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Problem Statement:

The goal of this project is to design an auxiliary air supply system for Case-New Holland tractors, specifically the Magnum series, that can supply air for a wide array of different tools and implements. This system will be added to a pre-existent air braking system, which will help alleviate the cost and reuse some parts already on the tractors with the braking option. The project has complied to SAE, ANSI, and ISO regulations for air brakes on tractor trailers and tractor hydraulic locations, specifically SAE J702 – Brake and Electrical Connecting locations, SAE J318 – Automotive Air Brake Line Couplers, and ANSI/ASAE S366.2 (ISO 5675) – Hydraulic Quick Coupler Locations. The auxiliary air supply system also conforms to the demands of numerous implements and pneumatic tools.

Design Features:

- The system will use the preexisting compressor located on the engine.
- The compressor draws in clean air through the air intake giving the system filtered, particulate free air unlike that of implement mounted compressors.
- The air flows through an air dryer, pulling all the moisture from the air system
- Two 2.5 gallon air tanks will be added and the pressure will be approximately 120 PSI.
- A quick coupler will be added to the bottom tank so that an air hose can be connected for pneumatic tools to be used
- A pressure regulator will give the operator the ability to control the pressure needed for different implements.
- The regulator will lead to two different glad hands, one located at the rear of the tractor and one located at the front of the tractor, giving the operator the capability of front or rear mounted implements, and also a good, secure connection for hook-up
- Solenoid valves will allow the operator to shut off the auxiliary air supply completely and another valve will shut off the system when the brakes are applied making sure that all air flow is diverted directly to the braking system.
- Slow Moving Vehicle sign assures for safety during on road use.

Alternative Solutions:

- Implement mounted system with additional compressor and air tanks
- Tractor mounted additional compressor independent of air brake system
- Compressor that runs by PTO, electrical system, or hydraulically driven and additional air tanks

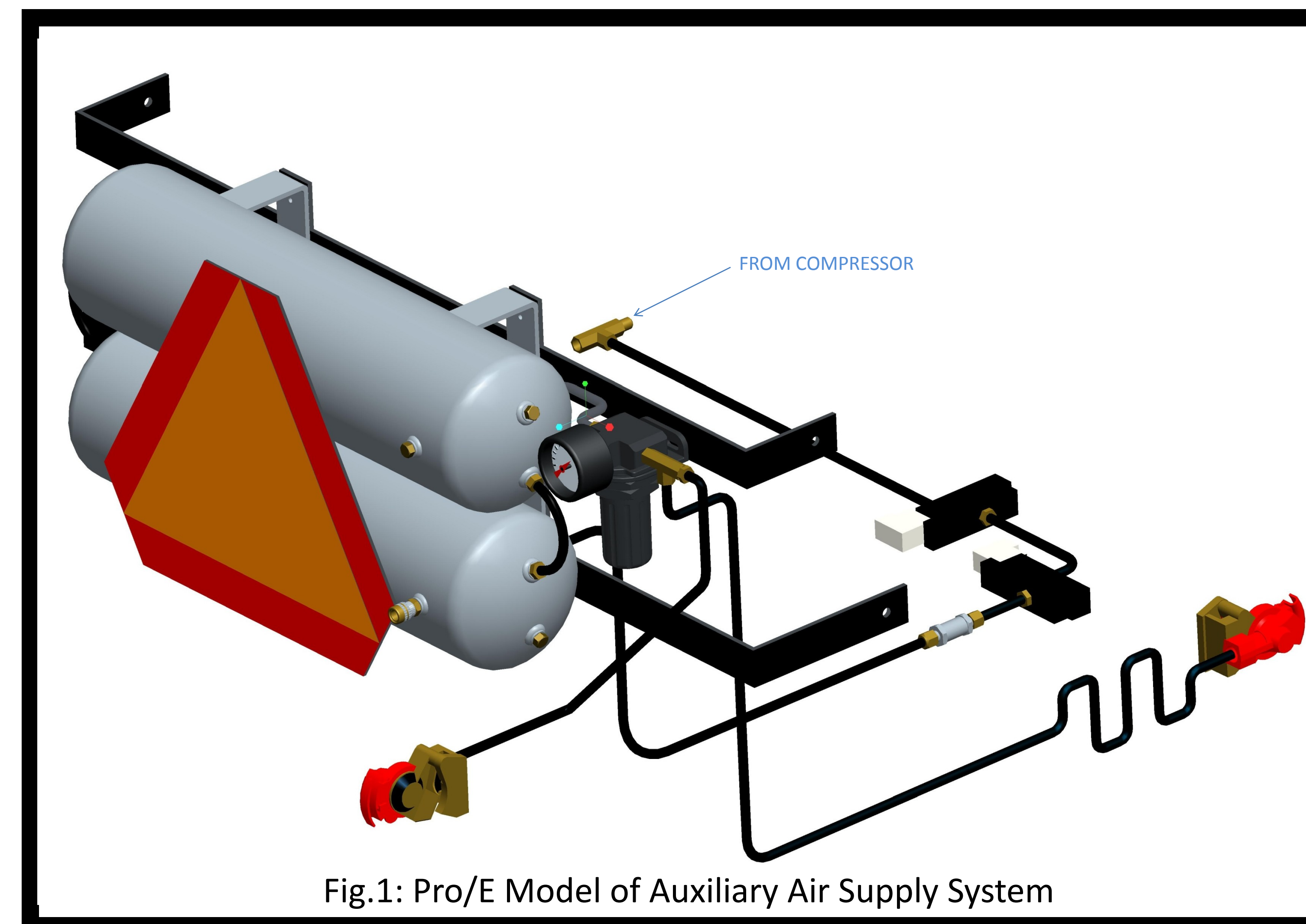


Fig.1: Pro/E Model of Auxiliary Air Supply System

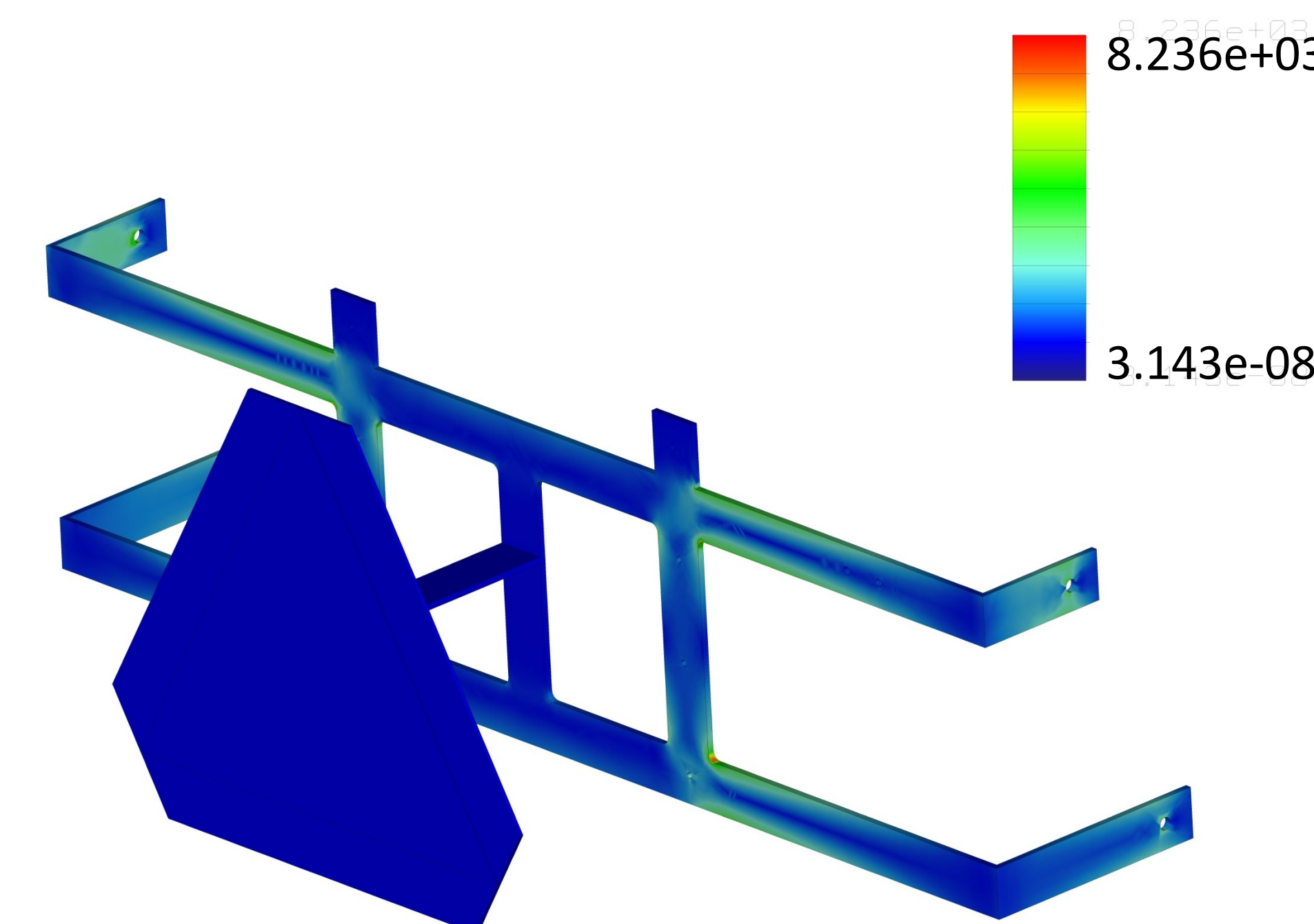


Fig. 2: Von Mises Stress of bracket, 200 lbf load. (Units - PSI)

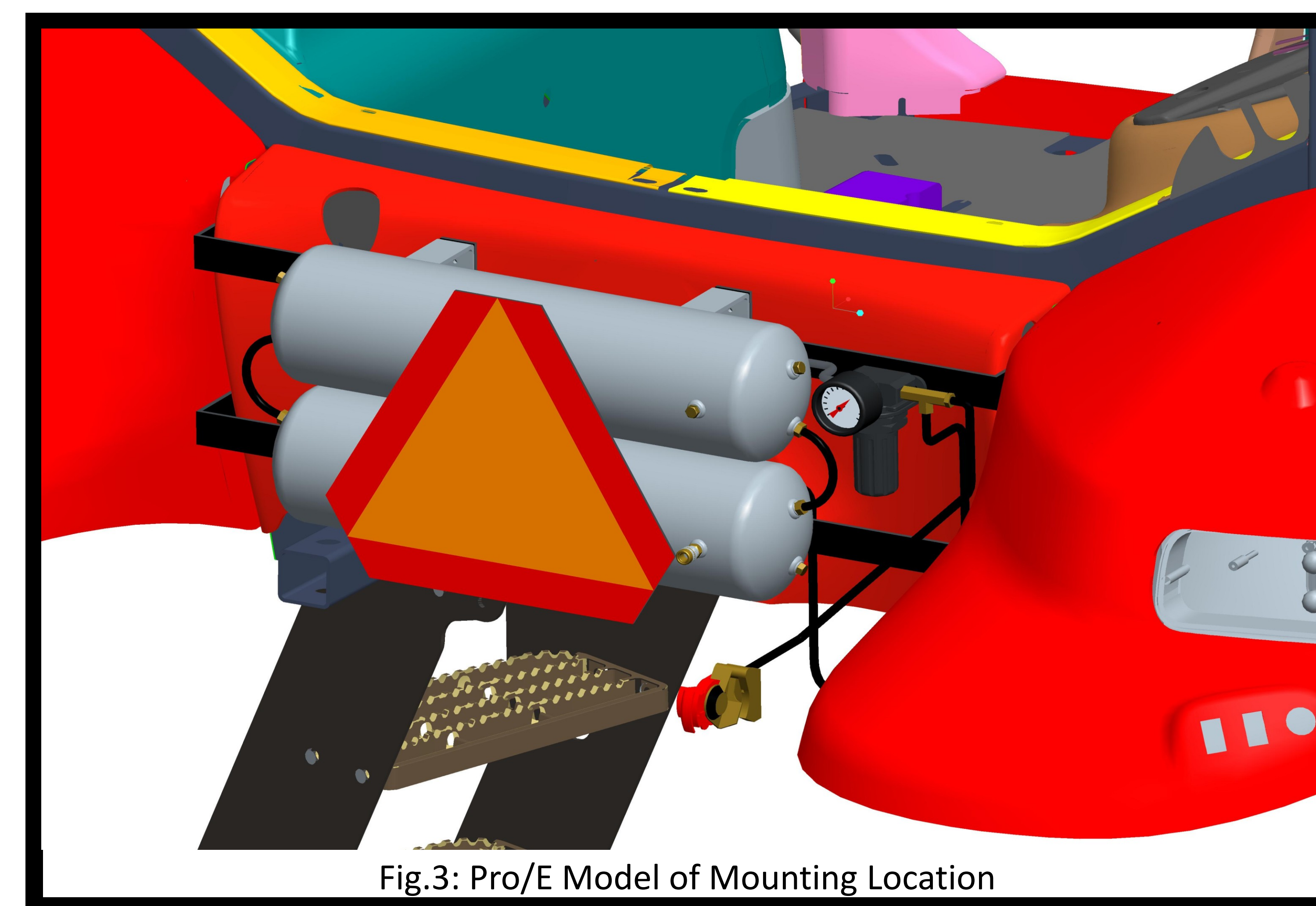


Fig.3: Pro/E Model of Mounting Location

Flow & Consumption:

The air compressor runs continuously and supplies air at approximately 120 PSI. The flow rate of the compressor used for the braking system is 21.2 CFM, giving the ability to air up the system in roughly 13 seconds. Five gallons of additional air volume will be added, an increase from the 3.2 gallons used for Case planters over 16 rows. Consumption of common tools:

Tool Type	Req'd CFM's	Tool Type	Req'd CFM's
Disc Grinder	6	Die Grinder	8
1/2" Air Drill	4	1" Impact	10
Air Chisel	4	3/4" Impact	7
Cut off tool	4	3/8" Ratchet	4

Air compressors previously on planters have flow rates of .7-1.2 CFM. The flow of the engine mounted compressor will provide plenty of flow to the planter. All pressure ratings are within the 120 PSI limit.

Applications:

Some applications for this system include:

- Pneumatic air tools (Impact wrench, air nozzle, air chisel, etc.)
- Air Clutches on planters
- Pneumatic down pressure on planters
- Blowing out knotters for hay bailing
- Debris removal from implements

Some applications may require a flow control valve.

Budget:

Qty.	Description	Price
2	2.5 Gallon Viair Air Tanks	\$ 145.90
5	Viair 1/4" NPT pipe plugs	\$ 5.00
1	Viair 1/4" NPT Male Quick Connect Coupler	\$ 4.00
1	Viair Pressure Regulator (0-200 psi)	\$ 34.95
1	Parker – Solenoid Air Control Valve, Normally Closed	\$ 74.00
1	Parker – Solenoid Air Control Valve, Normally Open	\$ 74.00
1	Parker - Stainless Steel Check Valve, Unidirectional	\$ 50.16
50'	Parker 1/4" air hose	\$ 71.50
16	1/4" NPT compression fittings	\$ 16.00
1	1/4" NPT, 1 male, 2 female, T-fitting	\$ 11.00
2	Gladhands	\$ 8.00
1	Rocker switch	\$ 8.20
~	Miscellaneous nuts, bolts, wire	\$ 20.00
Total Dependent Auxiliary Air Supply		\$ 522.71
1	Wabco Air Compressor (412352020)	\$ 850.00
1	Wabco Air Dryer	\$ 188.95
Total Independent Auxiliary Air Supply		\$ 1,561.66

All costs are consumer costs – Prices will vary