Risk assessment - General

THE UNIVERSITY OF WARWICK

Title of risk assessment	Use of Engineering Build Space v1.1	Department	Engineering	Date	September 2019

Description of activities:

Use of General Fabrication Equipment and Associated Activities in Engineering Build Space (Comprising of rooms EBS1.1, EBS1.2 and EBS1.3)

The Engineering Build Space and the relevant rules and access restrictions are designed to comply with the **Provision and Use of Work Equipment Regulations 1998 (PUWER).**

Persons at risk	Staff	Students	Occasional Visitors				

***Further assessment may be need to be undertaken as required by the relevant legislation**

Hazards	Existing control measures	Additional control measures required	By whom/when
Include brief explanation as to how they may cause harm.	Consider; safety devices, cut-out switches, safety signs, SOPs, training, PPE. etc	Required to prevent/reduce likelihood of hazard occurring.	Person responsible and completion date.
General Health and Safety Whole Engineering Build Space – Electric shock from machinery, guards and fences on machinery correctly set, machinery used at correct speed settings, Loose clothing not worn, jewelry removed, eye protection (goggles) worn when working, ventilation, extraction, equipment properly adjusted / used when working & emergency stop locations in the Build Space.	**General Control Measures** • Appropriate PPE (as dictated by local rules for equipment) must be worn at all times when using machinery. • Loose hair tied back and jewellery taken off. Sleeves pulled up. • Know where the Emergency stops are located within the room. • Areas should be kept clean and tidy. Scrap material should be put in bins. • Never run in the Build Space.	Weekly Inspections of all Build Space equipment to ensure emergency stops and guarding are in place and functioning correctly. Regular 'policing' of working practice to ensure compliance.	Engineering Build Space Makers in Residence

Full list of Engineering Build Space rules and expected behaviors (safe working practice) listed on Moodle Page (https://moodle.warwick.ac.uk/course/view.php?id=25097)		• Stools should be placed under desks if practical work is being undertaken. • Never blow dust - sweep into a bin or use vacuum. • Excess tools and materials put away after use. Carrying tools the correct way. • Main risk when people do not know or understand how to use something correctly – if not sure always ask. • All tools to be subject to visual inspection prior to use to look for wear, damage or incorrect start up/set up configuration?> • Mains powered tools checked as part of annual PAT testing programme.		Access to individual equipment controlled via key access and access only granted when competency is demonstrated to Maker in Residence. Student access between 9 am and 5 pm Mon-Friday	
Evaluation of risk	**Severity: Serious**		**Likelihood: Possible**		**Risk factor: Low**
Material Health and Safety **Wood Hazards:** • Wood dust irritates eyes and respiratory tract. • High levels of exposure to wood dust can cause skin, lung and nasal disorders. • High amounts of wood dust can become explosive. • Accumulating wood dust can cause fire hazard. • Wood dust on the floor can be slippery. • Brushing can create airborne dust. **Plastic Hazards:** • Dust from hand and machine cutting and shaping of acrylic and other plastic materials can irritate the eyes, nose and throat. Inhalation of dust can present a hazard. • Heat softened plastics can stick to skin. • Work pieces can shatter during manufacture. **Metal Hazards:** • Waste materials from processing metals can damage the eyes and skin. • Coolants and cutting oils can irritate the eyes and cause dermatitis. • Falling materials can present a hazard.		**Wood Control Measures:** • Sufficient local extraction and ventilation provided. • Respiratory protective equipment should be worn during any prolonged hand or machine sanding (available in EBS) • Suitable eye protection should be worn (available in EBS). • Machine sanding should be kept to a minimum. • Work areas should be kept clean. **Plastic Control Measures:** • Sufficient local extraction and ventilation provided. • Water should be used as a lubricant to minimise dust. • Suitable eye protection and respiratory protective equipment should be worn during machining (available in EBS) • Gloves should be used if work pieces are heat softened. • Work pieces should be securely clamped during operations. **Metal Control Measures:** • Proper instruction should be given on safe handling of metals and metal waste. • Suitable eye protection should be worn when machining metals.		Regular inspections of relevant LEV. Regular 'policing' of working practice to ensure compliance.	Engineering Build Space Makers in Residence Build Space Users

• Cutting metal can generate heat. **Chemical Hazards:** • Chemicals such as solvents, glues and paints can potential cause issues such as respiratory problems, skin and eye irritations as well as chemical burns.		• Hands should be washed thoroughly after contact with metals and coolants. • Use coolants where necessary. **Chemical Control Measures:** • All chemicals to be approved before use in the Engineering Build Space and a relevant risk assessment and COSHH process completed. • List of approved chemicals maintained on Engineering Build Space Moodle page. • Appropriate PPE (as detail in manufacturer instructions and COSHH assessment) should be worn.			
Evaluation of risk	**Severity: Serious**		**Likelihood: Possible**		**Risk factor: Low**
Portable Tools and Equipment Including Drills and Hot Glue Guns • Electric Shock from tools. • Contact with cutters, blades, abrasive wheels and sanding discs can cause injuries. • Broken cutters, blades and abrasive wheels (or particles from cutting operations) can be violently ejected. • Dust can be inhaled. • Trailing cables could be tripped over. • Inadvertent operation of portable tools. • Noise can lead to hearing problems. • Batteries can spontaneously combust or explode if incorrectly used. • Start up torque can cause the user injuries. • Burns from hot parts of equipment		• Portable tools only used for the purpose for which they are designed in accordance with the manufacturer's recommendations. • Users should be aware of hazards associated with portable tools and precautions that should be taken during use. • Portable tools should be isolated when not in use or when when changing cutters, blades, etc (as detailed in manufacturer instructions) • Cutting blades, disks and abrasive wheels to be changed by trained persons only (Maker in Residence) • If the equipment has moving parts or is likely to produce hazardous material, long hair and loose clothing should be secured, dangling jewellery should be removed, suitable gloves and eye protection worn. • All equipment that has parts that heat up with no visible indication/light should always be treated as hot. • Batteries on portable equipment to be charged by competent person/trained users (eg. Maker in Residence)	Regular 'policing' of working practice to ensure compliance. Usage of all portable tools and equipment controlled via key access granted once competence demonstrated.	Engineering Build Space Makers in Residence Build Space Users

Evaluation of risk	Severity: Serious		Likelihood: Possible		Risk factor: Low	
Hand Tools • Sharp tools, falling tools, tools breaking or coming apart in use, slipping tools (which can occur when pressure is applied to them) can all cause injury.		• Hand tools should be stored at a suitable height for access. • Hand tools should not be left projecting from a bench. • Faces of hammer heads and hammer shafts should be frequently inspected. • Edged tools should be kept sharp and in good condition. Sharp or pointed tools should be handled with care (with cutting edges protected or pointing downwards). • Bench vices and clamps should be maintained in good condition. • Tools should not be carried in pockets or under belts.		Regular 'policing' of working practice to ensure compliance. Usage of all portable tools and equipment controlled via key access granted once competence demonstrated. Tools inspected by users before use.		Engineering Build Space Makers in Residence Build Space Users
Evaluation of risk	**Severity: Minor**		**Likelihood: Possible**		**Risk factor: Low**	
Pillar Drill • Loose hair and clothing which can become entangled in moving parts of the drill should be tied back. • Electric shock from tools. • Chuck keys, broken drill bits, swarf and work pieces could be violently ejected. • Sharp edges on drill bits, work pieces and swarf can cause cuts. • Drill jamming could produce a torque reaction. • Dust produced could be inhaled and other particles could be ejected.		• Long hair and loose clothing should be tied back and jewellery taken off. • Suitable eye protection should be worn (available in EBS) • The chuck key should only be used to tighten and loosen the chuck, and otherwise kept safely away from the drill. • Training to be given on how to remove burrs from material. • Work should be secured in suitable vice or clamp if possible.		Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated.		Engineering Build Space Makers in Residence Build Space Users
Evaluation of risk	**Severity: Minor**		**Likelihood: Possible**		**Risk factor: Low**	
Powered Saws						

• Work pieces can become jammed in sawing machines. • Hands or fingers can come into contact with the blade. • Clothing can become entangled with the blade. • Dust or debris can be inhaled. • Noise can cause permanent hearing damage. • Inadvertent starting of the machine can present a hazard. • Withdrawing the work piece with the machine running can present a hazard. • Blunt or damaged blades can present a hazard.		• A conveniently positioned mushroom headed stop button or other suitable control device that can quickly stop the machine in an emergency. • Suitable eye protection should be worn, long hair should be tied back and protected from entanglement. • Saw blades should be of the correct pattern, sharp and distortion free. • Guide blocks, fences and table are maintained in good condition. • Interlocked LEV system fitted. • Ensure that users keep their fingers clear of the saw line and do not make adjustments to the machine set-up until it stops.	Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of saw blade Inspection of equipment by user before use	Engineering Build Space Makers in Residence Build Space Users
Evaluation of risk	**Severity: Serious**		**Likelihood: Likely**	**Risk factor: Moderate**
Sheet Metal Working • Closing movement between surfaces and other parts can result in trapping and serious injury. • Sharp edges on cut materials can cause cuts. • Lack of space around machines can lead to the operator being pushed by passers-by. • Slippery floor surfaces or loose items around the machine can cause slips that result in contact with moving parts. • Manual handling of sheet materials and operating levers or treadles can present a hazard. • Entanglement of long hair and loose clothing in moving parts can present a hazard.		• There should be sufficient space around the machine to prevent the operator from being accidentally pushed by passers-by. • Loose clothing and jewellery should be tucked in / removed. • Gloves worn when removing sharp materials. • When the machine is not in use it should be made safe by locking or disabling the action.	Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use	Engineering Build Space Makers in Residence Build Space Users

Evaluation of risk	Severity: Minor		Likelihood: Possible		Risk factor: Low	
Plastics Forming • Hot or molten plastics discharged from machines can cause burns. • Fumes or dust can be inhaled. • The machine can become unstable and cause injuries. • Traces of moisture in hygroscopic material can present a risk of explosive discharge. • Strip heaters can present an electric shock hazard. • Plastic granulator can present trapping hazard.		• The machines are all provided with a means of emergency electrical isolation. • The machines are fitted with safety guards around the areas that may lead to possible ejection of hot material. • Appropriate personal protective equipment should be worn. Eye protection (goggles) worn when operating machines.		Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use		Engineering Build Space Makers in Residence Build Space Users

Evaluation of risk	Severity: Minor		Likelihood: Possible		Risk factor: Low	
Pressing Operations • Contact with crushing parts • Contact with other moving parts • Hit by ejected material/equipment		• No loose clothing or jewellery • Use of eye protection • Use of guarding where possible.		Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment		Engineering Build Space Makers in Residence Build Space Users

				Inspection of equipment by user before use	
Evaluation of risk	**Severity: Serious**		**Likelihood: Possible**	**Risk factor: Low**	
Laser Cutting • The equipment can present an electric shock hazard. • Fumes from some materials being cut might be harmful. • Looking into the light source when working on reflective materials might be harmful.		• List of approved and prohibited materials placed next to machine • Stock of approved materials kept in facility to reduce likelihood of dangerous fumes from unknown materials. • Enclosure provided with wavelength filtered window		Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use	Engineering Build Space Makers in Residence Build Space Users
Evaluation of risk	**Severity: Minor**		**Likelihood: Possible**	**Risk factor: Low**	
Milling and Turning • Long hair and loose clothing can become entangled in moving parts of the lathe. • Work pieces, chuck keys, broken cutting tools and swarf can be violently ejected from the lathe. • Centre lathes can present a hazard of electrical shock. • Sharp edges on tools, work pieces and swarf can cause cuts. • Contact with cutting fluids, oil and grease can		• A conveniently positioned mushroom headed stop button or other suitable control device that can quickly stop the machine in an emergency. • Fixed guards, or alternatively interlocked guards that enclose the drive mechanisms. • Machines are fitted with a chuck guard. • There should be sufficient space around the machine to prevent the operator from being accidentally pushed by		Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated.	Engineering Build Space Makers in Residence Build Space Users

irritate the skin. • Swarf can jam or be ejected if allowed to build up. • Inadvertent starting of the machine can present a hazard. • Lack of space around the machine can lead to the operator being pushed by passers-by. • Slippery floor surfaces or loose items around the machine can cause slips that result in contact with moving parts.		passers-by. Only one person at a time should operate the machine. • Eye protection (goggles) worn when operating the machine, long hair should be tied back and protected from entanglement. Loose clothing and jewellery should be tucked in / removed. • The machine should be electrically isolated before any internal mechanisms are adjusted. • Care should be taken to ensure that work mounted to a faceplate, a chuck (or between centres on a lathe) is properly secured and balanced to prevent excessive vibration. • Coolant nozzles should not be adjusted while the machine is in operation. • Swarf should not be allowed to accumulate as it can become entangled or ejected by the chuck or work piece. Swarf should not be removed while the machine is operating. • Contact with the skin should be kept to a minimum. Hands should be washed thoroughly after using the machine. • Emery cloth should **NEVER** be applied directly by hand on lathes.	Regular inspection of equipment Inspection of equipment by user before use	
Evaluation of risk	**Severity: Major**		**Likelihood: Possible**		**Risk factor: Moderate**
Sanding and Grinding • Work can become jammed in the machine. • Hands or clothing can become jammed in the sanding machine. • Wood dust can be inhaled. • Inadvertently starting the machine. • The belt can break and lash out. • Hands can come in to contact with the abrasive		• The machine has a means of isolation, emergency stop. • Fixed or locked guards to enclose the drive mechanism. • Any belts should be narrower than the belt support plate and pulleys, to protect the user from the belt edges. Belt should be set in the correct direction of rotation. • The standing table on the vertical belt sander should be of rigid metal construction. The gap between the table and the belt should be sufficient to clear the debris but small enough	Regular ‘policing’ of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once	Engineering Build Space Makers in Residence Build Space Users

surface.	to ensure sufficient support for the timber. • For angled sanding it should only be possible to tilt downwards away from the belt to avoid jamming between the table and the belt. • Eye protection (goggles) should be worn when the machine is in operation. Long hair should be protected from entanglement. • Abrasive belts should be examined before use, torn belts should be discarded. Fingers should be kept away from the sanding belt.	competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use		
Evaluation of risk	**Severity: Minor**	**Likelihood: Possible**	**Risk factor: Low**	
Low Temperature Casting • Molten metal in contact with moisture on moulds and equipment can cause an explosion. • Some molten metals can give off harmful fumes. • Hot metal can cause burns. • Unstable equipment or work pieces can cause injury. • The equipment can present an electric shock hazard.		• Appropriate personal protective equipment should be used. • Crucibles should be preheated before use to avoid cracking and to remove moisture. • Heat resistant gloves should be worn when handling molten metals.	Regular 'policing' of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use	Engineering Build Space Makers in Residence Build Space Users
Evaluation of risk	**Severity: Serious**	**Likelihood: Possible**	**Risk factor: Low**	
General CNC Equipment (including 3D printers, CNC mills and plasma cutter) • Contact with revolving cutters can present a hazard.		• A conveniently positioned mushroom headed stop button or other suitable control device that can quickly stop the machine in an emergency.	Regular 'policing' of working practice to ensure compliance.	Engineering Build Space Makers in Residence

• Long hair and loose clothing can become entangled with rotating cutters or arbors. • Broken cutters, waste and work pieces can be violently ejected. • Wood dust can be inhaled. • Closing movement between parts, under power feed, can result in finger trapping. • Heavy objects such as vices and index fixtures can fall from the table. • CNC machines can present a hazard of electrical shock. • Sharp edges on tools, work pieces and swarf can cause cuts. • Inadvertent starting of the machine can present a hazard. • Lack of space around the machine can lead to the operator being pushed by passers-by. • Slippery floor surfaces or loose items around the machine can cause slips that result in contact with moving parts. • Contact with cutting fluids, oil and grease can irritate the skin.	• Fixed guards, or alternatively interlocked guards that enclose the drive mechanisms. • There should be sufficient space around the machine to prevent the operator from being accidentally pushed by passers-by. • Eye protection (goggles) worn when operating the machine, long hair should be tied back and protected from entanglement. Loose clothing and jewellery should be tucked in / removed. • The machine should be electrically isolated before any internal mechanisms are adjusted or when cleaning the stage. • Suitable implements should be used to remove swarf to avoid hand contact.	Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment Inspection of equipment by user before use	Build Space Users
Evaluation of risk	**Severity: Major**	**Likelihood: Possible**	**Risk factor: Moderate**
Soldering Iron and Electronics Equipment • Risk of electric shock from tools. • Leads could cause a tangle/trip hazard. • Hot soldering iron tips can cause burns. • Splashes of flux and solder can cause injury and damage to clothing. • Inhalation of fumes.	• Extra-low voltage soldering irons are preferred if practicable. • Supply leads for soldering irons should be heat resistant. Care should be taken to ensure that trailing leads do not become entangled with the operator, others in the vicinity or the hot soldering iron. • Soldering should be carried out where distractions to the user can be minimised. • Suitable eye protection should be worn. • Fume extraction systems fitted.	Regular ‘policing’ of working practice to ensure compliance. Usage of all tools and equipment controlled via key access granted once competence demonstrated. Regular inspection of equipment	Engineering Build Space Makers in Residence Build Space Users

				Inspection of equipment by user before use		
Evaluation of risk	**Severity: Serious**		**Likelihood: Possible**		**Risk factor: Low**	

Summary of assessment: The area / activity has been assessed against existing control measures in place. The assessment has identified some issues and made recommendations for additional control measures.

Signature of assessor: ____ _____ **Name:** _Dr Simon Leigh_____ **Date:** _04th Sept 2019_____
Email Address: _____s.j.leigh@warwick.ac.uk_____

Build Space User Signature: I have reviewed this risk assessment accept the issues identified along with additional control measures that will be implemented in order to reduce any residual risk to a level that is low as is reasonably practicable.

Signature of user: _____ **Name:** _____ **Date:** _____