

Senior Design Project Description

Company Name	<i>Ward Vessel and Exchanger</i>	Date Submitted	<i>7/29/2020</i>
Project Title	<i>Design of a Machine to Bevel Half Pipe</i> (WARD_BEVEL)	Planned Starting Semester	Fall 2020

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	4	Electrical	2
Computer		Systems	
Other ()			

Company and Project Overview:

Ward Vessel & Exchanger offers design and fabrication of custom shell and tube heat exchangers and pressure vessels manufactured in accordance with ASME Code: Section VIII, Division 1.

Ward Vessel & Exchanger represents an innovative group of people that specialize in the custom design and fabrication of process equipment for the chemical, pharmaceutical, food/beverage, pulp/paper, power, refinery and pure water industries.

With our unique approach to fabrication engineering and strategic locations in both Charlotte, NC and Houston, TX, we continuously and effectively meet the needs of our Customers. See examples of company products:





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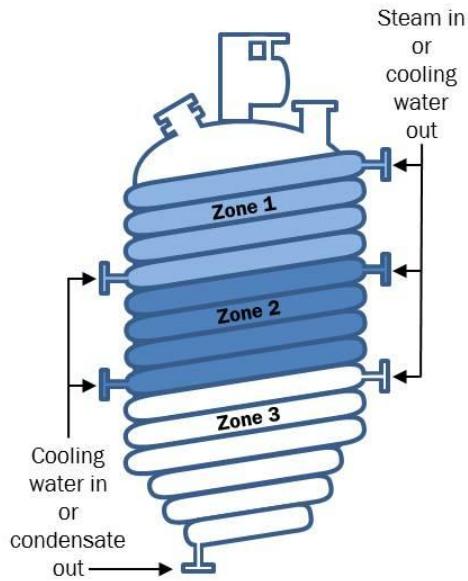
This project will focus on the automation of a sub-assembly fabrication process used in several product applications. This project is partially supported by a grant from the NC Manufacturing Extension partnership, an organization that helps to support business and job growth for NC companies.

Project Requirements:

Tanks and vessel applications in process industries often need a means of heat exchange to carry out the desired chemical reactions. This can be effected using a variety of methods. One method is to use a “half-pipe” welded onto the exterior of the tank or vessel. See photos below:



A heat exchange media is passed through the half-pipe and heat exchange is accomplished from the heat exchange media, through the vessel/tank wall, into (or from) the process material. The diagram below illustrates this concept and shows an application where either steam or cooling water is used as the heat exchange media:



Some applications, fabricators will cut a pipe in half, form the half-pipe to a vessel and weld it on. Ward uses an improved process which starts with a flat coiled steel blank that is fed into a forming machine which makes the desired shape of the half-pipe which will be welded on to a vessel. In the picture below, you can see the coil steel being fed into the shaping mandrel:



The shaped piece needs to have the edges beveled in order to be ready for welding on to the surface of the vessel. Proper beveling is critical to a successful weld. The bevel needs to be very consistent and uniform to insure a good fit-up for welding. Currently, the beveling is done by hand with a grinder. This project is to design a machine that can use mills or grinders to add a weld prep bevel to both sides of formed half-pipe material. The machine would add the bevel to flat strip, before it is formed into half-pipe. Therefore, it would be in-line, between the de-coiler and the mandrel former.



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Expected Deliverables/Results:

- Prototype of a machine that can be installed between the current de-coiler and the forming mandrel machine.
- Machine will bevel both sides to a prescribed bevel angle.
- Machine should accommodate different coil widths and thicknesses.
- Operation should be inherently safe.
- Machine should have a user interface to program settings and display process information

Disposition of Deliverables at the End of the Project:

The work product will be displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Interest in welding/fabrication
- Interest in machine design and building