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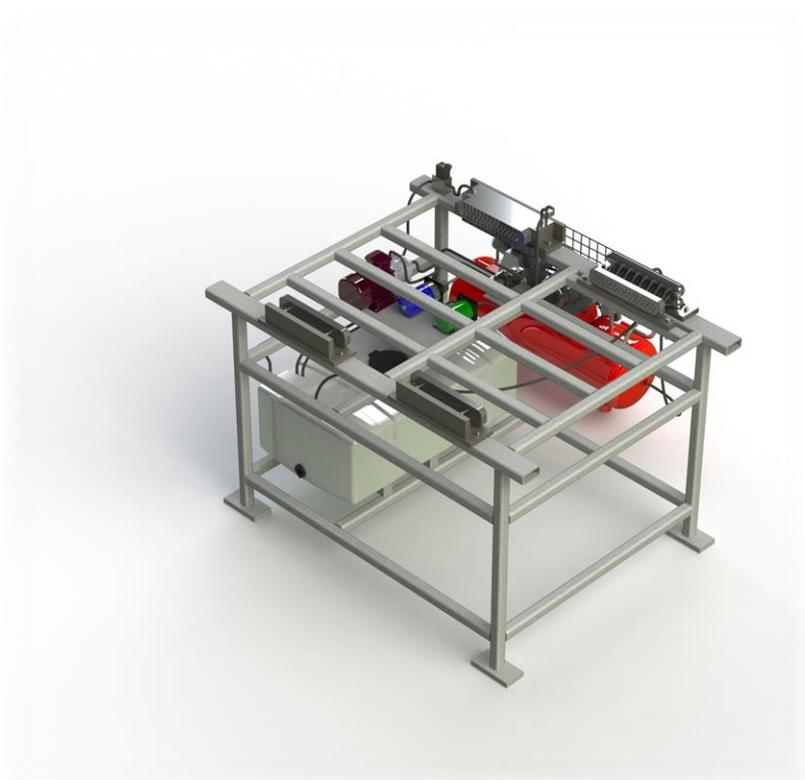
Burr OAK Tool Inc.

Hydroforming of Heat Exchanger Tubing

Burr OAK Tool Inc. is a world leader in providing machines, tools, and expertise to manufacturers of heat exchangers and tube processing industries. Burr OAK markets a machine that uses compressed air to perform tube expansion, which can be difficult to control. Burr OAK desired a process capable of greater control. This was the basis of our project.

Team Hydratorr's solution was to use a series of motors, hydraulic pumps, and fluid-control valves to meter a fixed volume of incompressible liquid (white mineral oil) to expand tubes in heat exchanger assemblies. The final solution was tailored to function with Burr OAK's existing tooling to make integrating the process easy. Our process design could lead the way to revolutionizing the way tubes are expanded in the heat

Burr OAK can build on our prototype and system design and scale them to handle any variety of tubes, arrangements, and materials. This will allow them to increase their customer base and expand the market of heat exchangers with new technologies. The prototype is also a tool that can be used by Burr OAK to perform further experimentation on hairpins of varying size and materials. This will be an invaluable resource as they incorporate the design into a full scale machine.



Hydraulic Hairpin Expander Machine

YEAR

2016-17

TEAM

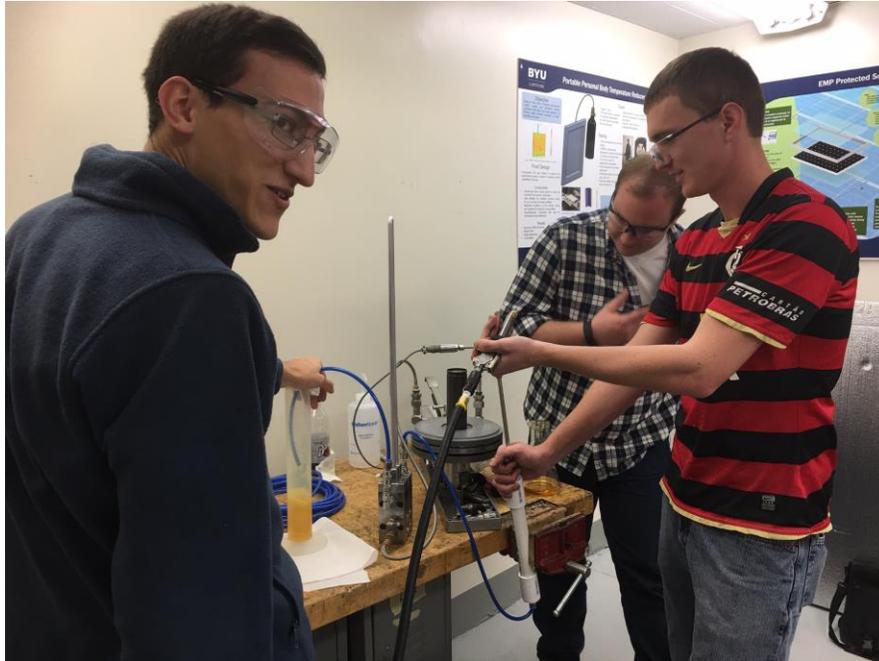
3: Hydratorr

COACH

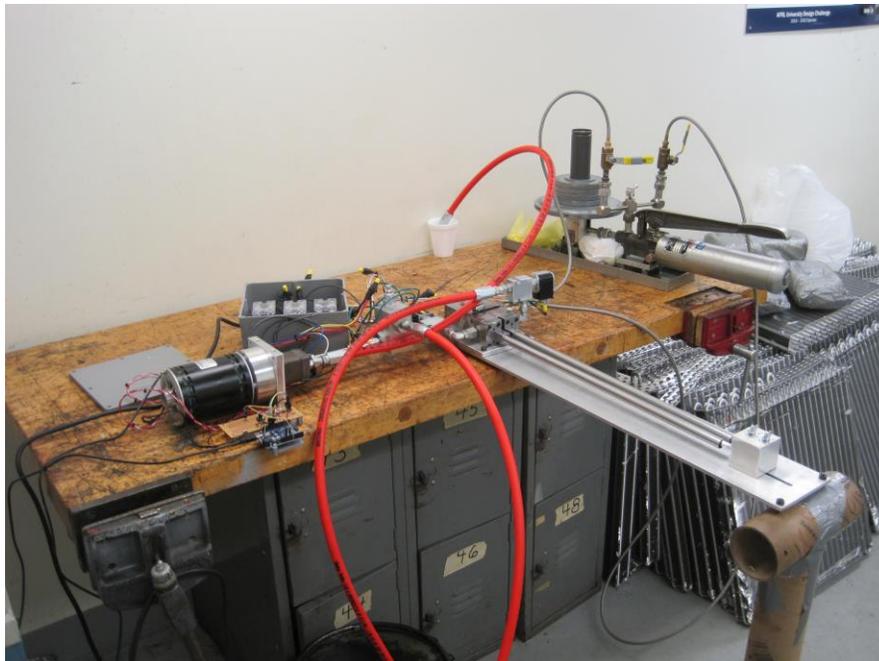
Michael Miles

STUDENTS

Brian Kluber, Chris Quinn, Gavin Grant, John Lyman, Sam Avila



Early evacuation tests showed that when the oil was pushed through the pressure manifold with pressurized air it became foamy. This was undesirable, so the decision was made to use a special manifold and filter to eliminate the foam.



The final prototype. Components shown: the filling, pressurization, and sealing systems. The system is capable of performing the expansion process automatically by activating the pump and solenoids via an Arduino PCB.