

## Instructions to Construct a Dust Explosion Demonstration Unit

### I. Materials needed:

- 3/8 inch thick LEXAN thermoplastic
  - 2 – 12"x12" ends
  - 2 – 18 3/4" x 12" sides
  - 1 – 12 3/4" x 19 3/4" top
  - 1 – 12" x 13 3/4" top 'holder'
  - 1 – 18 3/4" x 12 3/4" bottom
- 1- 5 1/2 x 1/4 black pipe nipple
- 1- 1/4 45° elbow black pipe
- 2- 1/4 mpt – 3/8 hose barb
- 5 foot 3/8 air hose
- 1 – 1/4 ball valve
- 1 – 1/4 mpt male to male quick connect
- 4 – 1 1/2 x 1/4 x 20 carriage bolt
- 4 – 1/4 x 20 wing nuts
- 2 – 3/8 hose clamp
- 2 – LEXAN glue
- 1 – silicon
- Pipe tape; Fine threaded screws

### II. Assembly instructions:

1. Measure the pieces of LEXAN and mark them in order to cut out the pieces exactly, with as straight of cuts as possible. To cut the Lexan, use a jigsaw, a skill saw, or a table saw. Use a sharp, larger tooth blade to keep the LEXAN shavings from melting and sticking to the blade.
2. After cutting out the parts, remove the rough edges with a file or 180-grit sand paper.
3. The inside measurements of the box will be 12"wide x 12" tall x 18" long. To put the box together, start with sides and ends together, then the bottom and then to top.
  - a. Cut an opening of 9 1/4 × 7 1/4" on the top cover – for placing powders and ignition source inside.
  - b. Drill pilot holes 4-drill bits smaller than the screw size.
  - c. Countersink the holes so the screw heads are not protruding from the LEXAN.
  - d. Once all the holes are pre-drilled, glue one piece at a time and screw them together.
  - e. When the box is glued and screwed together, let it set to dry. The dry time will vary based on the brand of glue used; check the drying time on the glue instructions.
  - f. After the glue has dried, use clear silicon to seal the cracks and corners on the inside to avoid dust accumulation in the corners.
4. Once the silicon has dried, drill a hole in the middle of one end for the pipe and fittings to go through. Use pipe tape on the threads to not allow any air leaks.

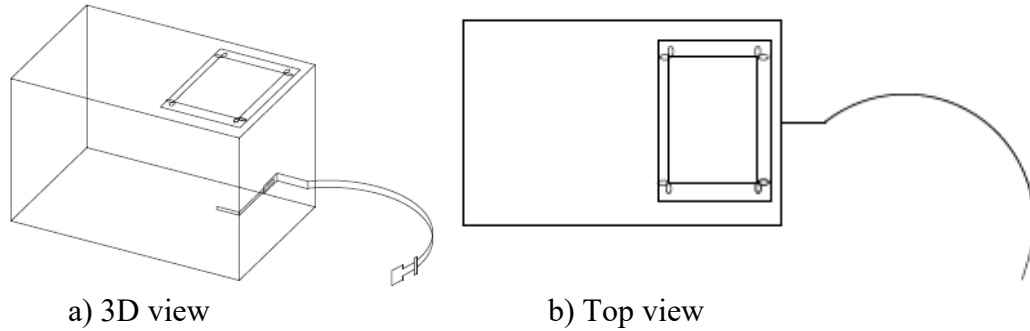


Figure 1. Dust explosion demonstration box

### III. Dust explosion demonstration instructions

1. When the box is assembled, put a small amount of grain dust, flour dust or sugar dust in a small bowl or dish under the pipe on the inside of the box from the opening on top.
2. Put the ignition source, a candle, filament from light bulb, etc., on the opposite side of the box.
3. Cover the opening of the box using a thin sheet of paper and clamp the opening
4. Stand back and make sure everyone has safety glasses and ear plugs on securely.
5. Give a quick shot of air into the box by quickly opening and closing the ball valve.
6. The dust will ignite and blow the paper off the hole on the top of the box.