

FAMU-FSU College of Engineering
Project Hazard Assessment Policy and Procedures

INTRODUCTION

University laboratories are not without safety hazards. Those circumstances or conditions that might go wrong must be predicted and reasonable control methods must be determined to prevent incident and injury. The FAMU-FSU College of Engineering is committed to achieving and maintaining safety in all levels of work activities.

PROJECT HAZARD ASSESSMENT POLICY

Principal investigator (PI)/instructor are responsible and accountable for safety in the research and teaching laboratory. Prior to starting an experiment, laboratory workers must conduct a project hazard assessment (PHA) to identify health, environmental and property hazards and the proper control methods to eliminate, reduce or control those hazards. PI/instructor must review, approve, and sign the written PHA and provide the identified hazard control measures. PI/instructor continually monitor projects to ensure proper controls and safety measures are available, implemented, and followed. PI/instructor are required to reevaluate a project anytime there is a change in scope or scale of a project and at least annually after the initial review.

PROJECT HAZARD ASSESSMENT PROCEDURES

It is FAMU-FSU College of Engineering policy to implement followings:

1. Laboratory workers (i.e. graduate students, undergraduate students, postdoctoral, volunteers, etc.) performing a research in FAMU-FSU College of Engineering are required to conduct PHA prior to commencement of an experiment or any project change in order to identify existing or potential hazards and to determine proper measures to control those hazards.
2. PI/instructor must review, approve and sign the written PHA.
3. PI/instructor must ensure all the control methods identified in PHA are available and implemented in the laboratory.
4. In the event laboratory personnel are not following the safety precautions, PI/instructor must take firm actions (e.g. stop the work, set a meeting to discuss potential hazards and consequences, ask personnel to review the safety rules, etc.) to clarify the safety expectations.
5. PI/instructor must document all the incidents/accidents happened in the laboratory along with the PHA document to ensure that PHA is reviewed/modified to prevent reoccurrence. In the event of PHA modification a revision number should be given to the PHA, so project members know the latest PHA revision they should follow.
6. PI/instructor must ensure that those findings in PHA are communicated with other students working in the same laboratory (affected users).
7. PI/instructor must ensure that approved methods and precautions are being followed by :
 - a. Performing periodic laboratory visits to prevent the development of unsafe practice.
 - b. Quick reviewing of the safety rules and precautions in the laboratory members meetings.
 - c. Assigning a safety representative to assist in implementing the expectations.
 - d. Etc.
8. A copy of this PHA must be kept in a binder inside the laboratory or PI/instructor's office (if experiment steps are confidential).

Project Hazard Assessment Worksheet

PI/instructor: Dr. McConomy	Phone #: 850-410-6624	Dept.: ME	Start Date: January 2021	Revision number: 1
Project: Senior Design: Low Cost HOTAS Team 512			Location(s): ME Senior Design Lab	
Team member(s): Robert Blount, Connor Chuppe, Robert Craig, Patrick Dixon			Phone #: 5613063836	Email: cnc17e@my.fsu.edu




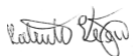
Experiment Steps	Location	Person assigned	Identify hazards or potential failure points	Control method	PPE	List proper method of hazardous waste disposal, if any.	Residual Risk	Specific rules based on the residual risk
Soldering (Wiring)	ME Senior Design Lab	Entire Team	Burning of skin Electrocution Fire Contaminated Air Lacerations	Ventilated Room	Gloves Safety Goggles	Place in container labeled "Lead Solder Waste for Recycling"	HAZARD: 2 CONSEQ:C	Shown below
							Residual: 2	
3D Printing	ME Senior Design Lab	Entire Team	Contaminated Air Burning of Skin	Use a filament that is not harmful Place in enclosure	Respiratory Mask	N/A	HAZARD: 1 CONSEQ:A	Shown below
							Residual:2	
Heat Shrinking	ME Senior Design Lab	Entire Team	Burning of Skin	Ventilated Room	Gloves Safety Goggles	N/A	HAZARD: 2 CONSEQ:A	Shown below
							Residual:3	
Mounting Components Together	ME Senior Design Lab	Entire Team	Contaminated Air, Lacerations, pinches	Ventilated Room	Gloves Respiratory Mask	N/A	HAZARD: 1 CONSEQ:A	Shown below
							Residual:1	
Maneuvering in Senior Design Lab (physical-ergonomic hazards)	ME Senior Design Lab	Entire Team	Trip and Fall, Struck by projectile	Clean floor Organized room	Closed-toed shoes Long pants	N/A	HAZARD: 1 CONSEQ:A,B, C	Shown below
							Residual:2	
Biological hazard (Covid-19)	ME Senior Design Lab	Entire Team	Covid-19, other types of infectious diseases	Masks, social distancing, clean surfaces often, test semi regularly	Masks, face shields, sanitization products	Discard of masks in appropriate containers	HAZARD: 3 CONSEQ: B,C,D,E Residual: varies 1-5	Will discuss with instructor-lab supervisor

Hazardous substances (epoxy, glue)	ME Senior Design Lab	Entire Team	Having skin exposure to epoxy or fast setting glue(burns, skin removal)	Using PPE, or advisory guidance	Gloves, all standard lab clothing	If residual material, left to harden in a designated container before disposal into trash.	HAZARD: 3 CONSEQ: B,C Residual: 2	Shown below
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Principal investigator(s)/ instructor PHA: I have reviewed and approved the PHA worksheet.

Name	Signature	Date	Name	Signature	Date
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Team members: I certify that I have reviewed the PHA worksheet, am aware of the hazards, and will ensure the control measures are followed.

Name	Signature	Date	Name	Signature	Date
<u>Robert Blount</u>		12/03/2020	<u>Robert Craig</u>		12/03/2020
<u>Connor Chuppe</u>		12/03/2020	<u>Patrick Dixon</u>		12/03/2020

ed.

DEFINITIONS:

Hazard: Any situation, object, or behavior that exists, or that can potentially cause ill health, injury, loss or property damage e.g. electricity, chemicals, biohazard materials, sharp objects, noise, wet floor, etc. OSHA defines hazards as “*any source of potential damage, harm or adverse health effects on something or someone*”. A list of hazard types and examples are provided in appendix A.

Hazard control: Hazard control refers to workplace measures to eliminate/minimize adverse health effects, injury, loss, and property damage. Hazard control practices are often categorized into following three groups (priority as listed):

- 1. Engineering control:** physical modifications to a process, equipment, or installation of a barrier into a system to minimize worker exposure to a hazard. Examples are ventilation (fume hood, biological safety cabinet), containment (glove box, sealed containers, barriers), substitution/elimination (consider less hazardous alternative materials), process controls (safety valves, gauges, temperature sensor, regulators, alarms, monitors, electrical grounding and bonding), etc.
- 2. Administrative control:** changes in work procedures to reduce exposure and mitigate hazards. Examples are reducing scale of process (micro-scale experiments), reducing time of personal exposure to process, providing training on proper techniques, writing safety policies, supervision, requesting experts to perform the task, etc.
- 3. Personal protective equipment (PPE):** equipment worn to minimize exposure to hazards. Examples are gloves, safety glasses, goggles, steel toe shoes, earplugs or muffs, hard hats, respirators, vests, full body suits, laboratory coats, etc.

Team member(s): Everyone who works on the project (i.e. grads, undergrads, postdocs, etc.). The primary contact must be listed first and provide phone number and email for contact.

Safety representative: Each laboratory is encouraged to have a safety representative, preferably a graduate student, in order to facilitate the implementation of the safety expectations in the laboratory. Duties include (but are not limited to):

- Act as a point of contact between the laboratory members and the college safety committee members.
- Ensure laboratory members are following the safety rules.

- Conduct periodic safety inspection of the laboratory.
- Schedule laboratory clean up dates with the laboratory members.
- Request for hazardous waste pick up.

Residual risk: Residual Risk Assessment Matrix are used to determine project’s risk level. The hazard assessment matrix (table 1) and the residual risk assessment matrix (table2) are used to identify the residual risk category.

The instructions to use hazard assessment matrix (table 1) are listed below:

1. Define the workers familiarity level to perform the task and the complexity of the task.
2. Find the value associated with familiarity/complexity (1 – 5) and enter value next to: HAZARD on the PHA worksheet.

Table 1. Hazard assessment matrix.

		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

The instructions to use residual risk assessment matrix (table 2) are listed below:

1. Identify the row associated with the familiarity/complexity value (1 – 5).
2. Identify the consequences and enter value next to: CONSEQ on the PHA worksheet. Consequences are determined by defining what would happen in a worst case scenario if controls fail.
 - a. Negligible: minor injury resulting in basic first aid treatment that can be provided on site.
 - b. Minor: minor injury resulting in advanced first aid treatment administered by a physician.
 - c. Moderate: injuries that require treatment above first aid but do not require hospitalization.
 - d. Significant: severe injuries requiring hospitalization.
 - e. Severe: death or permanent disability.
3. Find the residual risk value associated with assessed hazard/consequences: Low –Low Med – Med– Med High – High.
4. Enter value next to: RESIDUAL on the PHA worksheet.

Table 2. Residual risk assessment matrix.

Assessed Hazard Level	Consequences				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium

Specific rules for each category of the residual risk:

Low:

- Safety controls are planned by both the worker and supervisor.
- Proceed with supervisor authorization.

Low Med:

- Safety controls are planned by both the worker and supervisor.
- A second worker must be in place before work can proceed (buddy system).
- Proceed with supervisor authorization.

Med:

- After approval by the PI, a copy must be sent to the Safety Committee.
- A written Project Hazard Control is required and must be approved by the PI before proceeding. A copy must be sent to the Safety Committee.
- A second worker must be in place before work can proceed (buddy system).
- Limit the number of authorized workers in the hazard area.

Med High:

- After approval by the PI, the Safety Committee and/or EHS must review and approve the completed PHA.
- A written Project Hazard Control is required and must be approved by the PI and the Safety Committee before proceeding.
- Two qualified workers must be in place before work can proceed.
- Limit the number of authorized workers in the hazard area.

High:

- The activity will not be performed. The activity must be redesigned to fall in a lower hazard category.

Appendix A: Hazard types and examples

Types of Hazard	Example
Physical hazards	Wet floors, loose electrical cables objects protruding in walkways or doorways
Ergonomic hazards	Lifting heavy objects Stretching the body Twisting the body Poor desk seating
Psychological hazards	Heights, loud sounds, tunnels, bright lights
Environmental hazards	Room temperature, ventilation contaminated air, photocopiers, some office plants acids
Hazardous substances	Alkalis solvents
Biological hazards	Hepatitis B, new strain influenza
Radiation hazards	Electric welding flashes Sunburn
Chemical hazards	Effects on central nervous system, lungs, digestive system, circulatory system, skin, reproductive system. Short term (acute) effects such as burns, rashes, irritation, feeling unwell, coma and death. Long term (chronic) effects such as mutagenic (affects cell structure), carcinogenic (cancer), teratogenic (reproductive effect), dermatitis of the skin, and occupational asthma and lung damage.
Noise	High levels of industrial noise will cause irritation in the short term, and industrial deafness in the long term.
Temperature	Personal comfort is best between temperatures of 16°C and 30°C, better between 21°C and 26°C.

	Working outside these temperature ranges: may lead to becoming chilled, even hypothermia (deep body cooling) in the colder temperatures, and may lead to dehydration, cramps, heat exhaustion, and hyperthermia (heat stroke) in the warmer temperatures.
Being struck by	This hazard could be a projectile, moving object or material. The health effect could be lacerations, bruising, breaks, eye injuries, and possibly death.
Crushed by	A typical example of this hazard is tractor rollover. Death is usually the result
Entangled by	Becoming entangled in machinery. Effects could be crushing, lacerations, bruising, breaks amputation and death.
High energy sources	Explosions, high pressure gases, liquids and dusts, fires, electricity and sources such as lasers can all have serious effects on the body, even death.
Vibration	Vibration can affect the human body in the hand arm with `white-finger' or Raynaud's Syndrome, and the whole body with motion sickness, giddiness, damage to bones and audits, blood pressure and nervous system problems.
Slips, trips and falls	A very common workplace hazard from tripping on floors, falling off structures or down stairs, and slipping on spills.
Radiation	Radiation can have serious health effects. Skin cancer, other cancers, sterility, birth deformities, blood changes, skin burns and eye damage are examples.
Physical	Excessive effort, poor posture and repetition can all lead to muscular pain, tendon damage and deterioration to bones and related structures
Psychological	Stress, anxiety, tiredness, poor concentration, headaches, back pain and heart disease can be the health effects
Biological	More common in the health, food and agricultural industries. Effects such as infectious disease, rashes and allergic response.

Project Hazard Control- For Projects with Medium and Higher Risks

Name of Project: Low-Cost Hands-on Throttle and Stick		Date of submission: 12/3/20
Team member	Phone number	e-mail
Robert Blount	850-206-6022	Robert1.blount@famuedu
Connor Chuppe	561-306-3836	Cnc17e@my.fsu.edu
Robert Craig	850-728-7039	robert2.craig@famuedu
Patrick Dixon	850-218-8996	Pdd17@my.fsu.edu
Faculty mentor	Phone number	e-mail
Shayne McConomy	850-410-6624	smcconomy@eng.famuedu
Rewrite the project steps to include all safety measures taken for each step or combination of steps. Be specific (don't just state "be careful").		
3D Printing: Don't touch components that reach high temperatures, when cleaning part post print examine part for sharp edges first, wear gloves.		
Soldering (Wiring): Wear gloves and safety goggles, hold hand that is not holding the soldering iron far enough away to avoid burns, don't touch the hot part of the soldering iron.		
Heat Shrinking: Wear gloves, when using heat gun keep hand holding the heat shrink far away from hot air.		
Mounting Components Together: Don't breathe in epoxy, when screwing parts together be mindful of hand placement, don't force things together if they aren't fitting.		
Maneuvering in Senior Design Lab: Have situational awareness as too what other teams are working in the lab, don't rush or run in the lab.		
Covid 19: Wear a mask and social distance at all times, sanitize workstations before and after working, clean hands before and after entering the lab, don't come to lab if you have had known contact with someone Covid 19 positive.		
Thinking about the accidents that have occurred or that you have identified as a risk, describe emergency response procedures to use.		
In looking at an accident that occurred in October of 2010 where an 18-year-old male burnt his middle finger on a soldering iron, the emergency response for this, if it were to happen to us, would be to cool the burn, apply lotion and bandage the wound, notify another student working in the lab. If a severe burn, drive to the hospital and notify an employee of the college, if extremely severe call 911/Emergency responders.		

Common accidents that have occurred with 3D printing are minor burns in which the emergency response would be the same as stated above. Lacerations of the skin from people cleaning their part post print. If the cut is minor, clean the cut and bandage the wound, notify a fellow student in the lab. If severe, notify an employee of the college and determine if it needs to be stitched. If stitches are needed either drive to the hospital or dial 911 for emergency responders if cut is extreme.

For the potential risks associated with the heat shrink usage and mounting components together, the same procedure will be followed as stated above for either a cut or a burn.

List emergency response contact information:

- Call 911 for injuries, fires or other emergency situations
- Call your department representative to report a facility concern

Name	Phone number	Faculty or other COE emergency contact	Phone number
Keith Larson	(850)-410-6108	Larson@eng.famu.fsu.edu	
Patrick Hollis	(850)-410-6319	Hollis@eng.famu.fsu.edu	

Safety review signatures

Team member	Date	Faculty mentor	Date
Robert Blount	12/3/20		
Connor Chuppe	12/3/20		
Patrick Dixon	12/3/20		
Robert Craig	12/3/20		

Report all accidents and near misses to the faculty mentor.