Pneumatic Gauge

Use:

A pneumatic pressure gauge gives an indication of the pressure level in a robots pneumatic system at any given time, as it too is part of the system. This limits error from measurement by external gauges because, when removed from the tire pump fitting, a small amount of pressure is lost.

- **Checking for compliance with rule <R18>**, which limits us to 100psi, during or before a match quickly and efficiently.
- Indicating to the team **if their system needs to be recharged**. Example: A team may know their robot begins to face issues bellow 70psi and can check quickly if it needs recharging.
- **Proving protection against overcharging.** “The maximum recommended input pressure for VEX Pneumatic System is 100 psi” - VEX Pneumatics instruction sheet. Hence a gauge with a max reading of 120 psi, and an obvious indication of the 100 psi limit, encourages teams not to overcharge their system to ridiculous pressures such as 140 psi and 160 psi when not competing; thus increasing the life of the pneumatic components, and reducing the risk of damage or failure.

Compatibility:

The gauge takes two standard brass cylinder fittings at its base. The measuring rod at the top follows the standard VEX square bar at 3.175mm square. Although adding other parts onto this rod is not encouraged, because it affects the accuracy of the gauge, using a standard compatible bar means that the rod can extend though standard square holes (in the way a drive shaft can); thus interface with other dynamic/static parts in minimised and predicable. Our decision to omit brackets to secure the gauge, and instead allow the user to secure it with cable ties, means the design retains its continuity with other VEX pneumatic parts which operate under a similar principle (such as the reservoir).

CAD in Design Process:

We used Autodesk Inventor:

- **Inventors Spring Designer** helped speed up the design process by preforming advanced calculations on our calculated spring geometry. This informed us our spring had a large pitch making it too weak for the required load, hence adding 4 more active coils and increasing the wire thickness compensated. Determining the spring dimensions early in the design process was paramount to designing the overall shape from our sketches.
- **Visualising Situations:** Sketches were not accurate enough to test out different attachment options. Visualising their placement on a small C-Channel using CAD allowed us to make an informed decision, before completing the model of the design, not to include an attachment in our design due to size and restrictive placement.
- **Technical Drawings** were produced in hours, as apposed to manually which would take days, once modelling of the design was complete.
- **Interference** - Detecting interference between components allowed us to identify the rod’s base was too large as we forgot about the increased wire diameter.
- **Presentation** renders in inventor accurately communicate our designs shape, use, and construction to the end user. This supported by animations and explosions which communicate a higher detail difficult though static images.