

Risk Assessment Safety Plan

I. Project information:

Design and Development of a Human Powered Vehicle: NASA Competition		01/20/2017
Name of Project		Date of submission
Team Member	Phone Number	e-mail
Luke Maeder	904-674-5953	ltm12@my.fsu.edu
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Quentin Hardwick	813-454-8053	qth14@my.fsu.edu
Garret Rady	850-597-0711	gar11@my.fsu.edu
Faculty mentor	Phone Number	e-mail
Dr. Chiang Shih	850-410-6331	shih@eng.fsu.edu
Dr. Nikhil Gupta	850-410-6201	ng10@my.fsu.edu

II. Project description:

NASA hosts a Rover Competition every year where teams have to design and build a two person, human powered rover to be run on a track set up by NASA. This competition is a timed run along the track and the team with the best time wins. The challenge part of this project is the actual design and build of the rover, as NASA has set up constraints about how the rovers are built. Many Of these constraints are to simulate trying to get the rover to mars and make it useable to astronauts with us of basic technology.

II. Describe steps from project initiation to completion:

The main components of this project involves the design phase, the building phase, and the testing phase. During the design phase all aspects of the rover must be taken into account, including but not limited to, the frame, the wheels, the suspension, and the steering. During the building phase the frame must be constructed along with anything else built. Once that is complete the rover must be assembled into a working vehicle where it then moves into testing phase. During the testing phase the rover is driven over obstacles similar to what will be found on the NASA track in order to test its viability in clearing the obstacles.

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 areas where this project can become dangerous are during the building phase. In the machine shop, if anyone is working with a machine, distractions by other people can cause in attentiveness resulting in an injury. The more complex and dangerous Machines will only be used by trained personnel and under supervision by another. Machinery breaking or malfunctioning is Also a possibility that cannot be foreseen, only mitigated by the appropriate PPE. The testing phase also has some potential problems in that the frame folds in half and a hand could easily get crushed in between the two halves of the frame. Also, When testing the rover on obstacles it is possible for the rover to tip over and trap the drivers underneath it.

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.

In July 2004 a man was died inside a steel pipe while he was welding because it caught his clothes on fire and he couldn't get out of the pipe. This accident resulted from welding in a small space with a small, one way exit. In order to keep this from happening it is best to weld in an open area where any sparks or hot metal can fall harmlessly to the floor, away from the welder. Also wearing tough and simple clothes to keep the chance of them catching on fire low would help prevent fires. Keeping a fire extinguisher in easy reach in order to stop any unexpected fires in another way to prevent this hazard from escalating.

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).

All of the safety hazards listed during the building phase can be avoided by following simple machine shop safety rules. Always wear safety glasses when using a cutting machine to keep eyes safe from flying metal debris. After cutting a piece of metal the edge will be sharp so it is important to use a sander or file to smooth the edges down to avoid cuts. With welding hazards the best way to avoid them is to weld in a spacious area without anything in the area that can catch on fire, and to use a welding mask. Keeping a fire extinguisher around during both the cutting and the welding also prevents any fires from escalating. To prevent the hazards during the testing phase it is important to mark the folding joint with bright colors so it is easily seen and to make sure everyone involved is aware of the joint to avoid hands getting crushed. In order to avoid tipping, simple math can be done before trying an obstacle to insure any angles are not too steep for the rover and its drivers.

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”).

During the design phase of the project the rover components must be selected and created to fit the NASA competition. During the building phase the rover frame must be constructed and any other parts that are not being bought. While drilling or cutting any metals, wear appropriate safety glasses. After any cutting or drilling metal sand down the sharp edges to avoid cuts. While any welding is occurring avert eyes unless protected by a welding mask and avoid having anything flammable near the welding location. Ensure welding location is clear and there are working fire extinguisher nearby and easily accessible. Once construction and assembly of the rover is completed move into the testing phase. During the testing phase all sharp corners and joints need to be visibly marked to ensure driver safety. Helmets must be worn at all times while testing in case of vehicle roll over during obstacle testing.

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

During any incident that is too dangerous or too serious to handle immediately call 911. For any minor injury such as small burns or shallow cuts use a medical kit or go to the emergency room for treatment. In the event of a fire, use the fire extinguisher if possible. If the fire is too large, evacuate the building and close doors behind you to help contain the fire while calling 911 and activating the fire alarm. In the event of a vehicle roll over, broken bones and spinal safety are the most important risk and the injured person should be handled as little as possible until someone with medical experience says otherwise.

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
		Dr. Nikhil Gupta	850-410-6201
		Dr. Chiang Shih	850-410-6331
		Mr. Keith Larson	850 410-6108

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
<i>[Signature]</i>	1/19/2017		
<i>[Signature]</i>	1/19/2017		
<i>Garnett Radly</i>	1/19/2017		
<i>[Signature]</i>	1/19/2017		
<i>Jacob Van Dusen</i>	1/19/2017		

Report all accidents and near misses to faculty mentor.