

Risk Assessment for Engineering

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Process / Location:	Engineering Workshop	Effective Date:	1 Jun 2011

Hazard Identification				Risk Evaluation				Risk Control	
No.	Work Activity	Hazard	Possible Injuries / Ill Health & Persons-at-Risk	Existing Risk Control (if any)	Severity	Likelihood	Risk Level	Additional Risk Control	Action IC
1	Manual handling work	Lifting and carrying heavy, bulky materials.	Musculoskeletal injuries/ person handling material	Proper lifting posture adopted when lifting object (refer SWP for manual handling). Workers advised to seek help from fellow workers when required. Trolley used to transfer object from point to point.	Moderate	Remote	Low risk	Refer to SWP 08 for safe manual handling.	
		Dropping of heavy and bulky object	Feet injuries, crushed/ person handling and person within the vicinity	Safety shoes with steel toe-cap provided to all workers.	Moderate	Remote	Low risk		
		Sharp, pointed edges of object	Cuts to hand, fingers (limbs)/ person handling and person within the vicinity	Hand gloves provided to all workers.	Minor	Occasional	Low risk		
2	Hot work involving oxy-fuel gas cutter.	Open flame (heat source), extreme hot surface/ object	Serious burns/ person directly/ indirectly involved in the operation.	Operator to wear PPE, eye/ face protection, welding gloves.	Major	Remote	Medium risk	Refer to SWP 04 for Hot works operation.	
		Flying fragment due to molten slag.		Operator to caution any body to stay clear of work area.	Major	Remote	Medium risk		
		Fire out break due to flammable/ combustible material near by.	Serious burns and property damage/ person directly/ indirectly involved in the operation.	Flammable/ combustible material/ substance removed from work area. Conducted within the designated hot work area Fully charged fire extinguisher stand-by. Fire Evacuation Plan drawn up & fire drill conducted twice by FSM. Hot work permit	Major	Remote	Medium risk	Constant supervision to ensure that safety measures and SWP complied.	Maintenance Engineer Maintenance Supervisor
		Explosion, flash fire.	Bodily injuries, serious burns and death/ person directly/ indirectly involved in the operation.	Flash back arrestor installed at gas cylinder outlet. Gas hose in good condition. Approved hose grip used (Omega clips)	Major	Remote	Medium risk	No excessive storage of gas cylinder within enclosed space.	Maintenance Engineer Maintenance Supervisor

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		Faulty/ Incorrect operating pressure	Burns from flash fire/ person directly involved in the operation.	Working pressure gauge installed to monitor the operating pressure.	Moderate	Remote	Low risk		
		Emergency escape route obstructed.	Serious injury or death to workers and nearby people due to fire or explosion and unable to escape effectively	Well ventilated workshop and clear escape route through main entrance. Regular housekeeping	Major	Remote	Medium risk		
		Improper lifting posture.	Back injuries/ person directly involved in the operation.	Gas cylinder is transported on trolley.	Moderate	Remote	Low risk		
		Greasy and torn/ loose clothing	Serious burns/ operator of equipment.	Fitting clothing worn and kept away from heat source	Moderate	Remote	Low risk		
		Struck by or against toppling of gas cylinder	Bodily injuries, soft tissue damage/ person directly/ indirectly involved in the operation.	Wear PPE, safety shoes. Gas cylinder securely strapped into trolley.	Moderate	Remote	Low risk	Gas cylinder not in use to be return to designated store.	Maintenance Engineer
3	Hot work involving arc welding	Presence of flammable material	Serious burns/ workers and nearby people due to fire or explosion	Flammable material/ substance removed from work area.	Moderate	Remote	Low risk	Operator to be alert & caution any body standing to close to stay clear.	
		Fire out break	Serious burns and property damage/ person directly/ indirectly involved in the operation.	Flammable material/ substance removed from work area. Fully charged fire extinguisher stand-by. Fire Evacuation Plan.	Major	Remote	Low risk	Fire emergency plan to be available and all staff briefed on it. Fire evacuation drill to be conducted twice a year.	EHS Officer
		Welding equipment left unattended and terminal accidental short circuit.	Serious injury due to fire / workers and nearby people	Welding equipment to be switch off when not in use.	Moderate	Remote	Low risk	Return to designated store for safe keeping.	Maintenance Supervisor
		Over heating of welding cable.	Electrocution and fire out break/ person directly/ indirectly involved in the operation.	Welding cable spread out before use. Work lead securely clamped to work piece.	Moderate	Remote	Low risk		
		Accidental contact of welding electrode when left unattended.	Electrocution to workers and nearby people.	Electrode removed from the clamp holder when welding operation cease.	Moderate	Remote	Low risk		
		Emergency escape route obstructed.	Serious injury/ workers and nearby people due to fire or explosion	Well ventilated workshop and clear escape route through main entrance. Regular housekeeping	Moderate	Remote	Low risk		
		Open flame (heat source), extreme hot surface/ object	Serious burns/ person directly/ indirectly involved in the operation.	Operator to wear PPE, eye/ face protection, gauntlet gloves (heat resistance).	Moderate	Remote	Low risk		
		Emission of welding fumes and gases	Adverse health effect/ person directly/ indirectly involved in the operation.	Adequate natural ventilation to dilute the effect of the fume.	Moderate	Remote	Low risk		

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		Faulty welding equipment (damaged leads, holders and connections) resulting in current leakages.	Electrical shock/ person directly involved in the operation.	Welding equipment maintained in good condition and earthed ELCB provided.	Moderate	Remote	Low risk		
		Absence of separation screens	Radiation burns/ person near by but not involved.	Welding area separated by partition screen	Moderate	Remote	Low risk		
		Incorrect shade of filter glass	Eye injury (Arc eye)/ person directly involved in the process.	Face shield with appropriate shade of filter glass provided.	Moderate	Remote	Low risk		
		Greasy and torn/ loose clothing	Serious burns/ person directly involved in the operation.	Fitting clothing worn and kept away from heat source	Moderate	Remote	Low risk		
		Wet area/ conditions	Electrical shock/ person directly/ indirectly involved in the operation.	Workshop is sheltered from the elements and the area is relatively dry.	Moderate	Remote	Low risk		
4	Use of electrical grinder/ cutter.	Flying fragments.	Injuries to the eyes/ person directly/ indirectly involved in the process.	Wear PPE, eye protection.	Moderate	Remote	Low risk		
		Absence of protective guard and movable parts.	Bodily injuries (Pinching, crushing of limbs) and amputation/ person directly involved in the operation.	Protective guards present.	Moderate	Remote	Low risk	Discourage tampering of protective guards.	
		Exposure to nuisance particulates	Lung irritation due to inhalation of nuisance particulates	Respirators provided and to be adopt	Moderate	Remote	Low risk		
		Short circuit or current leakage.	Electrocution/ person directly involved in the operation.	Electrical equipment to be earthed. ELCB provided.	Moderate	Remote	Low risk		
		Noise	Hearing discomfort / NID Operators / people nearby	Ear plugs provided Annual audiometric examination	Moderate	Remote	Low risk	Hearing conservation program	Ongoing enforcement on the use of ear plugs from respective supervisor
5	Use of drilling machine.	Flying fragments	Eye injuries due to flying fragment during drilling	Personal protective equipment (e.g. safety glasses)	Moderate	Remote	Low risk		
		Using hand to secure parts during drilling	Drill bit can cause serious hand injury when parts to be drilled is not secured	Parts to be drilled are secured with clamps on drilling platform	Moderate	Remote	Low risk		
		Short circuit or current leakage.	Electrocution/ person directly involved in the operation.	Electrical equipment to be earthed. ELCB provided.	Moderate	Remote	Low risk		
		Noise	Hearing discomfort / NID Operators / people nearby	Ear plugs provided Annual audiometric examination	Moderate	Remote	Low risk	Hearing conservation program	Ongoing enforcement on the use of ear plugs from respective supervisor

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6	Use of hand-held drilling machine.	Flying fragments	Eye injuries due to flying fragment during drilling	Personal protective equipment (e.g. safety goggles)	Moderate	Remote	Low risk		
		Using hand to secure parts during drilling	Drill bit can cause serious hand injury when parts to be drilled is not secured	Parts to be drilled are secured with clamps on drilling platform	Moderate	Remote	Low risk		
		Short circuit or current leakage.	Electrocution/ person directly involved in the operation.	Electrical equipment to be earthed. ELCB provided.	Moderate	Remote	Low risk		
		Noise	Hearing discomfort / NID Operators / people nearby	Ear plugs provided Annual audiometric examination	Moderate	Remote	Low risk	Hearing conservation program	Ongoing enforcement on the use of ear plugs from respective supervisor
7	Using of electrical saw.	Flying fragments.	Injuries to the eyes/ person directly/ indirectly involved in the process.	Wear PPE, eye protection.	Moderate	Remote	Low risk		
		Absence of protective guard and movable parts.	Bodily injuries (Pinching, crushing of limbs) and amputation/ person directly involved in the operation.	Protective guards present.	Moderate	Remote	Low risk		
		Exposure to nuisance particulates	Lung irritation due to inhalation of nuisance particulates	Personal protection equipment (e.g. respirator)	Moderate	Remote	Low risk		
		Short circuit or current leakage.	Electrocution/ person directly involved in the operation.	Electrical equipment to be earthed. ELCB provided.	Moderate	Remote	Low risk		
		Noise	Hearing discomfort / NID Operators / people nearby	Ear plugs provided Annual audiometric examination	Moderate	Remote	Low risk	Hearing conservation program	Ongoing enforcement on the use of ear plugs from respective supervisor
8	Usage of hand tools	Use of defective/ improper hand tools	Hand injury/ person directly involved in operation.	Hand tool used in good condition. Visual check to be carried out prior to use	Minor	Remote	Low risk		
9	Storage of tools/ equipments/ materials/ spare parts etc.	Struck by falling object by unstable storage.	Soft tissue damage/ person directly/ indirectly involved in the operation.	Tools / components are not stacked over one another on each layer of the shelving system; Object of irregular shape and size to be stored on ground floor	Moderate	Remote	Low risk		

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10	Operation of milling machine	Untrained operator	Bodily injuries/ operator and person within the vicinity.	Only workers trained in the safe operation are allowed to operate the machine. In-house training provided to new workers to refresh knowledge and understanding hazards involved.	Moderate	Remote	Low risk		
		Struck by flying object due to unsecured work piece.	Bodily injuries/ operator and person within the vicinity	Operator to check that work piece securely clamp in vice clamp before work commencement.	Moderate	Remote	Low risk		
		Flying fragments/ objects, splashing cutting oil	Eye injuries/ operator and person within close vicinity	Safety glasses / face shield provided to operator. Operator cautioned against placing anything on the machine while it is running.	Moderate	Occasional	Medium risk	Partition placed in between milling machine to shield adjacent operator from flying fragments.	
		Sudden starting of cutter.	Injuries to limbs/ operator	Operator advised to disengage all clutches and feed to prevent the cutter from starting unexpectedly.	Moderate	Remote	Low risk		
		Entanglement with rotating cutter.	Injuries to limbs/ operator	Operator provided with short sleeved and fitting T-shirt. No hand glove worn when operating rotating machine. Operator advised not to use rag to clean machine or part, when it is in motion.	Moderate	Remote	Low risk		
	Operation of milling machine (cont'd)	Cutter used in bad condition, (blunt)	Excessive force use causing injuries to limbs/ operator	Operator to ensure cutter are sharp and in good condition. Visual check to be conducted prior work commencement	Minor	Remote	Low risk		
		Slippery work area due to lubricant/ cutting oil dripping on floor.	Slip accident resulting in musculoskeletal injuries/ operator and person within the vicinity.	Lubricant/ cutting oil spills clean off immediately.	Moderate	Remote	Low risk		
		Contact with chemical, cutting oil	Skin allergic reaction (dermatitis), splashing into eyes/ operator	Chemical resistant gloves worn when handling machined parts as required	Moderate	Remote	Low risk		
		Handling of machined parts (hot surface)	Burns to hand/ operator	Operator provided with gloves when handling machined parts (hot) as required.	Minor	Remote	Low risk		

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		Machine left unattended	Bodily injuries/ person within the vicinity	Operator cautioned against leaving machine operating unattended.	Moderate	Remote	Low risk		
		Clearing of metal swarf from point of operation.	Cuts to hand/ operator	Push stick used to clear swarf from point of operation. Compressed air also used to blow debris out of point of operation. Hand gloves worn by operator.	Minor	Remote	Low risk		
		Trouble shooting and making adjustment when moving parts of machine & cutter in operation.	Injuries to limbs/ operator	Operator advised to ensure machine come to a complete stop before attempting to trouble shoot or make arrangement.	Moderate	Occasional	Medium risk	Ensure power turn off before proceeding with work. Refer to SWP-05 LOTO procedure	
		Clearing of swarf from machine, sharp pointed edges of object	Cuts to hand, fingers (limbs)/ person handling and person within the vicinity	Hand gloves provided to all workers. Compressed air used to blow swarf out of point of operation	Minor	Remote	Low risk		
		Waste material/ finished products strewed around work area resulting in tripping and step-on hazard (Maintenance of work area).	Bodily injuries/ person within the vicinity.	Housekeeping carried out by end of day to prevent accumulation of debris (swarf). Swarf is kept in drums located out door, waiting for proper disposal. Finished products are store away at designated location. Safety boots are worn	Moderate	Remote	Low risk		
11		Untrained operator	Bodily injuries/ operator and person within the vicinity.	Only workers trained in the safe operation are allowed to operate the machine. In-house training provided to new workers to refresh knowledge and understanding hazards involved.	Moderate	Remote	Low risk		
		Struck by flying object due to unsecured work piece.	Bodily injuries/ operator and person within the vicinity	Operator to check that work piece securely clamp in vice clamp before work commencement.	Moderate	Remote	Low risk		

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	Operation of lathe machine	Flying fragments/ objects, splashing cutting oil	Eye injuries/ operator and person within close vicinity	Safety glasses / face shield provided to operator. Operator cautioned against placing anything on the machine while it is running.	Moderate	Remote	Low risk		
	Operation of lathe machine	Dust generation from working with ceramic blocks	Inhalation of dust resulting in ill-health and eye irritation/ operator and person within the vicinity	Operation carried out within enclosure. LEV and Dust extractor provided. Respirator and safety glasses provided.	Moderate	Remote	Low risk		
		Sudden starting of cutter.	Injuries to limbs/ operator	Operator advised to disengage all clutches and feed to prevent the cutter from starting unexpectedly.	Moderate	Remote	Low risk		
		Cutter used in bad condition, (blunt)	Excessive force use causing injuries to limbs/ operator	Operator to ensure cutter are sharp and in good condition. Visual check prior to work commencement	Moderate	Remote	Low risk		
		Entanglement with rotating cutter.	Injuries to limbs/ operator	Operator provided with short sleeved and fitting T-shirt. Operators advised not to wear hand glove when operating machine.	Moderate	Remote	Low risk	Refer to SWP-01 for safe machine operation	
		Rotating protruded pipe from the lathe machine	Bodily injuries to nearby personnel if the protruded length is too long as the force of rotation could cause it to bend	Barricade the protrusion end of the machine Layout of the machine is away from the main working area Operator to keep a lookout for any nearby personnel	Moderate	Remote	Low risk		
		Slippery work area due to lubricant/ cutting oil dripping on floor.	Slip accident resulting in musculoskeletal injuries/ operator and person within the vicinity.	Lubricant/ cutting oil spills clean off immediately.	Moderate	Remote	Low risk		
		Contact with chemical, cutting oil	Skin allergic reaction (dermatitis), splashing into eyes/ operator	Workers provided with chemical resistant gloves when required to handle machined parts.	Moderate	Remote	Low risk		

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		Handling of machined parts (hot surface)	Burns to hand/ operator	Operator provided with gloves when handling machined parts (hot)	Moderate	Remote	Low risk		
		Machine left unattended	Bodily injuries/ person within the vicinity	Operator cautioned against leaving machine operating unattended.	Moderate	Remote	Low risk		
		Clearing of metal swarf from point of operation.	Cuts to hand/ operator	Push stick used to clear swarf from point of operation.	Moderate	Remote	Low risk		
				Compressed air also used to blow debris out of point of operation. Hand gloves worn by operator.					
		Trouble shooting and making adjustment when moving parts of machine	Injuries to limbs/ operator	Operator advised to ensure machine come to a complete stop before attempting to trouble shoot or make arrangement.	Major	Remote	Medium risk	Ensure power turn off before proceeding with work. Refer to SWP-05 LOTO procedure	
		Clearing of swarf from machine, sharp, pointed edges of object	Cuts to hand, fingers (limbs)/ person handling and person within the vicinity	Hand gloves provided to all workers. Compressed air used to blow swarf out of point of operation	Minor	Occasional	Low risk		
12	Operation of threading machine	Workers not trained in the proper method of using machine.	Injury to hand due to unsafe use/ operator	Only trained and experienced workers are deployed to operate machine.	Moderate	Remote	Low risk		
				New operator put under the supervision of more experienced workers.					
		Manual handling, lifting, carrying of heavy, bulky materials.	Musculoskeletal injuries/ person handling material	Proper lifting posture adopted when lifting object (refer SWP for manual handling). Workers advised to seek help from fellow workers when required.	Moderate	Remote	Low risk		

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		Dropping of heavy and bulky object while manual handling.	Feet injuries, crushed/ person handling and person within the vicinity	Safety shoes with steel toe-cap provided to all workers.	Moderate	Remote	Low risk		
		Manual handling of sharp, pointed edges of object.	Cuts to hand, fingers (limbs)/ person handling and person within the vicinity	Hand gloves provided to all workers.	Minor	Occasional	Low risk		
		Moving parts of machine (high torque)	Hand/ limbs can be drag into machine result crushing injuries/ operator.	Operator instructed not to wear loose fitting clothing, gloves when operating machine. Keep sleeves and jackets buttoned.	Moderate	Remote	Low risk		
		Flying fragments	Eye injuries/ operator	Safety glasses / face shield worn when operating machine.	Moderate	Remote	Low risk		
		Unattended machine, accidental starting	Hand/ limbs can be drag into machine result crushing injuries/ operator.	Power to machine is turned off when not in use.	Moderate	Remote	Low risk		
		Long heavy pipes used for threading. (falling object and awkward working posture)	Long pipe tipping resulting in falling object. Awkward working posture results in musculoskeletal injuries).	Long heavy pipe placed on pipe supports. Alternatively, operator is assisted by helper.	Moderate	Remote	Low risk		
		Clearing of sharp, pointed metal swarf from machine.	Cuts to hand, fingers (limbs)/ operator.	Brush or push stick used instead of bare hand.	Minor	Occasional	Low risk		
13	Cutting of metal sheet/ parts with plasma cutter.	Workers not trained in the proper method of using machine.	Injury to hand due to unsafe use/ operator	Only trained and experienced workers are deployed to operate machine. New operator put under the supervision of more experienced workers.	Moderate	Remote	Low risk		
		Fire hazards	Fire out break, burn injuries/ workers within the work area	All flammable removed from work area. Fully charged fire extinguisher on stand by.	Major	Remote	Medium risk		
		Flying fragment, hot molten slag.	Eye injuries/ operator	Safety glasses / face shield provided.	Moderate	Remote	Low risk		
			Bodily injuries from burn/ operator	Dry, undamaged clothing and gloves are worn, preferably flame-resistant.	Moderate	Remote	Low risk		
		Toxic fumes	Toxic allergic reaction and ill-health/ operator	Work area well ventilated. Forced ventilation used if ventilation is inadequate. Respirators to be used	Moderate	Remote	Low risk		
		Arc rays	Arc rays produce intense visible and invisible (ultraviolet and infrared) light rays that can burn eyes and skin.	Proper clothing protects your skin.. Eyes protected with a face shield or safety glasses outfitted with the correct lens shade.	Moderate	Remote	Low risk		

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14	Handling of heavy & bulky object using lifting equipment/ appliance (chain-blocks).	Workers not trained to use equipment safely, not familiar with operation procedure and unaware on safe rigging of load.	Death or bodily injuries/ person within the overhead crane operation area	Only worker trained on the safe operation procedure and rigging are being deployed.	Major	Remote	Medium risk	Close supervision of operation & workers by experienced supervisor. SWP 10 for safe use of lifting appliance and gears.	
		Lifting equipment/ appliance not fit for use due to lack of maintenance or wear and tear	Death or bodily injuries/ person within the hoisting operation area.	Lifting equipment undergoes mandatory yearly inspection by Qualified Person and issued with valid LE/LG certificate Pre-operation checks conducted .	Major	Remote	Medium risk	Pre-hoist operation checks to be carried out before commencing hoisting work.	
		Failure of hoisting equipment resulting in chain block and load dropping.	Death or bodily injuries/ person near by the work area.	Lifting equipment undergoes mandatory yearly inspection by Qualified Person and issued with valid LM certificate.	Major	Remote	Medium risk	SWP10 for safe use of lifting appliance and gears.	
		Failure of Lifting Gears (lifting chain) resulting in load dropping.	Death or bodily injuries/ person near by the work area.	Lifting Gears to undergo mandatory yearly inspection by QP and issued with valid LG certificate. Lifting capacity of the lifting gear and last inspection clearly displayed on the lifting gear.	Major	Remote	Medium risk	Pre-hoist operation checks to be carried out before commencing hoisting work. Refer SWP10 for safe use of lifting appliance and gears.	
		Hoisting of suspended load over head of worker.	Death or bodily injuries/ person near by the work area.	Operator cautioned against unsafe practice. Workers cautioned to stay clear of hoisting operation.	Major	Remote	Medium risk	Refer SWP10 for safe use of lifting appliance and gears.	
15	Heat welding machine (plastic)	Workers not trained in the proper method of using equipment/ machine.	Burns to hand/ limbs due to unsafe use/ operator	Only trained and experienced workers are deployed to carry out heat welding operation. New workers are put under the supervision of more experienced workers.	Moderate	Remote	Low risk		
		Heated air stream/ hot surface	Scalded or burn injuries/ operator.	Protective gloves are worn by workers.	Moderate	Remote	Low risk		
		Hazardous fumes	Ill-health from inhalation of hazardous fume/ operator	Operation carried out in well ventilated area. Forced ventilation provided when required.	Moderate	Remote	Low risk		

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		Missing information, MSDS	Ill-health from inhalation of hazardous fume/ operator	MSDS of plastic material is obtained from supplier. Based on MSDS, potential hazard identified and control measures applied accordingly.	Moderate	Remote	Low risk		
16	Working at height	Falling from height	Death or permanent disability/ person involved in the operation.	Safe means of access and working platform (complying with regulation) provided. Fall protection provided to all workers involved in working at height.	Major	Remote	Medium risk	Close supervision. Refer to SWP 06 for working at height	Maintenance Engineer
		Falling object.	Death or bodily injuries/ person directly or indirectly involved in the operation.	Working platform provided with toe board on all open side Area below installation work to be cordoned off	Major	Remote	Medium risk	Continuous monitoring/ supervision. Refer to SWP 06 for working at height	Maintenance Engineer
17	Housekeeping	Trip and fall on level.	Soft tissue damage/ person directly/ indirectly involved in the operation.	Housekeeping carried out regularly to clear all obstruction from workshop floor. Debris cleared daily.	Moderate	Remote	Low risk		