any accident. Safe work practice can be implemented under the following points:

Dressing in the workshop

Dressing code should be followed up before entering to the working area. The basic clothes that a person who will work in the workshop should wear are slim fit shirt or t-shirt, pants and shoe to allow them to move easily around the workshop. Long sleeve should be folded above elbow and long hair should be tied back. After entering the working area personal protective equipment should be used. Safety shoes and lab coat must be worn all the times while working in the workshop. Each machine and power tools have its own safety precautions where personal protective equipment's are required.

Environment of the workshop

The environment of the workshop should be provided with important equipments to keep the working place safe for working practice.

Ventilation

Ventilation is a control of the indoor air quality. In closed industrial work places there are chemical fumes or dust produced from several processes. These fumes or dust are spread out in the air of the working place which are harmful to human health. Ventilation is used to take out the air that contain harmful substances in to the environment and insert another clean air into the working place. Ventilation process can be carried out by opening windows or exhaust fan or simply by opening the entrance door to allow the air with harmful contaminant escape from the working area.

Fire fighting

Firefighting equipment is provided to protect human life. Firefighting system consists of fire storage tank, fire pumping system and distribution system. The storage tank of water kept either on top of the building or underground. The size of storage tank is depending on the hazard levels which depend on the work being carried out in the building. The hazard level of building is depending on its code system. The hazard levels are; Light hazard (for example: schools' residential buildings and offices), Ordinary hazard (for example: factories and warehouses), High Hazard (for example: stores which used for flammable materials like foam factories, aircraft hangars, paint factories, fireworks factories). The firefighting system should work continuously at least one hour or more depend on hazard level so also the size of the water tank is depending on that.

The fire pumping system consists of pumps which are located near the water tank. The location of the pump is just below the water tank to allow the water flow into the pump by gravity. Firefighting system is very important, so two additional pumps are added in case one pump is stopped. The backup pump is powered electrically, and the second backup pump is powered by diesel engine in case the electrical power shut off, so all these pumps are identical in capacity.

The distribution system consists of steel or galvanized steel pipes that are painted red. These pipes are joined either by welding or special clamps. The underground pipes are wrapped with a special coating that prevents corrosion and protects the pipe. The piping system consists of fire sparkler detect the fire heat and discharge water when the temperature has been exceeded.

Emergency escaping

Emergency exit is a special exit used in emergency cases such as fire. Emergency exit provides additional escaping access to the regular exit for faster evacuation also it used when the route to the regular exit is blocked by fire. It is usually outward opening door with a crash bar on it and with exit signs leading to it. However main door way can be used as fire exit in emergency cases. A fire escape is a special kind of emergency exit, mounted to the outside of a building.

Terminology

Hazard: can be defined in many ways but in terms of work place health and safety, Hazard means the potential source of harm or damage effects on persons causes delay to workflow. In machines hazard occur either in point of operation where the material is cut or shaped, power transmission such as pulley and belt or gears also electrical cables where used to transmit power and other moving parts.

Risk: is the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment loss.

Safety precautions: is the steps should be followed before working to avoid injury

Safety Signs

The easiest way to communicate with someone who does not know your language is to draw a simple picture that indicates your massage. Worldwide regulation for health and safety provide safety signs for all human which are in workplace to indicate them about the significant risk of the workplace. The safety signs are classified based on their color. The classifications of safety signs are indicated in the following table:

Color	Meaning or Purpose	Instruction & Information	Intrinsic Features	Example
RED	Prohibition / Danger alarm	Dangerous behavior; stop; shutdown; emergency cut-out devices; evacuate	Round shape; black pictogram on white background; red edging and diagonal line; red part to be at least 35% of the area of the sign.	
YELLOW or AMBER	Warning	Be careful; take precautions; examine	Triangular shape; black pictogram on yellow background with black edging; yellow part to be at least 50% of the area of the sign.	
BLUE	Mandatory	Specific behavior or action e.g. wear personal protective equipment	Round shape; white pictogram on blue background; blue part to be at least 50% of the area of the sign.	Ve 3
GREEN	Emergency escape; first aid. No danger	Doors; exits; escape routes equipment and facilities Return to normal	Rectangular or square shape; white pictogram on green background; green part to be at least 50% of the area of the sign.	Exit
RED (fire-fighting signs)	Firefighting equipment	Identification & location	Rectangular or square shape; white pictogram on red background; red part to be at least 50% of the area of the sign.	FIRE EXTINGUISHER

Safety sign meaning is in the following table:

Logo	Meaning	Logo	Meaning
Eye protection must be worn	Eye protection must be worn.	Wear gloves	Wear safety gloves if needed.
Lab coats must be worn in this area	Lab coats must be worn in this area.	No Jewellery	Do not wear jewelry.
Protective footwear must be worn	Protective footwear must be worn.	NO LOOSE CLOTHING	Do not wear loose clothing.
Wear ear protectors	Wear ear protection.	Do not use mobile phones	Do not use Mobile phone while working on machine.
Wear dust mask	Wear dust mask.	No eating	Eating in the work shop is not allowed.

No drinking	Drinking in the work shop is not allowed.	Exit	Emergency exit.
No smoking	Smoking in the work shop is not allowed.		
	Do not wear high heel shoes.	Warning	Warning use only with adequate ventilation.
	Do not wear open tow shoe or sandal.	Use only with adequate ventilation	

Risk Assessment

Machine Name	Band saw								
	ı		Hazar	d	Risks				
Crack machine	cut	ting bl	ade		Sudden broken machine cutting blade				
Unguarded blad	de				Phy	sical h	nand injury		
Unguarded driv	e n	nechar	nisms		Entangled operator clothes or small chopped pieces				
Loosely fit cloth	ning	, wear	ing jewelry and	uncovered long hair	Trapped in teeth of saw				
Accumulation of	of c	ut mat	erials on around	d the machine	limiting workspace and fall down people around				
Repetitive work								pational overuse syndrome (OOS)	
Electrical wire k	_						shock		
People		•		rained and qualified persons can use					
	_			can be issued to Students that are o	comp	etent	as recognition of	their ability.	
Process	Wood, cardboard and foam cutting in various shapes.								
Profiling				Likelihood				Severity	
Risks	L	evel	Descriptor	Meaning	Level		Descriptor	Meaning	
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury	

~	2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
	4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect
	5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect

Executive matrix

Based on work experience of using "Band saw" the likelihood of happening one of the hazards is "Unlikely" on the other hand the severity if one of the hazard happens is "Major" so the risk rating for the band saw is calculated by multiplying the value of likelihood and severity which it is in this case is 2 x 4 = 8 the risk rating is in the "Medium" range.

_	5 Almost	Low	Medium	Medium	High	High
000	4 likely	Low	Medium Medium		High	High
Likelihood	3 Possible	Low	Medium	Medium	Medium	Medium
Like	2 Unlikely	Low	Low	Medium	8	Medium
	1 Rare	Low	Low	Low	Low	Low
		1 Significant	2 Minor	3 Moderate	<mark>4 Major</mark>	5 Catastrophic
				Severity	_	

Safety Precautions

Safety shoes and lab coat must be worn

Safety goggle or face shield must be worn

Dust mask and ear muff must be worn

Never wear gloves during operation machine

Make sure band wheels covers are properly enclosed

Adjust blade guard height to about 3 mm above the top of the material being cut

Before you start the machine make sure the nothing is in touch with the cutting blade

Ensure the blade is tracking correctly and runs freely in and against the upper and lower guide rollers also it is under proper tension

Use a push stick to push workpiece or remove cut pieces from between the fence and saw blade when distance between the rip fence and cutting blade is less than 150mm

	Never touc	h blade while machine is working							
	During cutting keep hands out of the line of the saw blade								
	Move the workpiece slowly towards the cutting blade								
	Make relea	se (relief) cuts before tight curves when doing intricate scroll-type work							
	Keep the fl	oor around a band saw clean and free of obstructions or clutter							
	Keep the m	achine properly oiled and serviced							
	All nails or	metallic parts incrusted in the wood to be cut must be previously removed							
limit	Max	W: 30 cm							
		T: 17 cm							
		L: infinite							
	Min	W: 1 mm							
		T: 1 mm							
		L: infinite							

Machine Name	Wood lathe machine						
	Hazard	Risks					
Contact with r	evolving chucks and collets	Physical hand injury					
Work pieces and lathe	nd cutting tools broken can be violently ejected from the	High physical injury					
Hot cutting too	ol after using	Hand burn					
Loosely fit clot	hing, wearing jewellery and uncovered long hair	Wrapped around the chuck and working piece					
Swarf allowed	to build up on rotating chucks	Machine jam					
Repetitive wor	·k	Operator effected by occupational overuse syndrome (OOS)					
Electrical wire	kept within working place	Electrical shock					

People		-			ualified person ed to Students						t Students in the saf neir ability.	e use of the
Process	Wo	od tu	rning								·	
Profiling				Likelihood							Severity	
Risks	Le	vel	Descriptor		Meaning		Le	vel	De	escriptor	Mea	ning
		1	Rare	Could occ	cur in exception	nal		1	Sig	gnificant	No injury	
		2	Unlikely	Could occ	cur at some tim	е		2		Minor	First aid treatment containment, onsit	•
		3	Possible	Might occ	cur in some tim	e		3	M	oderate	Medical treatment containment with assistance	•
	•	4	likely	Probably circumsta	occur in most inces		~	4		Major	Extensive injuries, with no permanen	
		5	Almost	Expected circumsta	ted to occur in most nstances			5	Cata	Death, off-site release with permanent effect		ase with no
matrix	Based on work experience of using "Wood lath machine other hand the severity if one of the hazard happens is multiplying the value of likelihood and severity which it						or" s	so the	risk ra	ting for the	Wood lath machine	is calculated b
				5 Almost	Low	Medium		Mediu	m	High	High	
			000	<mark>4 likely</mark>	Low	Medium		Mediu	m	16	High	
			Likelihood	3 Possible	Low	Medium		Mediu	m	Medium	Medium Medium	
			를 기	2 Unlikely	Low	Low		Mediu	m	Medium	Medium	
				1 Rare	Low	Low		Low		Low	Low	
					1 Significant	2 Minor	3	Moder Sev	rate rerity	<mark>4 Major</mark>	5 Catastrophic	_
									J,			J

Safety	Safety sho	es and lab coat must be worn							
Precautions	Safety gog	gle or face shield must be worn							
	Eear muff	Eear muff must be worn							
	Dust mask must be worn when dust is generated								
	Never wea	or gloves during operation machine							
	Before the	lathe is turned on, ensure that all clamps and fittings are secure and that the work piece is free to turn							
	Use workp	siece free of defects							
	Hold tools	firmly with both hands and against the tool rest							
	Hold the st	tock securely on the faceplate or between the centres							
	Use sharp,	well-maintained chisels and gouges							
	Select a sp	eed that is appropriate for the job. Operate the lathe at a low speed and use a moderate cut depth to prevent							
	splinters fr	om flying out during roughing operations. The actual speed of the lathe depends on type of wood, a diameter of							
	The state of the s	ure of work being done and type of tool used.							
		I rests so that they are parallel and as close as possible to the stock. They should also be set high enough so that							
		tut into the wood slightly above the centre of the work being turned							
		ne tool rest when sanding or polishing							
		priate tools to hold the sand paper or emery paper whenever possible. If you must use your hands always hold the							
		way that will not allow the paper to catch, pull or entangle around the stock.							
		faceplate turning, the one hand steadies the tip of the chisel, which holds the edge against the tool rest while the							
		d guides the tool. Keep the tip of the chisel held higher than the handle.							
		workpiece containing checks, splits, cracks, or knots							
		metallic parts incrusted in the wood to be cut must be previously removed							
Limit	Max	Cutting speed 450 RPM							
		workpiece length 70 cm							
		work piece Diameter 28 cm							
	Min	Cutting speed 2100 RPM							
		Workpiece length 10 cm							
		Workpiece diameter 3.5 cm							
		TOTAL PROCESSION OF THE PROCES							

Machine Name				Press Drill							
	L.		Hazar	d			A .	Risks			
Contact with	revolv	ing cl	huck and drill bi	t	Phy	sical h	nand injury				
Work pieces	and dr	rill bit	broken can be	violently ejected from the lathe	High physical injury						
Loosely fit clo	othing	, wear	ring jewellery a	nd uncovered long hair	Wr	apped	around rotating	parts			
Repetitive wo	ork				Ope	erator	effected by occu	pational overuse syndrome (OOS)			
Electrical wire	e kept	withi	in working place		Ele	ctrical	shock				
People	ma	chine	, .	ained and qualified persons can use can be issued to Students that are							
Process	Dri	lling									
Profiling				Likelihood	Severity						
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning			
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury			
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release			
	~	3	Possible	Might occur in some time	~	3	Moderate	Medical treatment, Immediate containment with external assistance			
		4	likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect			
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect			

Executive Based on work experience of using "Press Drill" the likelihood of happening one of the hazards is "Possible" on the other matrix hand the severity if one of the hazard happens is "Moderate" so the risk rating for the Press Drill is calculated by multiplying the value of likelihood and severity which it is in this case is $3 \times 3 = 9$ the risk rating is in the "Medium" range. 5 Almost Medium Medium High Low High 4 likely High Low Medium Medium High 3 Possible Low 9 Medium Medium Medium 2 Unlikely Medium Medium Medium Low Low 1 Rare Low Low Low Low Low 3 Moderate 1 Significant 2 Minor 4 Major 5 Catastrophic Severity Safety shoes and lab coat must be worn Safety Safety goggle or face shield must be worn **Precautions** Dust mask and ear muff must be worn Never wear gloves during operation machine Use a vacuum, brush or rake to remove swarf Remove burrs and chips from a drilled hole. When making deep holes, clean out the hole frequently Use a clamp or drill vise to prevent work from spinning Make sure the drill bit or cutting tool is locked securely in the chuck. Remove the chuck key before starting the drill press Lubricate drill bit when drilling metal Reduce the drilling pressure when the drill begins to break through the workpiece. This action prevents drill from pulling into the work and breaking Keep floor around the drill press free of oil and grease Keep the working surface clean of scraps, tools and materials Do not force the drill with extra pressure Do not place hands under the stock being drilled Do not leave the drill press running unattended Drill bit diameter 16 mm Limit Max Min Drill bit diameter 1 mm

Machine Name				Scroll Saw				Makita			
	I		Hazar	rd				Risks			
High speed re holder	cipro	cating	g movements of	machine upper cutting blade	Physical hand injury						
Loosely fit clo	thing,	, wea	ring jewellery a	nd uncovered long hair	Entanglement with upper cutting blade holder						
Repetitive wo	rk				Operator effected by occupational overuse syndrome (OOS)						
Electrical wire	kept	with	in working place	e	Ele	ctrical	shock				
People		-		ained and qualified persons can us can be issued to Students that are							
Process	Wo	od, c	ardboard and f	oam cutting in various shapes.							
Profiling				Likelihood	Severity						
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning			
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury			
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release			
	~	3	Possible	Might occur in some time	>	3	Moderate	Medical treatment, Immediate containment with external assistance			
		4	Likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect			
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect			

Executive												
matrix		•	_					ards is "Possible" Il saw is calculated				
	hand the severity if one of the hazard happens is "Moderate" so the risk rating for the scroll saw is calculated by multiple the value of likelihood and severity which it is in this case is $3 \times 3 = 9$ the risk rating is in the "Medium" range.											
			•									
		70	5 Almost	Low	Medium	Medium	High	High				
		000	4 likely	Low	Medium	Medium	High	High				
		Likelihood	3 Possible	Low	Medium	9	Medium	Medium				
		K	2 Unlikely	Low	Low	Medium	Medium	Medium				
			1 Rare	Low	Low	Low	Low	Low				
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic				
						Severity						
Safety	Safety shoes and lab coat must be worn											
Precautions	Safety goggle or face shield must be worn											
	Dust mask and ear muff must be worn											
		_	ring operatio									
		-	•	loor must not be			romoved					
	All nails or metallic parts incrusted in the wood to be cut must be previously removed Adjust hold down screw to be in contact with the top surface of the workpiece											
	Never touch blade and upper head while machine is working											
	Do not force the workpiece hardly towards the cutting blade											
				ne line of the sa	_							
	_			out obsetrvatio								
			g area is well									
Limit	Max	Work pie	ece length 40	cm								
		Work pie	ece thickness	2.5 cm								
	Infinite width											
	Min Work piece length 0.5 cm											
		•	ece thickness	0.2 cm								
		Infinite v	vidth									

Machine
Name

Air Compressor + painting spray gun



		Hazar	d				Risks				
Exposure to s	solvent vap		<u>-</u>	Cau	ises he	ealth various issu	es e.g. the central nervous system,				
				irrit	irritation of eye, skin and respiratory system						
Exposure to I	iquid paint	that contains e _l	poxy and isocyanate	Cau	Cause asthma by breathing in paint mist. They can also cause						
				der	dermatitis by skin contact						
Loosely fit clo	othing, wea	aring jewellery a	nd uncovered long hair	Pai	nt may	drop on clothes	while mixing the paint or panting				
Week fittings	of high pr	essurized air hos	ses causes sudden hose opening	Hig	h phys	sical injuries					
Repetitive wo	ork			Ope	erator	effected by occu	pational overuse syndrome (OOS)				
Electrical wir	e kept with	nin working place		Ele	ctrical	shock					
People	Only ful	ly recognized tra	ined and qualified persons can use	the m	achine	es and will instruc	ct Students in the safe use of the				
_	machine	es. Certification of	can be issued to Students that are	compe	tent a	s recognition of t	heir ability.				
Process	Painting										
Profiling			Likelihood	Severity							
Risks	Level	Descriptor	Meaning	Le	evel	Descriptor	Meaning				
	1	Rare	Could occur in exceptional circumstances		1	Significant	No injury				
	2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release				
	3	Possible	Might occur in some time	•	3	Moderate	Medical treatment, Immediate containment with external assistance				

				Probably	occur in most					Extensive injuries,	off-site release	
	~	4	Likely	circumst			4		Major	with no permanen		
		5	Almost	Expected circumst	d to occur in mo ances	st	5	Ca	tastrophic	Death, off-site release with n permanent effect		
Executive matrix	"lik pai	c ely" conting	on the other	hand the seve calculated by	erity if one of th	e hazard ha	appens is "	'Mod	erate" so the	of happening one or risk rating for the A t is in this case is 4 >	Air compressor +	
				5 Almost	Low	Medium	Mediu	m	High	High		
			ikelihood	4 likely	Low	Medium	12		High	High		
			elih	3 Possible	Low	Medium	Mediu	m	Medium	Medium		
			=	2 Unlikely	Low	Low	Mediu	dium Medium		Medium		
				1 Rare	Low	Low	Low		Low	Low		
					1 Significant	2 Minor	<mark>3 Mode</mark>	<mark>rate</mark>	4 Moderate	5 Catastrophic		
							Sev	erity				
Safety	Saf	etv sh	nes and lah	coat must be	worn							
Precaution		-		shield must b								
S				uff must be w								
3	Nev	ver we	ear gloves du	uring operatio	n machine							
			-		well vintlated							
					care to preven	t spill						
					paint container							
Capacity	_		0.25 M ³ /mii									
. ,	_	-	65 X 2									
	Pov	wer 3	HP 2.2 kw									
	Pre	Pressure 0.8 MPa 115 Psi										

Machine Name		Hot wire foam cutter											
			Hazar	d				Risks					
Fumes can be	inha	led			Cau	ises pr	roblems in respira	tory system					
Contact with t	he h	ot wir	e		Cau	ises sk	kin burn						
				nd uncovered long hair	Bur	n if in	contact with hot	wire					
		ized a	ir hoses fittings	causes sudden hose opening	High physical injuries								
Repetitive wor					_			pational overuse syndrome (OOS)					
			n working place				shock						
People		•	, ,	ained and qualified persons can use can be issued to Students that are co									
Process	1	am cu		can be issued to students that are d	competent as recognition of their ability.								
Profiling				Likelihood	Severity								
Risks		I		Likelillood	Severity								
Misks	Le	vel	Descriptor	Meaning	Le	vel	Descriptor	Meaning					
	~	1	Rare	Could occur in exceptional circumstances		1	Significant	No injury					
		2	Unlikely	Could occur at some time	•	2	Minor	First aid treatment, Immediate containment, onsite release					
	3 Possible		Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance					
		4	likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect					
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect					

Executive										
matrix	other hand t	the severi	ty if one of th	e hazard happe	ens is "Min o	or" so the risk r	ating for the Ho	of the hazards is ot wire foam cutte ing is in the "Low "	r is calculated b	
	70	5 Almost	Low	Medium	Medium	High	High			
		Likelihood	4 likely	Low			High			
			3 Possible	Low	Medium	Medium	Medium	Medium		
		Like	2 Unlikely	Low	Low	Medium	Medium	Medium		
			1 Rare	Low	2	Low	Low	Low		
				1 Significant	<mark>2 Minor</mark>	3 Moderate	4 Moderate	5 Catastrophic		
						Severity				
Safety	Safety shoes	and lab	coat must be	worn						
Precautions	Dust mask m	nust be w	orn							
	Never wear	gloves du	ring operation	n this machine						
	Only be used	d to cut ex	kpanded poly:	styrene materia	al					
	Make sure t	he workin	g area is well	ventilated						
Limit	Max	Workpie	ce length 50	cm						
		Workpie	ce thickness	4 cm						
		Infinite v	width							
	Min Workpiece length less than 50 cm									
	Workpiece thickness 0.5 cm									
	Infinite width									

Machine Name			Sander	AEG	0		AEG	Tokita.			
			Hazar	d				Risks			
Dust may occu	ır				Cau	ises pr	roblems in respira	tory system			
Vibration							irect injury to the , and grip.	fingers and hand, affecting feeling,			
Loosely fit clot	thing	, wea	ring jewellery a	nd uncovered long hair	Effect hand movement						
Long term wo	rk				Ope	erator	effected by occup	pational overuse syndrome (OOS)			
Electrical wire			n working place				shock				
People				ained and qualified persons can use can be issued to Students that are c							
Process	Sar	nding									
Profiling				Likelihood	Severity						
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning			
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury			
		2	Unlikely	Could occur at some time	•	2	Minor	First aid treatment, Immediate containment, onsite release			
	~	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance			
		4	Likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect			
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect			

Executive matrix	Based on work exper the severity if one of likelihood and severi	the hazard ha	ppens is "Mino	r" so the ri	sk rating for the	Sander is calc	ulated by multiply			
		5 Almost	Low	Medium	Medium	High	High			
	poc	4 likely	Low	Medium	Medium	High	High			
	Likelihood	3 Possible	Low	6	Medium	Medium	Medium			
	Like	2 Unlikely	Low	Low	Medium	Medium	Medium			
		1 Rare	Low	Low	Low	Low	Low			
			1 Significant	5 Catastrophic						
					Severity					
Safety	Safety shoes and lab									
Precautions	Safety goggle or face	shield must b	e worn							
	Dust mask and ear m	uff must be w	orn							
	Hold the tool firmly									
	Do not leave the too	l running								
	Operate the tool only when hand held									
	Make sure the working area is well ventilated									
Capacity	Grinding plate diame									

Machine Name				Angle Grinder				JEO JEO		
			Hazar	d				Risks		
Inappropriate grinder	e disc us	sed f	or the task or fi	xing a disk that not for angle	Disk may grab or jam into the work piece this causes kickback where the angle grinder suddenly thrusts back towards the operator					
Fix a worn or	damag	ed di	isk		Atta	achme	ent can break, bec	oming a projectile and striking worker		
			or incorrectly	positioned	Spa	rks fly	towards the oper	rator causing burns		
The flange an	d cente	er ho	le are different	sizes	Disk can detach from the angle grinder's body					
High pressure	e applie	d du	ring working		Broken disk causes becoming a projectile and striking workers of kickback					
Loosely fit clo	othing, v	wear	ing jewellery ar	nd uncovered long hair	Entanglement with rotating parts					
Week high pr	essuriz	ed ai	r hoses fittings	causes sudden hose opening	Hig	h phys	sical injuries			
Repetitive wo	ork				Оре	erator	effected by occup	pational overuse syndrome (OOS)		
Electrical wire	e kept v	vithii	n working place		Elec	ctrical	shock			
People	Only fully recognized trained and qualified persons can use the machines and will instruct Students in the safe use of the machines. Certification can be issued to Students that are competent as recognition of their ability.									
Process	Cutt	ing o	or grinding							
Profiling				Likelihood				Severity		
Risks	Lev	el	Descriptor	Meaning	Le	vel	Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury		

2

Minor

Could occur at some time

Unlikely

2

First aid treatment, Immediate

containment, onsite release

		3	Possible	Might occ	cur in some tim	e		3	М	oderate	Medical treatment containment with assistance	•
	~	4	likely	Probably circumsta	occur in most inces		~	4		Major	Extensive injuries, with no permanen	t effect
		5	Almost	Expected circumsta		to occur in most nces		5 Cat		astrophic	Death, off-site rele permanent effect	ase with no
Executive matrix	based on work experience of using Angle Grinder the likelihood of happening one of the hazards is likely										lated by	
			-	5 Almost	Low	Medium		Mediu	ım	High	High	
	Likelihood		<mark>4 likely</mark>	Low	Medium		Mediu	ım	16	High		
			l ii	3 Possible	Low	Medium	١	Medium		Medium	Medium	
				2 Unlikely	Low	Low	ı	Mediu	ım	Medium	Medium	
				1 Rare	Low	Low		Low	,	Low	Low	
					1 Significant	2 Minor	3	Mode	rate	<mark>4 Moderat</mark>	e 5 Catastrophic	
							Severity					
Safety	Saf	ety sł	noes and lab	coat must be	worn							
Precautions	Saf	ety go	oggle or face	shield must b	e worn							
	Du	st ma	sk and ear m	uff must be w	orn							
			tool firmly									
			eave the tool									
				omendid disk								
				isk is fixed pro	•							
				rd in propre p	osition							
		•	handle must									
				e while workin	_							
	_		_	ng area is well	ventilated							
Capacity		_	speed 11000									
	Grinding desk diameter 100 mm											

Machine Name				Jigsaw				AEG			
			Hazar	d				Risks			
Dust may occu	ır				Cau	ıses pı	roblems in respira	tory system			
Contact with r	novir	ıg par	ts		Cau	ises pl	hysical injuries				
Cutting blade					Cau	ises fly	yaway cutting blac	de towards the operator			
Cut workpiece	that	has t	hickness more t	than the blade movement range			utting blade				
		unco	vered long hair		Burn if in contact with hot wire						
Repetitive wor								pational overuse syndrome (OOS)			
Electrical wire			n working place				shock				
People		-		ained and qualified persons can use can be issued to Students that are o							
Process			utting	can be issued to students that are t	Jonnpe	tent a	is recognition of t	nen ability.			
				Likelihood	Soverity						
Profiling				Likelinood	Severity						
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning			
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury			
	~	2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release			
		3	Possible	Might occur in some time	•	3	Moderate	Medical treatment, Immediate containment with external assistance			
		4	likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect			
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect			

Executive										
matrix	the severity if	one of t	the hazard ha	ppens is "Mod	erate" so th		the Jigsaw is c	is "Unlikely" on t alculated by multi " range.		
			5 Almost	Low	Medium	Medium	High	High		
		poo	4 likely	Low	Medium	Medium	High	High		
		Likelihoo	3 Possible	Low	Medium	Medium	Medium	Medium		
		-ike	2 Unlikely	Low	Low	6	Medium	Medium		
			1 Rare	Low	Low	Low	Low	Low		
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic		
	Severity									
Safety	Safety shoes a									
Precautions	Safety goggle									
	Dust mask and									
	Make sure tha									
	Fix the workpi	ece wit	hin workingbe	ench by using (G-clamp) of	(F-clamp) befo	re starting			
	Make sure the	workin	g area is well	ventilated						
	All nails or me	tallic pa	rts incrusted	in the wood to	be cut mus	t be previously	removed			
Limit	Max	Cutting	g depth:							
		Wood	75 mm							
		Alumir	num 18 mm							
		Non-a	lloyed steel 6	mm						
	Min	Cutting	g depth for w	ood, aluminum	and Non-a	lloyed steel 1 m	ım			

Machine Name				Skill Saw	7				AEG AEG		
	•		Hazar	d					Risks		
Projected par	rticles				Fly	towa	arc	ls operator cause	es physical injuries		
Fumes can be	e inhal	led			Ca	uses	pro	blems in respira	tory system		
Breakage of t	he dis	C			Br	Broken pieces fly towards operator causes physical injuries					
Ambient nois	e				Ca	Causes hearing problems					
Loosely fit clo	othing	uncov	vered long hair		Bu	ırn if i	in c	contact with hot	wire		
Week high pr	essuri	ized ai	ir hoses fittings	causes sudden hose opening	Hi	High physical injuries					
Repetitive wo	ork				Op	Operator effected by occupational overuse syndrome (OOS)					
Electrical wire	e kept	withi	n working place		Ele	Electrical shock					
People				ained and qualified persons ca can be issued to Students tha					ct Students in the safe use of the heir ability.		
Process	wo	od cu	tting								
Profiling				Likelihood					Severity		
Risks	Le	vel	Descriptor	Meaning	L	evel		Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1		Significant	No injury		
		2	Unlikely	Could occur at some time		2		Minor	First aid treatment, Immediate containment, onsite release		
	/	3	Possible	Might occur in some time	•	3		Moderate	Medical treatment, Immediate containment with external assistance		

	4	4	likely	/	Probably circumsta	occur in most nces		4		Major	Extensive injuries, with no permanen	
		5	Almos	st	Expected circumsta	to occur in mo	st	5	Cat	tastrophic	Death, off-site rele permanent effect	ase with no
Executive matrix	the se	everit	y if one	of t	he hazard ha	ppens is "Mod	erate" so th	ie risk rati	ing fo	the Skill Sav	zards is "Possible" o v is calculated by m Medium" range.	
				J	5 Almost	Low	Medium	Mediu	ım	High	High	
				000	4 likely	Low	Medium	Mediu	ım	High	High	
				Likelihood	3 Possible	Low	Medium	9		Medium	Medium	
		List		当 2 Unlikely		Low	Low	Mediu	ım	Medium	Medium	
				1 Rare	Low	Low	Low	ı	Low	Low		
						1 Significant	2 Minor	<mark>3 Mode</mark>	<mark>rate</mark>	4 Moderat	e 5 Catastrophic	
								Sev	verity			
Safety		•			oat must be v							
Precautions			_		hield must b							
		Dust mask and ear muff must be worn										
		Never wear gloves during operation machine										
	Make sure the working area is well ventilated Chek the cutting disk if it is cracked or split or if one or more teeth are missing, then it has to be replaced All nails or metallic parts incrusted in the wood to be cut must be previously removed											
1::		iis or		_			be cut mus	t be previ	lousiy	removed		
Limit	Max			_	g depth 54 mr							
	Min	Cutting depth 41.3 mm @ 45° Min Cutting depth 1 mm at any angle										

Machine Name				Heating gu	ın			AEG IIIII		
			Hazar	·d				Risks		
High tempera	ature	non-v	isible flame or r	may throw some sparks	Cau	uses fir	e if directed on f	ilmable material		
	witche	es and	I fan motors are	e not usually spark-free and can	Ma	y pose	a serious ignition	n if in use for long time		
Contact with	hot ti	р			Causes skin burn					
Loosely fit clo	othing	unco	vered long hair		Bur	n if in	contact with hot	tip or flame		
Week high pr	essur	ized a	ir hoses fittings	causes sudden hose opening	Hig	h phys	ical injuries			
Repetitive wo	ork				Ор	erator	effected by occu	pational overuse syndrome (OOS)		
Electrical wire	e kept	withi	in working place	e	Ele	ctrical	shock			
People		•			use the machines and will instruct Students in the safe use of the competent as recognition of their ability.					
Process			and paint dryin		e compe	etent a	s recognition or t	neir ability.		
Profiling				Likelihood	Severity					
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury		
	'	2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release		
		3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance		
		4	likely	Probably occur in most	~	4	Major	Extensive injuries, off-site release		

likely

circumstances

4

✓ 4

Major

with no permanent effect

		5	Almost	Expected circumsta	to occur in mo	st	5	Catastrophic	Death, off-site rele permanent effect	ease with no		
Executive matrix	Based on work experience of using "Heating Gun" the likelihood of happening one of the hazards is "Unlikely" on the oth hand the severity if one of the hazard happens is "Moderate" so the risk rating for the Heating gun is calculated by multipute the value of likely hood and severity which it is in this case is 2 x 4 = 8 the risk rating is in the "Medium" range.											
				5 Almost	Low	Medium	Medium	n High	High			
			000	4 likely	Low	Medium	Medium	n High	High			
		ikelihood		3 Possible	Low	Medium	Medium	n Medium	Medium			
			Like	2 Unlikely	Low	Low	Medium	n 8	Medium			
				1 Rare	Low	Low	Low	Low	Low			
					1 Significant	2 Minor	3 Modera	ite <mark>4 Modera</mark>	te 5 Catastrophic	_		
							Seve	erity				
Safety	Saf	ety sh	oes and lab o	oat must be	worn							
Precautions	Fac	Face mask must be worn										
	Do vap Be Alw Un Alw Allo Nev Nev	Never wear gloves during operation machine Do not use a heat gun near combustible or flammable materials including open containers of flammable liquids, flammable vapors Be aware of the direction of the heat Always switch the heat gun off before putting it down on any surface Unplug the heat gun when not in use Always maintain a minimum of one centimeter of clearance between outlet nozzle and work surface Allow the tool to cool before storing it Never touch the hot metal nozzle with clothing or skin Never direct the air flow towards one's body Never block the inlet grill or obstruct the air flow of the unit while in operation Never hold work piece by hand while using a heat gun or you will risk direct exposure of the heat to your hand, workpiece										
Limit	Ma			mperature 90								
	Mii	n	Tei	mperature 60	0°C							

Machine Name Rechargeable drill



			Hazar	d				Risks			
Contact with r	evol	ing cl	huck and drill b	it	Physical hand injury						
Work pieces a	nd di	rill bit	broken can be	violently ejected from the lathe	High physical injury						
Loosely fit clot	thing	unco	vered long hair		Wrapped around rotating parts						
Repetitive wo	rk				Operator effected by occupational overuse syndrome (OOS)						
Electrical wire	kept	withi	n working place		Electrical shock						
People		•		ained and qualified persons can use can be issued to Students that are c							
Process	_		or tightening a s				Ü	,			
Profiling				Likelihood				Severity			
Risks	Level		Descriptor	Meaning	Level		Descriptor	Meaning			
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury			
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release			
	✓ 3 Possible		Possible	Might occur in some time	>	3	Moderate	Medical treatment, Immediate containment with external assistance			
	4 likely		likely	Probably occur in most circumstances		4	Major	Extensive injuries, off-site release with no permanent effect			
				·							

Executive matrix	other hand the	e severi	ty if one of th	e hazard happe	ens is "Mod	erate" so the ri	sk rating for th	the hazards is "P ee Rechargeable do	rill is calculated	
		7	5 Almost	Low	Medium	Medium	High	High		
		Likelihood		Low	Medium	Medium	High	High		
		elih	3 Possible	Low	Medium	9	Medium	Medium		
		Ϊ́Ξ	2 Unlikely	Low	Low	Medium	Medium	Medium		
			1 Rare	Low	Low	Low	Low	Low		
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic		
						Severity				
Safety	Safety shoes a			worn						
Precautions	Dust mask mu	st be w	orn							
	Ear muff must	be wor	n if needed							
	Never wear gl	oves du	ring operation	n machine						
	Use the proper drill bit for the operation									
	Use a clamp or vise to prevent work from spinning									
	Make sure the drill bit or cutting tool is locked securely in the chuck									
	Do not force t	he drill	with extra pre	essure						
Limit	Max	Drill bi	t diameter 10	mm						
	Min	Drill bi	t diameter 1 i	mm						

Machine Name				Portable gas weldin	g					
			Hazar	d			A A	Risks		
Fire caused l	by hea	t, spar	rks, molten met	al or direct contact with the flame	Causes fire if not handle with care					
Fumes creat	ed dur	ing fla	me cutting		Cau	ises pr	oblems in respira	tory system		
High visual r					Causes eye flashback					
Contact with	n hot m	netal			Causes skin burn					
Week high p	ressur	ized g	as hoses fittings	causes sudden hose opening	High physical injuries and Fire					
Loosely fit cl	lothing	unco	vered long hair		Burn if in contact with flame					
Repetitive w	/ork				Operator effected by occupational overuse syndrome (OOS)					
People		•	, •	nined and qualified persons can use can be issued to Students that are co	e the machines and will instruct Students in the safe use of the					
Process			or cutting meta		•			•		
Profiling				Likelihood				Severity		
Risks	Le	evel	Descriptor	Meaning	Le	evel	Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury		
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release		
				Might occur in some time				Medical treatment, Immediate		

3

Moderate

3

Possible

containment with external

assistance

			191 - 1	Probably	occur in most				N.4 - 1	Extensive injuries,	off-site release	
	~	4	likely	circumsta	nces			4	Major	with no permanent	t effect	
		5	Almost	Expected	to occur in mo	st	/	5 C	atastrophic	Death, off-site rele	ase with no	
			74111030	circumsta	nces				atastropine	permanent effect		
Executive			•	_		_			• • •	one of the hazards is	•	
matrix				•						the Portable gas we	_	
	by	y multiplying the value of likely hood and severity which it is in this case is $4 \times 4 = 8$ the risk rating is in the "High" range.										
				T							I	
			٥	5 Almost	Low	Medium		1edium	High	High		
	4 likely Low Medium 3 Possible Low Medium 2 Unlikely Low Low						M	1edium	High	20		
	3 Possible Low Medium Medium Medium							Medium				
			==	2 Unlikely	Low	Low	М	1edium	Medium	Medium		
				1 Rare	Low	Low		Low	Low	Low		
					1 Significant	2 Minor	3 M	1oderate		e <mark>5 Catastrophic</mark>		
								Severit	у			
Safety	Saf	fety sl	hoes and lab o	oat must be v	worn							
Precautions	He	at pro	oof gloves mu	st be used								
				-	well vintilated							
		-			onnections usir	ng approve	d leak	k-test sol	ution			
		•	hoses for leak									
			•		oarks, flames ar	nd hot meta	al					
			nt lighter to ig				,		1			
					keep sudden h					ators		
					open and adju					the oxygen "blows o	uut" tha flama	
					f the flame bur					the oxygen blows t	out the name,	
								•	•	y coil hoses and rep	lace equinment	
					ssible at the we	•	,, C33u	are on re	galators, ficati	y con noses and rep	ace equipment	
Limit	Ma			tal thickness 7								
				al thickness 20								
	Mi	n			ess than 7.62 c	m						
			_		ess than 20.32 c							

Machine Name

Arc Welding Machine



			Hazar	d				Risks
Fumes can be	inha	led			Cau	ises pr	oblems in respira	tory system
Arc rays (ultra	viole	t radia	ation)		Cau	ises ey	e flashback	
Hot welded m	etal				Ski	n burn	if in contact with	
Sparks					Hig	h burr	if in contact with	l
Loosely fit clot	thing	unco	vered long hair		Bur	n if in	contact with spar	·k
Repetitive wo	rk				Op	erator	effected by occup	pational overuse syndrome (OOS)
Electrical wire	kept	withi	n working place		Ele	ctrical	shock	
People		•		ained and qualified persons can use can be issued to Students that are c				
Process	Me	etal W	elding/					
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
		3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
	~	4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect

		5	Almo	st	Expected circumsta	to occur in mo	st	5	Ca	tastrophic	Death, off-site rele permanent effect	ease with no
Executive matrix	oth	er ha culate	nd the se	verit	ty if one of th	e hazard happe	ens is "Mod	erate" s	o the r	isk rating for	one of the hazards is the Arc Welding Ma < 4 = 16 the risk ration	achine is
				_	5 Almost	Low	Medium	Med	lium	High	High	
				Likelihood	4 likely	Low	Medium	Med	lium	16	High	
				elih	3 Possible	Low	Medium	Med	lium	Medium	Medium	
				Lik	2 Unlikely	Low	Low	Med	lium	Medium	Medium	
					1 Rare	Low	Low	Lo	W	Low	Low	
						1 Significant	2 Minor	3 Mod	lerate	4 Moderat	e 5 Catastrophic	
								S	everity]
Safety	Safe	ety sh	noes and l	lab c	oat must be	worn						
Precautions	We	lding	helmit pr	ovid	led with UV p	roteting filter						
	Hea	at pro	of gloves	mus	st be used							
	Wo	rk in	well vent	ilate	d area							
Limit	Max	Х	W	eldir	g current 200	O Amp						
			Ele	ectro	de diameter	4 mm						
	Mir	1	W	eldir	ng current 25	Amp						
			Ele	ectro	de diameter	1.6 mm						

Machine Name				Laser cutter Mach	ine			7,190
			Hazaı	^r d				Risks
Toxic fumes	can be	inhal	ed		Cau	ıses p	roblems in respira	atory system
Invisible high	energ	gy lase	er beam		Cau bur		evere eye damage	e, including blindness and serious skin
The high inte	•	aser b	peam can produ	uce extremely high temperatures	Cau	ıse a f	ire, especially if th	ne material used is not compatible
People		-		ained and qualified persons can us can be issued to Students that are				
Process	Foa	am cu	tting					
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
	>	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect

Executive matrix	Based on work experience of using "Laser cutter Machine" the likelihood of happening one of the hazards is "Possible" on the other hand the severity if one of the hazard happens is "Major" so the risk rating for the Laser cutter Machine is calculated by multiplying the value of likelihood and severity which it is in this case is 3 x 4 = 12 the risk rating is in the "Medium" range.										
			5 Almost	5 Almost Low Medium Medium High		High	High				
		900	4 likely	Low	Medium	Medium	High	High			
		Likelihood	3 Possible	Low	Medium	Medium	12	Medium			
		ĬŠ	2 Unlikely	Low	Low	Medium	Medium	Medium			
			1 Rare	Low	Low	Low	Low	Low			
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic			
						Severity					
Safety	Safety shoes a	nd lab d	coat must be v	worn							
Precautions	Safety goggle	or face :	shield must be	e worn							
	Hearing prote		ust be worn								
	Gloves must b	-									
	Dust mask mu										
	Make sure the		-								
	•			out an instructo							
					place and in	terlocks are wo	orking properly				
	DO NOT look	-									
						nufacturer or u	ise materials th	at are highly			
		•		xic byproducts							
				ing unattended							
Limit			-	d fire extinguis	ner nearby						
Limit			ng temperatui ng humidity 9!								
			ngth 1200 mr								
			idth 800 mm								
			ng temperatui	-a 5°C							
			ng temperatur ng humidity 59								
		Sheet Length 1 mm Sheet Width 1 mm									

Machine Name

3D PRINTER



			Hazar	d				Risks
Toxic fumes	can be	inhal	ed		Cau	ises pr	roblems in respira	tory system
Hot surfaces					Skir	n burn	if in contact with	
People		•		ained and qualified persons can use can be issued to Students that are				
Process	Cre	eating	3d plastic mod	els				
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
	~	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect

_	5 Almost	Low	Medium	Medium	High	High
000	4 likely	Low	Medium	Medium	High	High
Likelihood	3 Possible	Low	Medium	Medium	12	Medium
Lik	2 Unlikely	Low	Low	Medium	Medium	Medium
	1 Rare	Low	Low	Low	Low	Low
		1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic
				Severity		

Safety Precautions

Safety shoes and lab coat must be worn

Hearing protection must be worn

Gloves must be worn

Dust mask must be worn

DO NOT operate the machine without an instructor

DO NOT leave a 3D printers operating unattended

ALWAYS keep a properly maintained fire extinguisher nearby

Place 3D printers in areas that are well ventilated to minimize exposure to particle emissions.

Choose 3D printers with built-in ventilation systems.

Machine Name				WATER	BATI	H MA	CHINE	
			Hazar	·d				Risks
Hot surfaces	and m	ateria	als		Skir	ո burn	if in contact with	
loose hair/cl	othing				Wr	apped	around rotating/	shaking parts
overheating					Cau	ise a fi	ire	
Moving and	lifting	heavy	items of equip	ment (< 10Kg.).	ma	y caus	e bodily injury pa	rticularly when full of water.
People	ma	chine	s. Certification	ained and qualified persons can use can be issued to Students that are	compe	etent a	as recognition of t	heir ability.
Process	use	ed to i	incubate sampl	es in water under atmosphere pres	sure a	t cons	tant temperature	for a long period time.
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	vel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
	'	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect

Executive matrix	While using "WATE I severity if one of the value of likelihood and	hazard happe	ns is "Major" s	o the risk ra	nting for the Las	er cutter Mach	ine is calculated b			
		5 Almost	Low	Medium	Medium	High	High			
	poc	4 likely	Low	Medium	Medium	High	High			
	Likelihood	3 Possible	Low	Medium Medium		12	Medium			
		2 Unlikely	Low	Low	Medium	Medium	Medium			
		1 Rare	Low	Low	Low	Low	Low			
		1 Significant 2 Minor 3 Moderate 4 Moderate 5 Catastrophic								
			Severity							
Safety	Safety shoes and lab	coat must be	worn							
Precautions	Hearing protection n	nust be worn								
	Heat proof gloves m	ust be used								
	mask must be worn									
	Make sure the worki	ng area is well	ventilated							
	DO NOT operate the machine without an instructor									
	DO NOT leave rhe m									
	ALWAYS keep a properly maintained fire extinguisher nearby									

Machine Name





								D2
			Hazar	d				Risks
Low flamma	ble ma	terial	S		cau	ise a fi	ire.	
Opening the	Door I	Durinខ្	g the Test					est of -70 °C: touching the wall sample
								nout gloves. Instant frostbite, the
								e frostbite will even be necrotic.
								L50 °C: the high temperature gas will
								sh out of the test chamber. If the
							eievant protectior ace	is not done, it is likely to burn our
People	On	ly full	v recognized tr	ained and qualified persons can use	the n			t Students in the safe use of the
reopie	l l	•		can be issued to Students that are co				
Process				ent specimens to analyze the behavior				Total State of the
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
				Might occur in some time				Medical treatment, Immediate
	~	3	Possible			3	Moderate	containment with external
1								assistance
		4	likely	Probably occur in most	/	4	Major	Extensive injuries, off-site release
			,	circumstances	Ļ			with no permanent effect
ı		5	Almost	Expected to occur in most		5	Catastrophic	Death, off-site release with no
				circumstances			,	permanent effect

Executive matrix	While using "CLIMA the severity if one o the value of likelihoo	f the hazard ha	ppens is "Majo	r" so the ri	sk rating for the	Laser cutter M	lachine is calculat			
		5 Almost	Low	Medium	Medium	High	High			
		4 likely	Low	Medium	Medium	High	High			
	2	3 Possible	Low	Medium	Medium	12	Medium			
	Likelihood	2 Unlikely	Low	Low	Medium	Medium	Medium			
		1 Rare	Low	Low	Low	Low	Low			
			1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic			
					Severity					
Safety	Safety shoes and lak	coat must be	worn							
Precautions	Safety goggle or face	e shield must b	e worn							
	Hearing protection i	nust be worn								
	Heat proof gloves m	ust be used								
	Make sure the work	ing area is well	ventilated							
	DO NOT operate the machine without an instructor									
	DO NOT leave a the machine operating unattended									
	20 mon reave a time	•	_	her nearby						

Machine Name				DRYING	OVE	N MA	CHINE	
			Hazar	rd				Risks
Using plastics machine	s that a	are no	ot made to with	stand high temperatures into the			em to melt and ig the room	nite. This can set fire to the equipment
rinsing items	with \	olatil/	e substances, o	r not rinsing away residual volatile	cau	ise the	substance to bed	come airborne. Due to the machine
substances in	n the e	quipn	nent before put	ting them in the dryer				n the gas, it can escape and be inhaled around the machine
Hot surfaces	and m	ateria	als				if in contact with	
overheating					Cau	ıse a f	ire	
People		•		ained and qualified persons can us can be issued to Students that are				
Process	use	d to i	remove water a	nd other solvents from the materi	al, plac	ced ins	ide them	
Profiling				Likelihood				Severity
Risks	Le	vel	Descriptor	Meaning	Le	evel	Descriptor	Meaning
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release
	~	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect

Executive matrix	While using "DRYING severity if one of the value of likelihood ar	hazard happe	ns is "Major" so	the risk ra	ting for the Las	er cutter Mach	ine is calculated b		
		5 Almost	Low	Medium	Medium	High	High		
	000	4 likely	Low	Medium	Medium	High	High		
	Likelihood	3 Possible	Low	Medium	Medium	12	Medium		
	Lik	2 Unlikely	Low	Low	Medium	Medium	Medium		
		1 Rare	Low	Low	Low	Low	Low		
			1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic		
			Severity						
Safety Precautions	Safety shoes and lab Safety goggle or face Hearing protection m Heat proof gloves mu Dust mask must be w Make sure the working DO NOT operate the DO NOT leave a the man	shield must be nust be worn ast be used yorn ng area is well machine with nachine opera	e worn ventilated out an instructo ting unattende	d					

Machine Name		COMPRESSION TENSION MACHINE								
			Hazar	d				Risks		
Dangerous mo	ving	parts	at loading/unlo	pading mechanisms	ma	y caus	e bodily injury			
Hot surfaces a	nd m	nateria	als		Skir	n burn	if in contact with			
Moving and lif	ting	heavy	items of equip	ment (< 10Kg.).	ma	y caus	e bodily injury			
People	ma	chine	s. Certification	ained and qualified persons can use can be issued to Students that are c	etent a					
Process	Us	Used to perform reliable strength and flexure tests on mortar specimens.								
Profiling				Likelihood				Severity		
Risks	Le	vel	Descriptor Meaning		Le	vel	Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury		
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release		
	•	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance		
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect		
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect		

Executive matrix	While using "COMPRESSION TENSION MACHINE" the likelihood of happening one of the hazards is "Possible" on the other hand the severity if one of the hazard happens is "Major" so the risk rating for the Laser cutter Machine is calculated by multiplying the value of likelihood and severity which it is in this case is 3 x 4 = 12 the risk rating is in the "Medium" range.										
			5 Almost	Low	Medium	Medium	High	High			
		poc	4 likely	Low	Medium	Medium	High	High			
		Likelihood	3 Possible	Low	Medium	Medium					
			2 Unlikely	Low	Low	Medium	Medium	Medium			
			1 Rare	Low	Low	Low	Low	Low			
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic			
Safety	Safety shoes and la	ab c	oat must be v	worn							
Precautions	Hearing protection	ı mı	ıst be worn								
	Gloves must be wo	orn									
	DO NOT operate th	he n	nachine with	out an instructo	or						
	DO NOT leave the	mad	chine operati	ng unattended							
	ALWAYS keep a pro		•	_							

Machine Name	CONCRETE MIXING MACHINE									
		Hazar	d			Risks				
loose hair/clot	hing			Wrapped	around rotating/	shaking parts				
Flying debris a	nd dust pa	articles		Causes problems in respiratory system						
Moving and lif	ting heavy	items of equip	ment (< 10Kg.).	may cause bodily injury particularly when full of materials.						
People	Only full	y recognized tra	ained and qualified persons can use	the machin	es and will instruc	t Students in the safe use of the				
	machine	s. Certification	can be issued to Students that are co	ompetent a	s recognition of th	neir ability.				
Process	MIXING	CONCRETE								
Profiling	filing Likelihood				Severity					
Risks	Level	Descriptor	Meaning	Level Descriptor Mean						

		1	Rare	9	Could occ	ur in exception nces	al		1	Si	gnificant	No injury				
		2	Unlike	ely	Could occ	Could occur at some time			2		Minor	First aid treatment, Immediate containment, onsite release				
	✓ 3 Possible		ole	Might occ	Might occur in some time			3	M	oderate	Medical treatment, containment with eassistance					
		4	likely	У	Probably circumsta	occur in most nces		'	4		Major	Extensive injuries, owith no permanent				
		5	Almo	st	Expected circumsta	to occur in mos nces	st		5	Cat	astrophic	Death, off-site release permanent effect	ase with no			
matrix			•			• •		3 x 4		he risl		Machine is calculate the "Medium" range High High Medium Medium Low				
			<u>-</u>		1 Naie	1 Significant	2 Minor	3	Mode		4 Moderat					
								•	Sev	erity						
Safety		-			oat must be v	worn										
Precautions			nust be wo sk must be		rn											
					g area is well	ventilated										
							or									
	DO	NOT	leave the	mac	hine operati	ng unattended	DO NOT operate the machine without an instructor DO NOT leave the machine operating unattended									

Machine Name		SIEVE ANALYSIS "SHAKER"								
			Hazar	d	Risks					
loose hair/clot	loose hair/clothing							shaking parts		
Moving and lif	ting	heavy	items of equip	ment (< 10Kg.).	ma	y caus	e bodily injury par	ticularly when full of materials.		
Flying debris a	ınd d	ust pa	rticles		Cau	ıses pı	roblems in respira	tory system		
People		•		nined and qualified persons can use can be issued to Students that are co						
Process	Us	Used for the characterization of bulk goods of different forms and sizes, and the knowledge of their particle size distributions								
Profiling				Likelihood				Severity		
Risks	Level		Descriptor	Meaning	Level		Descriptor	Meaning		
		1	Rare	Could occur in exceptional circumstances		1	Significant	No injury		
		2	Unlikely	Could occur at some time		2	Minor	First aid treatment, Immediate containment, onsite release		
	•	3	Possible	Might occur in some time		3	Moderate	Medical treatment, Immediate containment with external assistance		
		4	likely	Probably occur in most circumstances	~	4	Major	Extensive injuries, off-site release with no permanent effect		
		5	Almost	Expected to occur in most circumstances		5	Catastrophic	Death, off-site release with no permanent effect		

Executive matrix	While using "SIEVE ANALYSIS "SHAKER"" the likelihood of happening one of the hazards is "Possible" on the other hand the severity if one of the hazard happens is "Major" so the risk rating for the Laser cutter Machine is calculated by multiplying the value of likelihood and severity which it is in this case is 3 x 4 = 12 the risk rating is in the "Medium" range.										
			5 Almost	Low	Medium	Medium	High	High			
		poc	4 likely	Low	Medium	Medium	High	High			
		Likeliho	3 Possible Low Media		Medium	Medium	12	Medium			
			2 Unlikely	Low	Low	Medium	Medium	Medium			
			1 Rare	Low	Low	Low	Low	Low			
				1 Significant	2 Minor	3 Moderate	4 Moderate	5 Catastrophic			
Safety	Safety shoes and la	ab c	oat must be	worn							
Precautions	Gloves must be wo	rn									
	Dust mask must be	e wc	orn								
	Make sure the wor	kin	g area is well	ventilated							
	DO NOT operate th		_		or						
	DO NOT leave the										
				3							

Machine									
Name	VIBRATING TABLE MACHINE								
		Hazar	d			Risks			
loose hair/clot	hing			Wrapped	around rotating/	shaking parts			
Moving and lif	ting heavy	items of equip	ment (< 10Kg.).	may cause bodily injury particularly when full of materials.					
Flying debris a	nd dust pa	articles		Causes problems in respiratory system					
People	Only fully recognized trained and qualified persons can use the machines and will instruct Students in the safe use of the machines. Certification can be issued to Students that are competent as recognition of their ability.								
Process	Concrete	e blocks and tile	s molds .						
Profiling			Likelihood	Severity					
Risks	Level	Descriptor	Meaning	Level Descriptor Meani					

		1	Rare	9	Could occ	cur in exception	al		1	Sigr	ificant	No injury	
		2	Unlike	ely	Could occ	cur at some tim	e		2	Minor		First aid treatment, Immediate containment, onsite release	
	~	3	Possik	ole	Might occ	Might occur in some time					Medical treatment, containment with eassistance		
		4	likel	У		Probably occur in most circumstances		~	4	N	ajor	Extensive injuries, of with no permanent	
		5	Almo	st		Expected to occur in most circumstances			5	Cata	trophic	Death, off-site release permanent effect	ase with no
	the	: valu€	e of likelih	Likelihood	5 Almost 4 likely	Low Low	Medium Medium		Mediu Mediu	ım ım	High High	High High	e.
1				Likeli	3 Possible 2 Unlikely	Low	Medium Low		Mediu Mediu		12 Medium	Medium Medium	
					1 Rare	Low	Low		Low	,	Low	Low	
				•		1 Significant	2 Minor	3	Mode	rate verity	<mark>l Moderat</mark>	e 5 Catastrophic	
Cofoty	Saf		l book and I	ah c	oat must be	worn			361	verity			
Safety Precautions		•			bat must be	WOIII							
		Gloves must be worn Dust mask must be worn											
rrecautions	Du	st mas	sk must b	Make sure the working area is well ventilated									
recautions						ventilated							
recautions	Ma	ake su	re the wo	rking	g area is well	ventilated out an instructo	or						

First Aid Treatment

First aid treatment is the action which will be taken in case of accident happen to prevent any further complications that may occur for the injured person, until the assigned nurse at the university or the public health care arrives.

First Aid Treatment								
If an accdent happende and the infected person has:	Action must be taken							
Bleeding cut or wound	Stop Bleeding: Apply direct pressure on the cut or wound with a clean cloth, tissue, or piece of gauze until bleeding stops. Clean Cut or Wound: Gently clean with soap and warm water or alcohol pad. Try to rinse soap out of wound to prevent irritation. Protect the cut or Wound: apply plaster or wrap around elastic bandage.							
Swelling	Protection: protect from other possible injuries by using a support or other measures Rest: to reduce the swelling, do not walk or bear weight on the injured limb, avoid activities involving the injured area for the initial 24 to 72 hours after injury Ice: ice packs should be applied during the first 72 hours. The pack should be wrapped in a towel and applied for 20 minutes to reduce the swelling and the pain and to control the bleeding. It could be reapplied after a 20 minutes break if necessary. Compression: apply a compression bandage to support and control the swelling. Remember to remove the bandage before going to sleep. Elevation: of the affected limb to reduce the swelling, bleeding and pain							
Fanting	 Position the person on his/her back. If the person is breathing, restore blood flow to the brain by raising the person's legs above heart level about 30 centimeters if possible. Loosen belts, collars or other constrictive clothing. To reduce the chance of fainting again, don't get the person up too quickly. If the person doesn't regain consciousness within one minute, call your local emergency number. Check the person's airway to be sure it's clear. Watch for vomiting. Check for signs of circulation (breathing, coughing or movement). If absent, begin CPR. Call your local emergency number. Continue CPR until help arrives or the person responds and begins to breathe. 							

	What to look for - Broken bones and fractures
Broken bone and fractures	 Swelling Difficulty moving Movement in an unnatural direction A limb that looks shorter, twisted or bent A grating noise or feeling Loss of strength Shock What you need to do - Broken bones and fractures If it is an open fracture, cover the wound with a sterile dressing and secure it with a bandage. Apply pressure around the wound to control any bleeding. Support the injured body part to stop it from moving. This should ease any pain and prevent any further damage. Once you've done this, call 999 or 112 for medical help. While waiting for help to arrive, don't move them unless they're in immediate danger.