

HIRAC Report

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1. Hazard Management Details – General

This form relates to OHS Procedure – [Hazard Identification, Risk Assessment and Control \(HIRAC\)](#)

School / Work Location:	Ballarat Tech School (Fed College)
Name of Person(s):	Liam Mudge
Date Conducted:	26/10/2023
Last Reviewed:	June 2021
Next Review Due:	October 2024

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<p>Description of Use:</p> <p>The Ballarat Tech School delivers a range of STEM curriculum projects. Some of these may be hazardous to user's health if safety procedures and lab etiquette are not followed.</p> <p>This document assesses the risks and control methods involved with using Automated machinery in the context of additive manufacturing, industrial automation and robotic systems.</p> <p>This includes:</p> <ul style="list-style-type: none"> • Dobot – Robotic Arm • Robotic kits such as :Vex EDR and IQ, mBot and the PiTop Robot kits • Custom made robotic systems. • 3D printers such as the MakeBlock Sketch, BambuLab CX1 & P1S and the Stratasys J55 • UV Printer and Vinyl Printer 	<p>Summary of Key Risks: (Refer to appropriate subsections)</p> <ul style="list-style-type: none"> • Entanglement • Electricity • Slips/trips/falls • Temperature • Shearing • Collisions • Crushing • Chemical
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Risk Assessment Matrix

Assessing OHS Risks

Risk assessments in matters of Occupational Health and Safety* are based on 2 key factors:

- The severity of any injury/illness resulting from the hazard(s), and
- The likelihood that the injury/illness will actually occur.

**Assessment of risk level based on likely severity and probability of harm*

		LIKELIHOOD			
		Very Unlikely Could happen, but probably never will	Unlikely Could happen, but very rarely	Likely Could happen sometime	Very likely Could happen any time
SEVERITY	Death or permanent disability	MEDIUM	HIGH	EXTREME	EXTREME
	Long-term illness or serious injury	LOW	MEDIUM	HIGH	EXTREME
	Medical attention and short-term incapacity	VERY LOW	LOW	MEDIUM	HIGH
	First aid needed	VERY LOW	VERY LOW	LOW	MEDIUM

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2. Documentation		
Relevant Legislation/Standards	Y / N	Comments
Key reference material:		<ul style="list-style-type: none"> • AS/NZS 3760:2022 In service safety inspection and testing of electrical equipment • AS 4024.3301-2017 Safety of Machinery- Robots for Industrial environments- Safety Requirements for Industrial robots - Robots • Product Safety Solutions. 3D printing and Consumer Product Safety. Gail Greatorex, • Hazardous Substance Risk Assessment Guide for the Composites Industry. Queensland Government Department of Employment and Industrial Relations. • Machinery and Equipment Safety- an Introduction. A Handbook for workplaces. Worksafe Victoria. • Safe Work Australia 'MANAGING RISKS OF HAZARDOUS CHEMICALS IN THE WORKPLACE Code of Practice May 2018' • Digital copies of user manuals are held online/BTS filing system, hard copies need to be available at the individual machines.

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3. Hazards

Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
ENTANGLEMENT Can anyone's hair, clothing, gloves, cleaning brushes, tools, rags or other materials become entangled with moving parts of the tools or materials?	Yes	Medium	<ul style="list-style-type: none"> Long hair, loose clothing, rags, cleaning brushes and jewellery could become entangled in the moving parts of the equipment or, could knock over equipment/vessels. 	<ul style="list-style-type: none"> Ensure hair, loose clothing, rags, and jewellery is kept clear of moving parts when in use. PPE can be used to restrict loose clothing. Hair ties/hair nets can be used to secure long hair. Ensure inappropriate jewellery and accessories (e.g. bracelets) are not worn when operating equipment. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
<p>IMPACT & CUTTING INJURIES</p> <p>Can anyone be crushed/cut/struck etc.</p> <p>Due to:</p> <ul style="list-style-type: none"> Material falling of equipment. Uncontrolled/unexpected movement of equipment. Inability to stop/immobilize equipment. Contact with moving parts during operation. 	Yes	Medium	<ul style="list-style-type: none"> Equipment may move in an unexpected way causing collision/impact damage to users and other objects. Unexpected Power up/down of system resulting in movement. Pinching, crushing, or other injuries related to collision may occur if persons occupy/hold machinery while it is operational. Risk of ejected material (filler material, swarf etc.) entering eye or skin while work piece is being removed/handled. Mismatch of equipment parts may cause several hazards. 	<ul style="list-style-type: none"> Users inducted into safe work practice. Use of clearly marked exclusion zones on and around automated machinery. Interlock mechanisms to halt automated activity upon user interaction, where possible. Use of spotter while operating automated machinery so it can be stopped quickly if required. Use of PPE while working with advanced manufacturing equipment and work pieces. Refer to manufactures manual, MSDS's and Standard Operating Procedures for equipment specific information prior to use. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
SHEARING <ul style="list-style-type: none"> Can anyone's body parts be sheared between two parts of tool, or between a part of the tool and a work piece or structure? 	Yes	Medium	Automated equipment may cause shearing injury if body parts become entangled in machinery while it's operational.	<ul style="list-style-type: none"> Users inducted into safe work practice. Use of exclusion zones on and around automated machinery. Interlock mechanisms to halt automated activity upon user interaction, where possible. Use of spotter while operating automated machinery so it can be stopped quickly if required. Refer to manufactures manual and safe operating procedures for equipment specific information prior to use. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
ELECTRICITY Can anyone be injured or burnt due to: <ul style="list-style-type: none"> • Access to electricity. • Damaged or poorly maintained electrical leads, cables, or switches? • Water near electrical equipment? 	Yes	High	<ul style="list-style-type: none"> • Contact with electrically live components. • Cables may become damaged because of normal use or mistreatment posing an electrical shock hazard. • Components of automated equipment may become hot because of electrical resistance or intended operation. • Wet areas where electrical equipment is operated can cause outlets/equipment to be exposed to water 	<ul style="list-style-type: none"> • Users inducted into safe work practice. • Use of exclusion zones on and around automated machinery as required. • Interlock mechanisms to halt automated activity upon user interaction, where possible. • Use of spotter while operating automated machinery so it can be stopped quickly if required. • Ensure all power cables are regularly inspected prior to use and maintained by trained personnel. • Any equipment operating in a wet area must have power adequately isolated from "Splash zones" • Use of water alarms to alert to water spills. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
ERGONOMICS Can anyone be injured due to: <ul style="list-style-type: none"> Poorly designed workstation? Inadequate or poorly placed lighting? 	Yes	Medium	<ul style="list-style-type: none"> Inappropriate placement of machinery controls. Design of workstation does not allow observation of machine and control system at the same time. Inadequate lighting may result in incorrect wiring/assembly. Inadequate lighting may result in unintended contact with tool/workpiece. Machine cell obstructed by objects/machinery. 	<ul style="list-style-type: none"> Control station located at or near machine cell. Ensure machine cell has adequate room to perform task unobstructed. Ensure adequate lighting to perform task. Additional lighting may be required if ambient/room lighting is insufficient 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
RADIATION Can anyone using the tool, or in the vicinity of the tool suffer injury or illness due to exposure to radiation in the form of any of the following: <ul style="list-style-type: none"> infra-red radiation ultra violet light microwaves 	Yes	Medium	<ul style="list-style-type: none"> Some automated manufacturing machinery uses class 2 lasers which can cause damage to eyes if looked at directly. Some manufacturing processes use UV radiation to cure inks/resins. 	<ul style="list-style-type: none"> Engineered exclusion zones. Interlocking features reduce visual access to the beam/radiation. UV shielded screens to reduce exposure risks. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
NOISE Can anyone using the tool, or in the vicinity of the plant, suffer injury due to exposure to noise?	Yes	Medium	<ul style="list-style-type: none"> Multiple manufacturing processes can result in an increased noise level which could be hazardous over prolonged periods. 	<ul style="list-style-type: none"> Limiting exposure to noisy environment. Reducing the amount of time multiple operations are undertaken by operators, Use of appropriate PPE. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
SLIPS / TRIPS / FALLS Can anyone using the tool, or in the vicinity of the plant, slip, trip or fall due to:	Yes	Medium	<ul style="list-style-type: none"> Poor housekeeping practices allowing the build-up of waste materials or failure to immediately clean up spills could result in a slip hazard. Inappropriate placement of objects (e.g. spare materials, bags etc.) in the immediate vicinity of the plant equipment may result in trip hazard. 	<ul style="list-style-type: none"> Ensure appropriate cleaning and housekeeping practices are maintained to minimise the risk of a slip, trip or fall. No bags, work pieces or waste to be left on the floor/walkways 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
FIRE & EXPLOSION <ul style="list-style-type: none"> • Can anyone be injured by fire? • Can anyone be injured by explosion of gases, vapours, liquids, dusts, or other substances? 	Yes	Medium	Equipment/Components/Chemicals may catch fire if overheated/left on for extended periods of time.	<ul style="list-style-type: none"> • Refer to manufactures manual, MSDS's and Standard Operating Procedures for equipment specific information prior to use. • Appropriate supervision/observation of machinery while in use. • Ensure equipment powered down when not in use. • Use of appropriate signage to identify hot components/work pieces. • Access to appropriate fire suppression measures. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
TEMPERATURE / MOISTURE Can anyone come into contact with objects at high or low temperatures?	Yes	Medium	<ul style="list-style-type: none"> Some machinery components and work pieces may become hot during the operation process. Heating of additive manufacturing material may release fumes which could induce nausea or respiratory problems for users. Some chemical processes may result in exothermic reactions. 	<ul style="list-style-type: none"> Avoid touching hot components. Rest unit on heatproof surface. Allow work piece to cool before touching. Ensure appropriate ventilation. Refer to material MSDS additive materials. Refer to manufactures manual and safe operating procedures for equipment specific information prior to use. 	Low

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Hazards Inspected		Initial Risk	Description of Risk	Control Measures	Residual Risk
OTHER Can anyone be injured or suffer ill-health from exposure to: <ul style="list-style-type: none"> Chemicals? Toxic gases or vapours? Fumes/Dusts? 	Yes	Medium	<ul style="list-style-type: none"> Some processes may involve toxic chemical as either a primary consumable material or as a waste product. Post processing of workpieces may involve chemical baths, the production of dust or fumes. 	<ul style="list-style-type: none"> Ensure appropriate ventilation. Refer to material MSDS additive materials. Refer to manufactures manual and safe operating procedures for equipment specific information prior to use. Use of appropriate PPE 	Low

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4. Risk Assessment Signoff

Authorised By: Albert Ferguson

Signature: A-Ferguson

Date: 16/01/2024

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