

## **SAFETY GUIDELINES FOR SHOCK TUBE**

1. Do not stand near shock tube when it is being fired
  - a. Stand no closer than 30 feet in any direction and only gather in the room with the Helium tanks.
  - b. Vacate the entire lab area and close all doors firmly locked
  - c. Place warning signboards outside each door of the lab area
  - d. Stand next to person who controls Helium tank
2. Wear ear and eye protection
3. Warn everyone around you that shock tube is to be fired
  - a. Make sure Machine Shop and Metrology lab know
  - b. Take extra precautions for warning if classes are going on in either Machine shop or Metrology lab
4. Double check to make sure no one is in the big tank
5. Check to make sure door to outside is closed and locked
6. Have the shock tube area roped off prior to test
7. Make sure bolts are completely tightened in the enclosure at end of shock tube.
8. Make sure all lexan is in place and both sliding doors are closed
9. Be sure to yell “firing” when releasing gas and also around the pressure where the diaphragm is expected to burst
10. Attach vacuum if sample that is to be blasted will cause excessive debris
11. **If for any reason someone comes within 30 feet of tube shut off gas immediately and ask person to leave**

## Procedure for Running a Safe Shock Tube Experiment

1. Ensure each of the following items are available in good condition
  - a. Oscilloscope, High Speed Camera, proper cables, extension cords, duct tape, research notebook, pressure sensors, mylar sheets, etc
  - b. Ask someone to help you mount and setup the cameras if you are new and learning.
2. Set up Camera in proper position
3. Set up flash bulbs and/or proper lights
4. Attach cables to necessary components and to triggers
5. Once High Speed Camera and components are set up, then place sample in enclosure
  - a. Use rubber band for positioning and then tape the sample in place
  - b. Adjust camera for experiment and focus on sample
6. Set up computer software (Imacon200, or Photron SA1)
7. Trigger camera and adjust images accordingly
8. Once Camera and computer are in place, properly set up oscilloscope place pressure sensors in the shock tube
9. Make sure everything is turned on and set up properly for given test
  - a. Camera images and triggers for both oscilloscope and camera are dependent on the number of plies being used
10. Make sure mylar is in place between driver and driven section
11. Once mylar is in place and both the camera and oscilloscope are set up properly, double check sample and make sure it is in place and shock tube muzzle is touching it.
12. Check everything over one more time and make sure nothing triggered prematurely
13. Make sure tank is completely shut and **follow the safety rules**
14. If sample is known to make mess attach vacuum to enclosure tank. Go to helium tank and slowly begin releasing gas into the shock tube
15. Remember to yell “firing” when loading and when burst is expected
16. Once sample has been blasted, shut off gas and proceed to checking the scope and camera for data
17. Make sure to save data to respected positions

- a. Camera data saved under “users” for Imacon.
  - b. Oscilloscope data saved on floppy/USB and then on your computer
    - i. Double check to make sure data is there
18. Remove sample from shock tube and piece back together
- a. Once the piece pertaining to the sample have been collected and the sample put back together as well as possible, **take pictures**
    - i. Remember the longer you wait the more time the sample has to creep back and lose shape...which means losing crucial information