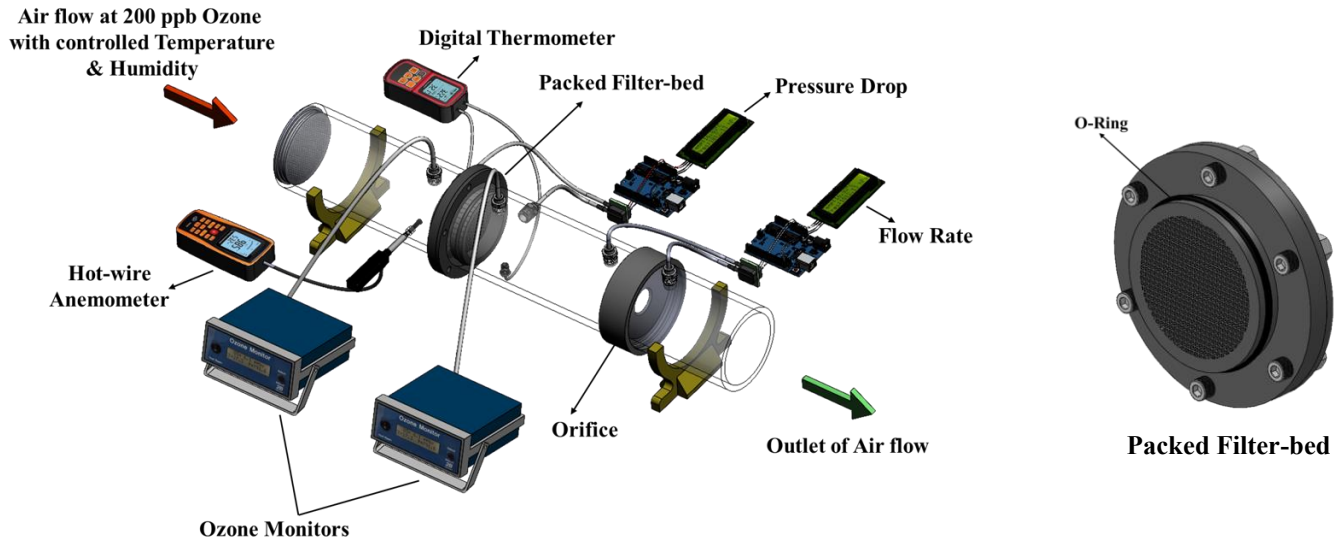


Engineering Project portfolio



Compact Ozone Test Train

Scope of work

- Designed and fabricated a compact modular test train for evaluating ozone filters.
- Packed bed with O-ring seal design for better leak protection and effective filter packing.
- Developed pressure and flow-rate measurement devices for accurate readings.

Implementation

- SolidWorks used to design and create part drawings for fabrication.
- Polypropylene chosen as build material for ozone resistance and easy machining.
- Arduino + Differential pressure sensors used for custom measurement devices.

Achievements

- New design is compact, leak-proof and modular setup.
- Packed bed design reduces voids, improves filter material packing and higher efficiency.
- Overall measurement accuracy improved by 25%.

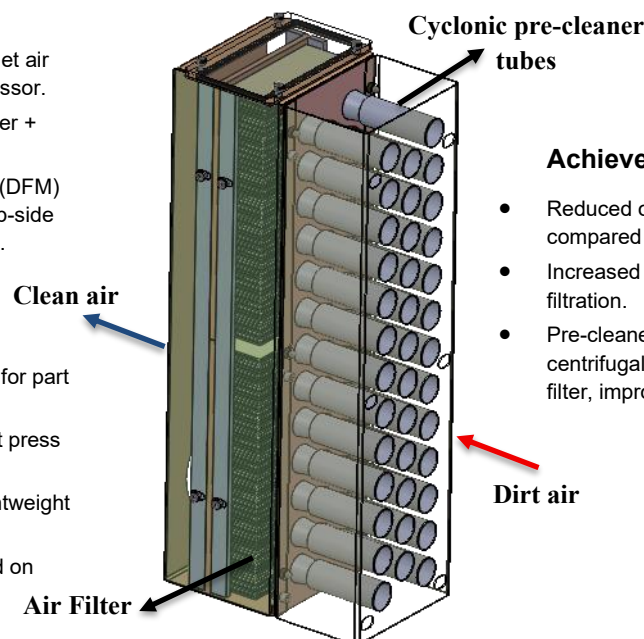
Multistage Inlet Air Filter (1000CFM)

Scope of work

- Designed and fabricated a multistage inlet air filter for heavy dust filtration in a compressor.
- Filter design includes cyclonic pre-cleaner + panel air filter for staged separation.
- Optimized for Design for Manufacturing (DFM) and Design for Assembly (DFA), with top-side filter serviceability for easy maintenance.

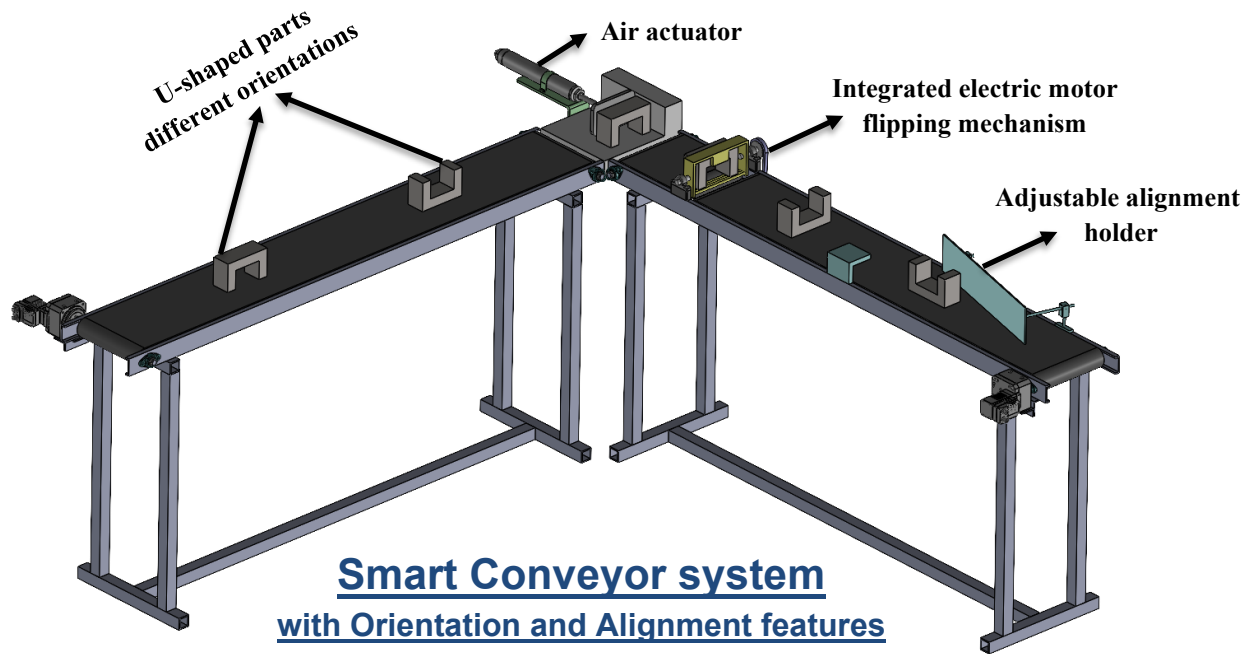
Implementation

- Sheet metal domain in SolidWorks used for part design and fabrication drawings.
- K-factor and bend radius chosen to meet press brake machine requirements.
- 16-gauge stainless steel selected for lightweight and corrosion resistance.
- Pre-cleaner and filter size chosen based on required airflow (CFM).



Achievements

- Reduced overall size and weight by 35% compared to traditional blowers.
- Increased service lifetime by 15× with staged filtration.
- Pre-cleaners remove 70% of dust particles via centrifugal action before reaching the main filter, improving efficiency and filter durability.



Scope of work

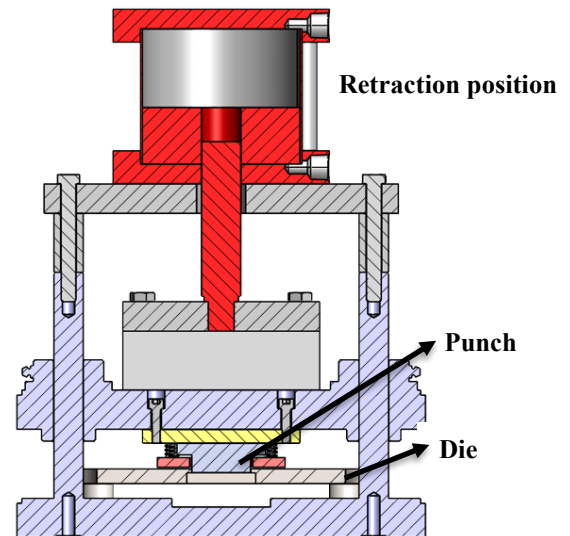
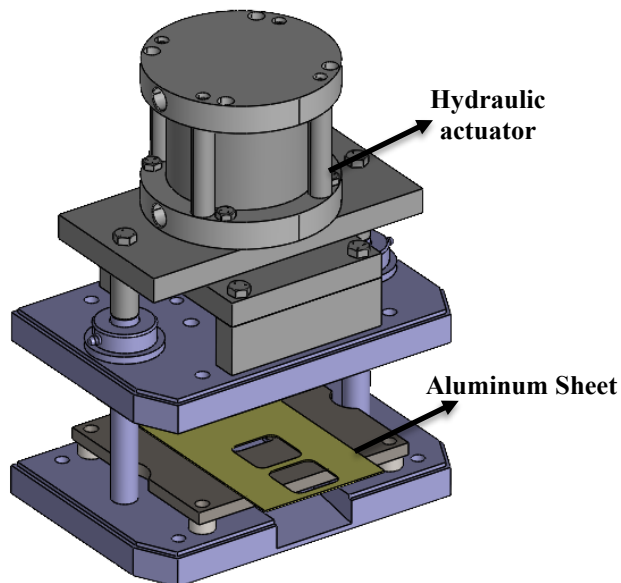
- Designed a conveyor system to orient and align U-shaped parts in manufacturing unit.
- Developed for 80FPM conveyor speed and 150 lb maximum load capacity.
- Designed the adjustable alignment holder for handling different part sizes.

Implementation

- Fabricated the frame using the hollow rectangular bars, ensure high strength/weight.
- Selected a 500W AC gear motor for conveyor belt drive, with good torque and speed balance.
- Integrated an air actuator, to transfer parts between conveyor belts.

Achievements

- Developed a simple and robust flipping mechanism, with high orientation accuracy.
- Improved part handling efficiency, reducing manual intervention during manufacturing.
- Ease of maintenance and serviceability with readily available parts.



Die Punching machine for aluminum sheets

Scope of work

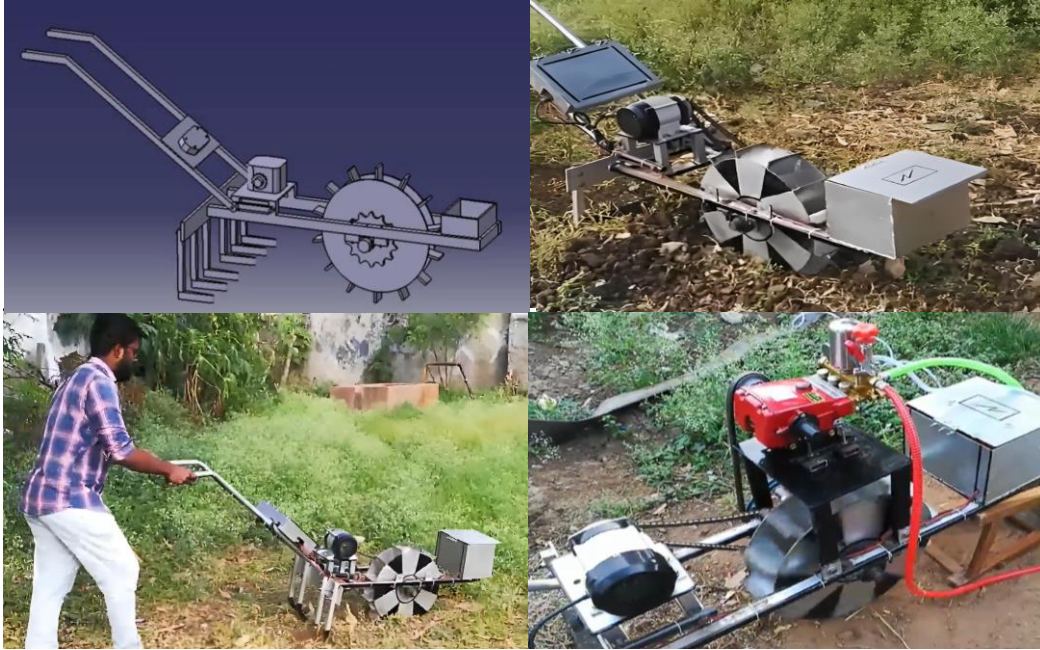
- Designed and fabricated a hydraulic die punching machine for cutting aluminum sheets.
- Designed and machined precise die and punch for accurate, repeatable part geometry.
- Integrated a 4" dia hydraulic actuator (5" stroke, max 12,500 lb force at 1,000 psi).

Implementation

- Used SolidWorks for 3D modelling and part drawings for fabrication.
- Used high-strength steel for the die, punch, and frame to ensure rigidity and tool life.
- Incorporated return springs and linear bearings for smooth punch motion and self-retraction.

Achievements

- Simple and serviceable design with quick assembly/disassembly.
- Achieved high dimensional precision and clean edge quality in aluminum sheets.
- Improved production efficiency—capable of punching up to 16 parts per minute.



Multipurpose farming machine

Scope of work

- Designed and fabricated a modular farming machine capable of ploughing, weeding and spraying by interchanging tools.
- Powered by a 750W electric motor as the primary source for clean and efficient operation.
- Developed for small-scale farms with focus on versatility and ease of operation.

Implementation

- Modeled and created part, assembly drawing in CATIA.
- Used powder-coated steel for strength, durability and corrosion resistance.
- Integrated motor controller and handle-mounted throttle for variable-speed control and suction pump for spraying application.

Achievements

- Enabling quick replacements of attachments, ensuring fast setup between operations.
- Compact and lightweight frame suitable for narrow farmlands.
- Achieved eco-friendly and cost effective performance compared with I.C engines, providing up to 8hrs of operation per charge.



80CC Motorized bicycle

Scope of work

- Built an 80CC hybrid motorized bicycle integrating an internal combustion engine with pedal power for dual operation.
- Selected a 10–44 gear ratio for improved torque and ease of steep climbing.
- Right-hand throttle control linked to carburetor's butterfly valve for smooth speed regulation.

Implementation

- Mounted the engine, ignition coil, exhaust pipe, oil filter, and fuel tank securely to the bicycle frame.
- Designed custom clamps with rubber boots to minimize vibration and improve stability.
- Added a chain tensioner to maintain consistent chain tension and reduce energy loss.

Achievements

- Enabled extended travel range by switching seamlessly between pedaling and powered propulsion.
- Enhanced hill-climbing performance suitable for varied terrains and gradients.
- Achieved fuel efficiency of 55 km/L with low maintenance and simple assembly.