

Pneumatic Can Crusher with Collection Bin

A pneumatics demonstration that crushes cans with a cylinder under 5/2 solenoid-valve control, with push-button cycling and a collection bin.

1. Introduction / Background

Pneumatics is the muscle of factory automation: fast, simple, and forceful from nothing but compressed air.

This project demonstrates it completely — a pneumatic cylinder crushes aluminium cans under a 5/2 solenoid valve, cycles on push-buttons, and drops each crushed can into a collection bin.

2. Problem Statement

Students meet pneumatics as symbols on a circuit diagram; this project makes it physical. Sizing the cylinder for crushing force at the available pressure, sequencing a 5/2 valve, regulating flow for smooth motion, and building safe guarding around a crushing point is genuine fluid-power engineering at bench scale.

3. Objectives

- Crush aluminium cans with a pneumatic cylinder at approximately 4 bar.
- Sequence extend/retract through a 5/2 solenoid valve with push-button control.
- Collect crushed cans in a bin with full machine guarding and e-stop.

4. Proposed Methodology

Shop air at approximately 4 bar feeds a filter-regulator to the 5/2 solenoid valve. Pressing the crush button shifts the valve; air drives the cylinder down, the platen crushes the can against the anvil, and the retract button (or auto-return) lifts the platen while the crushed can falls into the collection bin. Flow-control valves set a safe, smooth stroke speed.

5. System Architecture / Working

- Pneumatics: cylinder, 5/2 solenoid valve, filter-regulator, flow controls, air at ~4 bar.
- Control: crush/retract push-buttons, optional auto-cycle timer, e-stop.
- Mechanical: crush platen and anvil, collection bin, full guarding around the crush zone.

6. Hardware / Software Requirements

- Pneumatic cylinder, 5/2 solenoid valve, FRL unit, flow-control valves, push-buttons, e-stop, MS frame, guards, collection bin.
- No firmware in the basic build; compressed-air supply required.

7. Expected Outcomes

- A working crusher flattening cans per cycle into the collection bin.

- Demonstrated force sizing from bore and pressure (design calculation).
- A complete report, PPT and viva Q&A; on pneumatics, valve sequencing and guarding.

8. Applications

- Fluid-power laboratory teaching.
- Recycling-awareness demonstrations.
- Pneumatic circuit design study.

9. Future Scope

- Automatic can feed magazine.
- Crush counting with a counter/display.
- PLC control replacing push-buttons.

10. Conclusion

The crusher turns an air supply into visible mechanical work with the sizing math shown — a first pneumatics build done properly, guarding included.