



**Company Information**

<b>Company Name</b>	<i>Carrier Corp</i>	<b>Date Submitted</b>	<i>04/24/2023</i>
<b>Project Title</b>	<i>Air-Cooled Chiller Lines 30RC and 30XV Base Rail Standardization and Consolidation (CARRIER_RAIL)</i>	<b>Planned Starting Semester</b>	<i>Fall 2023</i>

**Senior Design Project Description**

**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.

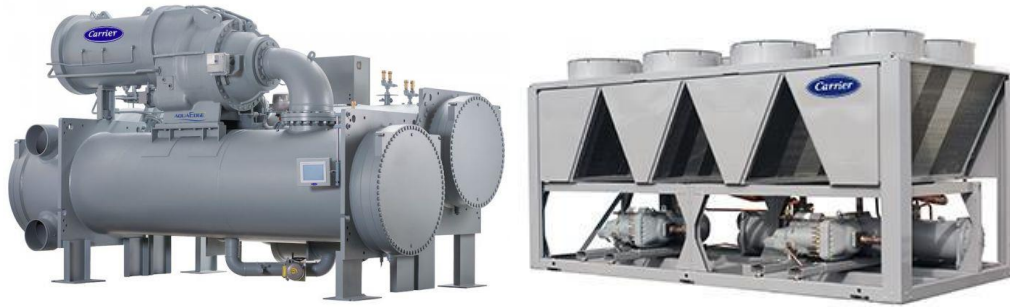
<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	5		

**Company and Project Overview:**



Carrier is a world leader in high-technology heating, air-conditioning and refrigeration solutions. Carrier provides products for HVAC building systems worldwide.

Built on Willis Carrier’s invention of modern air conditioning in 1902, Carrier is a global leader in heating, air-conditioning and refrigeration solutions. In addition to the familiar residential products, Carrier has a vast array of heavy capacity commercial products for buildings and hi-rises of all types. These sophisticated units contain a wide variety of technologies including air handlers, air/water chillers, sensors and building automation controls.

The 9701 Old Statesville Rd Charlotte NC Carrier facility contains design engineering, test engineering and manufacturing operations. Some product examples are shown below:



The Carrier Charlotte factory manufactures commercial water-cooled chillers. Including the air-cooled chiller product lines 30XV and 30RC which are the subject for this project.

	
<p><b>30RC</b></p>	<p><b>30XV</b></p>

**Project Requirements:**

Carrier Air-Cooled Chiller Product Lines 30XV (Screw Compressor) and the new 30RC (Scroll Compressor) base rails are designed differently but support similar components, e.g. evaporator, condensing coils, etc. The outcome is to standardize and use one common base rail design across 30XV and 30RC Product Lines. To standardize on sheet-metal base rails:

1. Identify common design features: Review the design of the base rail supports for each



- product line.
2. Determine the load requirements: take into account the differences in chiller weights, vibration and seismic considerations as well. This will ensure that the standardized and optimize that the design can withstand worst case scenario (real-world forces). A FEA report and study is required to validate the new base rail design.
  3. Develop a standard design: design should incorporate the necessary features to ensure stability and safety for both product lines
  4. Test the design: With the help of Carrier Engineers, Base Rail Supplier and the Charlotte Ops, there will be some real-world testing. Ideally, Carrier would need a finalized base rail design by early Feb in order to have a prototype tested before the UNC-Charlotte Senior Project – May completion and report out.

A successful project with a solid base rail design will have a significant impact on Charlotte Operations and Product Engineering (AC). This project could deliver costs savings with fewer part numbers, better leverage with supplier on higher-volume for a common base rail and usage. The new base rail standard developed in this project could provide a template for future designs that can be adapted for various applications.

**Expected Deliverables/Results:**

- A new improved and tested base rail that will meet both 30XV and 30RC requirements.

**Disposition of Deliverables at the End of the Project:**

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

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

- Strong interest in FEA along with MEGR 3225 – Introduction to Finite Element Analysis, use of Abaqus or Comsol
- CAD Modeling with Creo
- Sheet metal experience would be helpful
- Design reviews will be done at Carrier's Charlotte facility