HAZARD MANAGEMENT – RISK ASSESSMENT

This template or equivalent template can be used

Date: 17/04/20

MULTIPLE TASKS

(If you have not completed a risk assessment before refer to the Handbook Chapter Appendix A for guidance)

RECORD THE HIGHEST RESIDUAL RISK RATING Ensure the appropriate level of authority to complete the activity can be evidenced. (e.g. a signature or formal approval attached)	☐ Low ☐ Medium ☐ High ☐ Very high

Physical location(s) or Operational unit	Student Personal Workshops
Names of workers involved in completing the risk assessment	Harry Lukasz: a1721127

Supervisors/person in control of the area/activity

- *Ensure that the control measures address the hazards identified for each step in the process for this task.*
- *Ensure that there is a system for retaining this Risk assessment. (See section 5.1 of the Handbook chapter)*
- *Ensure that workers who undertake this task have access to this Risk assessment, are provided with the relevant, information, instruction and training required before they undertake the task. (This includes any other guidance material (e.g. Safe operating procedures) where required by this Risk assessment.)*
- *Ensure that if there is a requirement for instruction (Level 2 proficiency) and/or training (Level 3 competency/qualification) the information is added to the Training plan.*

Standard controls for this location (e.g. Lab/workshop rules) (See definitions for information on control banding) The control measures listed must be applied by all workers when entering the location regardless of whether they are completing the task. The control measures must be specific. They do not need to be repeated under each task below.	**[List lab/workshop rules here if applicable]** NA - Personal student workshops are subject to varying rules.

Hazard identification: Stop and think. What could cause harm from start to finish?		**Assess the harm**	**What needs to be in place before you start?**	**Re-assess the level of risk**
Identify and list each hazard that is part of this work process	Record how/when the worker is exposed to the hazard (e.g. what is the route of exposure when completing the task)	Calculate the risk rating without controls in place (See descriptor table overleaf)	The measures you select must address the hazard, be selected in accordance with the Hierarchy of Control and be clear to the worker. (Refer to the Hierarchy of Control Appendix A page 6 for guidance.)	i.e. the residual risk rating after controls are in place
Task 1:	**Forming conflute/foam material for fuselage of prototypes**			
A)Skin laceration B)Skin burns C)Particulate inhalation	These risks are present throughout the full manufacturing process of the airframe prototypes. A)Skin lacerations can occur when initially cutting material to desired size. Expected tools to cause these lacerations are a craft knife, hand saw and hacksaw. B)Exposure to minor burns when joining	☐ Low ☐ Medium ☐ High ☐ Very high	A)PPE: This can be mitigated by ensuring the worker wears appropriate PPE (Appropriately thick gloves) B)PPE: This can be mitigated through use of PPE (Appropriately thick gloves) when using a hot glue gun. C)PPE: This can be mitigated by wearing appropriate PPE (face mask) when shaping material through sanding methods.	☐ Low ☐ Medium ☐ High ☐ Very high

	material due to application of hot glue. C)Exposure to particulate inhalation when shaping material through use of sandpaper.			

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Identify and list each hazard that is part of this work process	Record how/when the worker is exposed to the hazard (e.g. what is the route of exposure when completing the task)	Calculate the risk rating without controls in place (See descriptor table overleaf)	The measures you select must address the hazard, be selected in accordance with the Hierarchy of Control and be clear to the worker. (Refer to the Hierarchy of Control Appendix A page 6 for guidance.)	i.e. the residual risk rating after controls are in place
Task 2:	**Manufacturing Control/Power System**			
A)Skin laceration B)Skin burns C)Chemical Inhalation D)Damage to eyes	These risks are present throughout the full manufacturing process of the control system. A)Skin lacerations: When sizing the wires to connect flight controllers, arduino and sensors, skin lacerations can occur when using wire cutters. B) Skin burns can occur when soldering wires to flight controllers, arduino and sensors. Burns can also occur if the power source is shorted when connecting circuitry due to heating of electrical elements and battery. C) Inhalation of toxic rosin can occur when soldering any element of the system. D) When soldering, molten flux from soldering wire can boil and jump from the wire. When signal wire is cut, the unconstrained end is often launched unexpectedly.	☐ Low ☐ Medium ☐ High ☐ Very high	A)PPE: This can be mitigated by ensuring all workers wears appropriate PPE (Appropriately thick gloves) B)PPE/Administration:This can be mitigated by ensuring all workers wear appropriate PPE (Appropriately thick gloves). The likelihood of shorting the power source can be reduced if all circuitry is checked by at least two members before the addition of power. Due to social distancing measures, detailed images of the circuit will be uploaded and assessed over zoom to ensure all circuitry is safe and acceptable. C)Engineering: Chemical inhalation can be eliminated by ensuring all soldering is conducted in a large area with the mandatory use of a solder fume extractor - a device which is easily obtained through an online purchase. D) PPE/Engineering: This risk can be mitigated via implementing appropriate PPE (safety glasses/face shield which must be worn at all times when conducting these processes). Flux burns can also be mitigated by ensuring soldering wire with low flux composition is used.	☐ Low ☐ Medium ☐ High ☐ Very high

Task 3:	Calibrate/Flight Test System			
A) Prop Strike B) Overcharging lithium polymer battery cells/charging while unattended C) Losing control of/ losing prototype due to loss of control signal D) Skin burns	A) Prop strike is a common risk, especially when the system is initially calibrated. This occurs when a motor, with a propeller attached, unexpectedly rotates, striking any objects within the propellers radius. Propeller strike at this scale can cause skin laceration if safety measures are not taken. B) Overcharging a lithium polymer battery can cause overheating and in severe cases, spontaneous combustion. Charging the battery unattended exacerbates these effects. C) Since all prototypes are in the testing phase, the likelihood of control failure is medium. When remotely piloting the system, loss of control could cause the system to erratically gain altitude and if test flight is conducted outside, the system could be lost. D) Certain electrical components of the prototype system can become hot in the situation of component failure. Speed controllers are a specific component of the electrical system that experience large heat fluctuation when faulty or incorrectly used. Handling of such components can cause burns.	☐ Low ☐ Medium ☐ High ☐ Very	A) Engineering: Prop strike can be eliminated via implementing a programmed safety switch on the transmitter system such that motors are only activated when the system is clear of any obstructions. Prior to this, testing can be conducted without propellers constrained to the motors to ensure unexpected motor activation does not occur. B) Administrative/Engineering: The documentation of a safe operating procedure can be provided to all team members regarding the charging of a lithium polymer battery. Further, overcharging can be eliminated via implementing a balance charging device which monitors charging current and battery voltage in each cell of the lithium polymer battery. Such devices also feature an built-in timer which automatically cancels charging should the battery not charge after the expected time. These devices are low-cost and easily obtained through online vendors. C)Engineering: To avoid losing prototypes in the event of a control system failure during test flights, prototypes can be tethered to an anchor such that loss of control will not result in the system erratically gaining altitude or displacement from initial position. Remote pilots and observers will be positioned beyond the length of the tether such that injury due to impact with the prototype cannot occur. D) Engineering/Isolation: This risk can be mitigated via mounting electrical components that experience large heat fluctuation such that contact with workers when handling the device is not possible. Isolation of the device after use can be implemented to allow all electrical components to reduce in temperature until it is deemed safe to handle the device.	☐ Low ☐ Medium ☐ High ☐ Very high

Authorisation for staff and student related tasks		
Residual risk rating	**Authorisation**	**Name and signature (or attach evidence of authorisation)**

Low & medium risk	Supervisor/Person in control of the area/activity	Rey Chin	
High risk	Head of School/Branch		
Very high risk	Executive Dean/Divisional Head		

Proof of hazard identification and risk assessment is required for this task

- ❑ File your completed Risk assessment as instructed by the Supervisor/Person in control of the area/activity
- ❑ Ensure there is a system for retaining formal Risk assessments in accordance with the State Records of SA, General disposal Schedule No. 30 issued under the State Records Act 1997. (Contact the University's Records Management Office for further assistance/information if required.)

DESCRIPTORS FOR ASSESSING THE LEVEL OF RISK

Assess the level of risk based on the likelihood of an incident occurring and the consequence			
Likelihood Table		**Consequences Table**	
Almost certain	There is an expectation that an event/incident will occur.	**Severe**	Injury resulting in death, permanent incapacity.
Likely	There is an expectation that an event/incident **could occur** but not certain to occur.	**Major**	Injury requiring extensive medical treatment (e.g. hospitalisation) or activities could result in a Notifiable occurrence.
Possible	This expectation lies somewhere in the midpoint between "could" and "improbable".	**Moderate**	Injury requires formal medical treatment (e.g. hospital outpatient/doctors visit).
Unlikely	There is an expectation that an event/incident is doubtful or **improbable** to occur.	**Minor**	Injury requires first aid treatment.
Rare	There is no expectation that the event/incident will occur.	**Negligible**	Injury requires minor first aid (e.g. bandaid), short term discomfort (e.g. bruise, headache), no medical treatment.

The level of risk will increase as the likelihood of harm and its severity increases										
Likelihood of exposure	**Consequences – level of seriousness of the injury following exposure to the hazard(s) -**									
	Negligible		**Minor**		**Moderate**		**Major**		**Severe**	
Almost certain	☐	**Medium**	☐	**High**	☐	**Very High**	☐	**Very High**	☐	**Very High**
Likely	☐	**Medium**	☐	**Medium**	☐	**High**	☐	**Very High**	☐	**Very High**
Possible	☐	**Low**	☐	**Medium**	☐	**High**	☐	**High**	☐	**Very High**
Unlikely	☐	**Low**	☐	**Low**	☐	**Medium**	☐	**Medium**	☐	**High**
Rare	☐	**Low**	☐	**Low**	☐	**Low**	☐	**Medium**	☐	**Medium**