Risk Assessment
Safety Plan

I. Project information:

Capacitor Assembly Automation	1/20/2017
Name of Project	Date of submission

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Faculty mentor	Phone Number	e-mail
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II. Project description:

Unison Industries designs and manufacture range of electrical system components, their ignition system are installed on over 80% of the jet engines in the world. This project is to develop a level of automation to the process of assembling ignition exciters in order to improve the assembly time from 27 mins to 15 mins. The steps of the assembly process team 6 has decided to automate is the placing of double sided tapes on each capacitor before stacking, creating an L-gauge for perfect stacking of the capacitors preventing misalignment, wrapping of insulated paper around the stacked capacitors, and dimensional check of the assembled capacitor.

II. Describe steps from project initiation to completion:

1) Design and manufacture prototypes using 3D printing and the machine shop
2) Test the following operation steps
   - Tape rolling
   - Stacking
   - Wrapping of the insulation paper
   - Dimensional checks
3) Make any necessary changes

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)

Fabricating components requires the use of high voltage operating machinery that consist of rotating and cutting parts.
Rotating parts can be dangerous, even smooth, slowly rotating shafts can grip clothing, and through a mere contact can force an arm or hand into a dangerous position
The danger of cutting action exists at the point of operation where finger, arm and body injuries can occur and where flying chips or scrap material can strike the head, particularly in the area of the eyes or face.
While operating the different prototypes, there are also a few safety risks. The tape roller is operated by a motor, and has moving parts. To avoid injury, the user should make sure there is nothing on the tracks that could get caught in the wheels and should keep hands away from the mechanism when it is moving. The wrapping mechanism is also powered by motor, so the user should use the same caution as with the tape roller to avoid any injury.

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.

It was recorded last year that an explosion occurred when a 17-year-old boy was using hairspray which is believed to create extra adhesion to a printer's build plate. Unfortunately, this was ignited by a spark, whether from an outlet or from the printer itself is

unclear, and the massive explosion took Taylor's life. Team 6 will make sure all necessary precautions are taken during 3D printing of some of our components and the use of right materials.

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).

Heavy Machinery will be operated by only trained personnel wearing the right personal protection equipment.
Verification that the electrical system is disconnected from power sources and wires are not active will be done before any time mechatronics work is done.
Any work done with hand tools will be done by experienced users or supervised by experienced users wearing the proper PPE.

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").

1) Design and manufacture prototypes using 3D printing and the machine shop. Wear appropriate footwear, clothing, and eyewear while using machinery. Ensure that hands and loose articles of clothing are away from machinery. Tie back any loose hair and remove all jewelry. Locate kill switch on machinery before use.

2) Test the following operation steps

- Tape rolling. Before turning on motor, check that there is nothing in tracks. Keep hands away from mechanism when it is running to avoid getting fingers caught in the moving parts.
- Stacking. This is a manual process, but be sure to pick up capacitors on the left hand side to avoid getting fingers caught in the L-Gauge
- Wrapping of the insulation paper. Before turning on motor, check the mechanism is clear of loose articles. Keep hands away from moving parts.
- Dimensional check. This is a manual process, but be sure to pick up the capacitor from the top to avoid getting fingers caught in the gauge. When removing the capacitor, use the finger guide on the bottom of the gauge to help push the capacitor back out.

3) Make any necessary changes

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

Machine Shop: During an emergency (machine malfunction, hands caught in machine), hit the kill switch on the machine to turn it off. If the person is injured, assess the injury and call 911 if needed. Never work alone in the shop.

Tape Roller: During an emergency, turn off the motor and assess the injury/problem. If the problem was an object on the track, remove the object and continue use of the tape roller. If there was an injury, assess the injury and call 911 if needed

Stacking: There is very minimal risk, and it is unlikely that an injury will occur.

Wrapping of the insulation paper: During an emergency, turn off the motor and assess the injury/problem. If the problem was an object in the rotating arms, remove the object and continue use of the tape roller. If there was an injury, assess the injury and call 911 if needed

Dimensional Check: There is very minimal risk, and it is unlikely that an injury will occur.

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
Chiang Shih	850-410-6321		
Carl A. Moore	(850) 410-6367		

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

Report all accidents and near misses to faculty mentor.