

Risk Assessment Safety Plan

Project information:

Mobile GPS Payload		03/02/2018
	Name of Project	Date of submission
Team Member	Phone Number	e-mail
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Faculty mentor	Phone Number	e-mail
Dr. Shayne McConomy	(850)410-6624	smcconomy@eng.famu.fsu.edu
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I. Project description:

The project sponsor is the Air Force Research Lab's Advanced GPS Technology (AGT) Program, whose mission is to provide satellite navigation services in adverse conditions while reducing costs. The team is designing a mobile lab to allow AGT to test a GPS payload in various locations. The design goal is to provide a cost-effective, user-friendly, and transportable lab. The mobile lab must protect the test equipment, produce its own power, and house four technicians. The team is selecting several parts for the mobile lab including the trailer, heating and AC unit, generator, workstations, antenna mast, shielding, and floor plan. While selecting the parts of the mobile lab, the team considers cost, efficiency, ergonomics, and size. The design is a 40-ft. shipping container, transported to the test site on a flatbed trailer. The team is presenting a scaled 3D printed model as proof of concept for AGT, who is finally responsible for the lab's full-scale construction.

II. Describe the steps for your project:

First, the outer shell was chosen. The team decided on a shipping container. Next, the proper components to match the size and materials of the outer shell were selected. This included HVAC, insulation, tables, chairs, server racks and lighting. Next the floorplan was chosen. The floor plan and components were then digitally modeled in a CAD software. Finally, the CAD files will be used to create a 3D printed model.

III. Given that many accidents result from an unexpected reaction or event, go back through the steps of the project and imagine what could go wrong to make what seems to be a safe and well-regulated process turn into one that could result in an accident. (See examples)

The Mobile GPS Payload project is a relatively safe project since the team isn't responsible for physical construction. No dangerous tools or equipment will be used in the project. There are dangers in traveling to and from school to work on the project. 3D printers are a low risk tool but have the potential for serious concerns if used improperly.

IV. Perform online research to identify any accidents that have occurred using your materials, equipment or process. State how you could avoid having this hazardous situation arise in your project.

3D printing is a fairly safe process with few safety issues if the equipment is used properly. Improper use can lead to hazardous consequences. One such incident involved using hairspray on the print plate. While hairspray helps with removing the model, the fumes in the print box condensed enough to create a highly flammable container. Once the printer heated up the gases caught fire and burnt down the building which housed the printer. An incident like this can be avoided by insuring that the printer is well ventilated before it is turned on and heated up.

V. For each identified hazard or “what if” situation noted above, describe one or more measures that will be taken to mitigate the hazard. (See examples of engineering controls, administrative controls, special work practices and PPE).

One measure that could be made to prevent an explosion like the one listed above is to not use hairspray on the 3D printer. Hairspray is effective in model removal, but it presents an unnecessary hazard. Our group could use Elmer's glue, which is a popular substance used on the print bed which won't give off any flammable gases. Another way of preventing a fire is by ensuring proper ventilation. Proper ventilation allows for any flammable gases to be evacuated from the print bed before the printer gets too hot. Along with that, any poisonous gases that are given off by the material will be ventilated and not inhaled. Both solutions will be used by the team to ensure proper safety.

VI. 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”).

The outer shell of the lab unit and internal components (HVAC, insulation, tables, chairs, server racks, lighting) were all selected. The floorplan was also chosen. After all components and configurations were selected, the design was created in a CAD program. These selection and modeling steps were hazard-free and did not require any specific safety precautions. Once the CAD model is complete, the team will begin 3D printing the scaled physical model. Throughout the printing process, the team will ensure to adhere to all ventilation and operational safety recommendations.

VII. Thinking about the accidents that have occurred or that you have identified as a risk, describe emergency response procedures to use.

Up to this point there have been no accidents reported to the team. However, potential accidents in the production and the consumption phases must be addressed. Hazards during the 3D printing phase include fires, as well as unwanted chemical reactions. Additionally, while the product is being used there is potential for high levels of carbon monoxide emission from the generator. Precautions for all of these potential hazards will be taken into account; however, in the case of any severe emergency, 911 will be called immediately, and any necessary safety protocol will be followed. Additionally, both the stakeholders from the AFRL and FAMU-FSU COE will be notified.

VIII. 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
Environmental Health & Safety	(850)644-6895	Dr. Shayne McConomy	(850)410-6624
FAMU Police	(850)599-3256	Dr. Emmanuel Collins	(850)410-6373
FSUPD	(850)644-1234	Dr. Chiang Shih	(850)645-0102

IX. Safety review signatures

- Faculty Review update (required for project changes and as specified by faculty mentor)
- Updated safety reviews should occur for the following reasons:
 1. Faculty requires second review by this date:
 2. Faculty requires discussion and possibly a new safety review BEFORE proceeding with step(s)
 3. An accident or unexpected event has occurred (these must be reported to the faculty, who will decide if a new safety review should be performed.
 4. Changes have been made to the project.

Team Member	Date	Faculty mentor	Date
Travis Bruner	3/1/2018		
Michael Connell	3/1/2018		
Taylor D. Davis	3/1/2018		
Richard Gal	3/1/2018		
Raine Sagramsingh	3/1/2018		

Report all accidents and near misses to faculty mentor.