



Company Information

Company Name	<i>Carrier Corporation</i>	Date Submitted	<i>05/5/2021</i>
Project Title	<i>Development of water mist system for Evaporative cooling in Chiller Application – 30XV or 30RC (CARR_MIST3)</i>	Planned Starting Semester	<i>Fall 2021</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:

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1
Computer	1	Systems	
Other ()			

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:



Project Requirements:

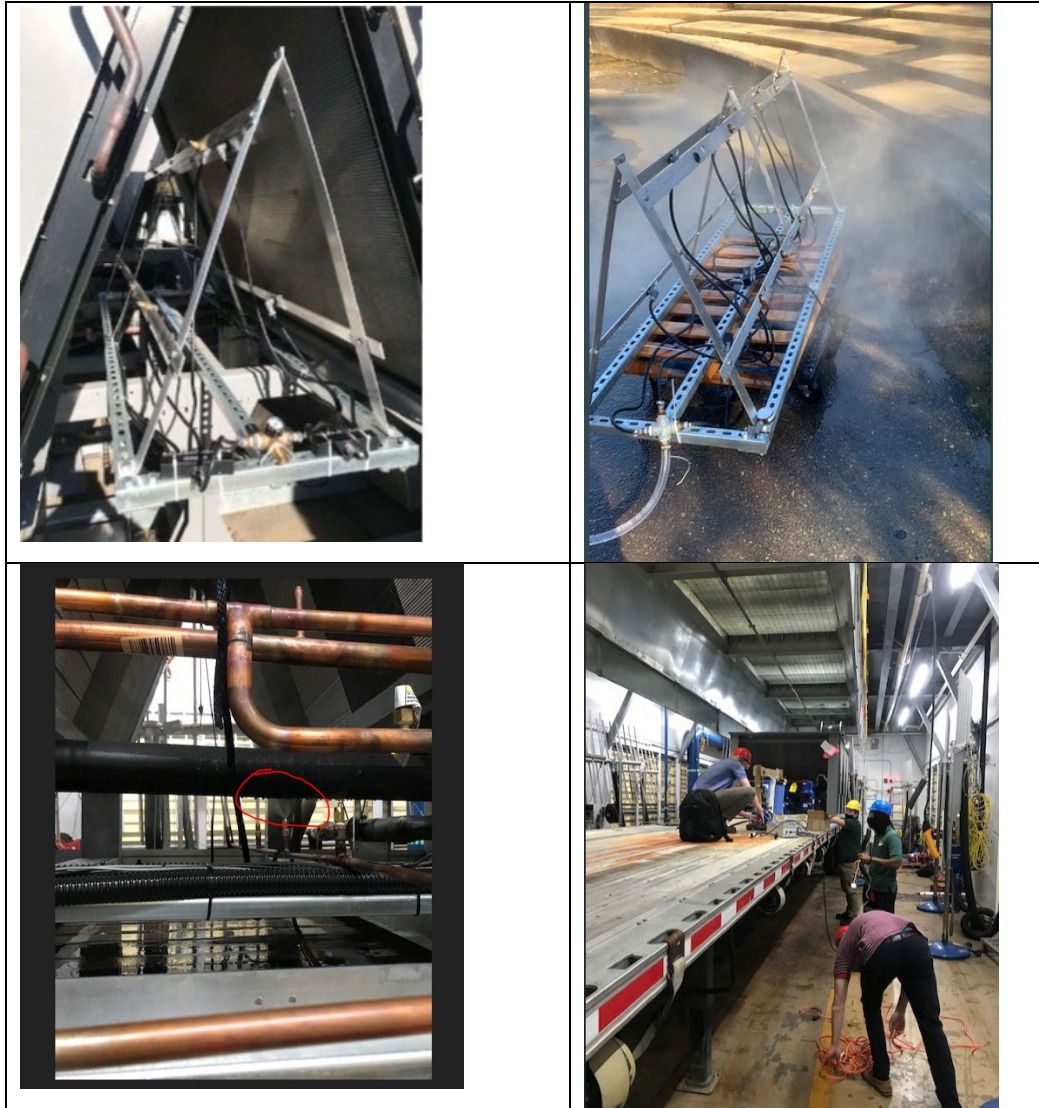
Evaporative cooling is a means for lowering the ambient temperature seen by the heat rejecting heat exchangers (condenser) in an air-cooled air-conditioning system (Air-cooled Chiller in this case) to the wet bulb temperature of the air. This improves the effectiveness of the heat rejecting heat exchangers and the efficiency of the overall system.

Air-Cooled Chiller Example:



Evaporative cooling is achieved by spraying a water mist into the air in the vicinity of the condenser coils which is then pulled into the coils by means of induced draft fans. The water mist creating nozzles are optimally sized and spaced, such that the water use and water pump power consumption is minimal and that there is an even distribution of temperature across the coils.

The CARR_MIST Phase 2 team developed a rough proof-of concept implementation of this concept. See photos below



With the completion of the Phase 2 effort, the team conducted evaporating cooling on half a circuit of a Carrier chiller and identified areas of design improvement in the flow adjustment, mounting and junction box areas.

The system should be designed to be fully automated so that the spray is activated when the dew point is within a specific range, to where there is economic benefit to activating the system. The improved design model needs to be tested on a 4V Carrier chiller to confirm all functionality, verify energy efficiency ratings.

Expected Deliverables/Results:



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The WILLIAM STATES LEE COLLEGE of ENGINEERING
Industrial Solutions Laboratory

1. A report out of the project either electronically or hard copy
2. Physical system design and benefit analysis
3. The control codes developed.
4. Demonstration, test and verification of the system

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. Typically, the work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date. Please confirm your expectation in this section.

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

- Preference given to students that have taken or will be taking MEGR 3214 – Refrigeration and Air Conditioning or ENER4275 - Air Conditioning Systems
- Testing will be conducted at the Carrier facility in Huntersville, students must be capable of travelling to this site.