



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	Carrier Corporation	Date Submitted	03/27/2018
Project Title	Improvement of Heavy Assembly Movement Devices (CARR_MOVE)	Planned Starting Semester	Fall 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	4	Electrical	1
Computer		Systems	1
Other ()			

Company and Project Overview:

Carrier is a world leader in high-technology heating, air-conditioning and refrigeration solutions. Carrier is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp., a leading provider to the aerospace and building systems industries 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.

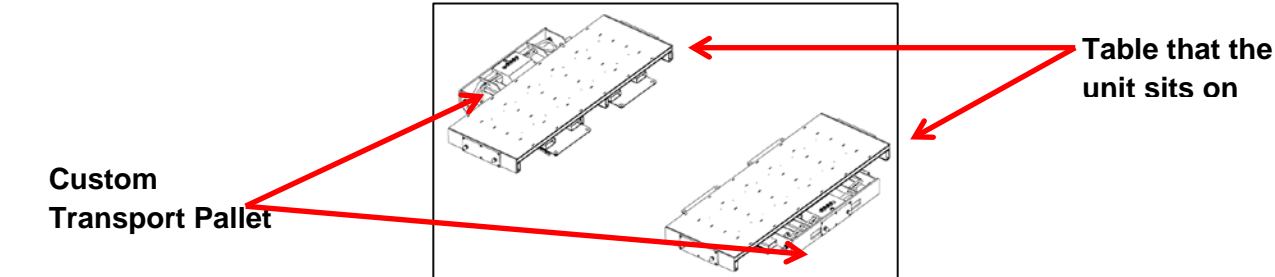
The Charlotte NC Carrier facility contains design engineering, test engineering and manufacturing operations. Some product examples are shown below:



As you can see in the photo, these are large, heavy units up to 100,000 pounds. These units have to be moved through the factory as they proceed through the assembly and test process. Carrier currently uses transport pallets that ride on a cushion of air. Carrier is seeking to improvement this process.

Project Requirements:

Show the current technologies here in pictures



Air “Bladders” mounted under the pallets

Explain what the problems are with the current technology

Current technology requires a significant volume of air required to lift and move the units which creates the need to run large capacity air generators. The physical connection of the air pallets is by large flexible hoses on hose reels. This requires time for the technician to pull out the hose needed for the move and then retract the hose after unit moves are made. During this time, the



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hose creates a trip hazard. Also these bladders fail (burst) due to wear or running over sharp debris. These are very expensive to repair, replace and maintain. The proposed solution must consider distribution of load on the floor surfaces. Too much point loading can cause floor and foundation failure. Therefore, any alternative considered must include an analysis of how load will be distributed to be incorporated as a key element when making a final recommendation.

Describe what the student team would be doing

The team should be researching other options to move large machinery without the need for compressed air. The objective is to eliminate the air requirement (along with the bladders and hoses) which eliminates the associated maintenance & operating expense while improving safety & ergonomics by eliminating a trip hazard. By avoiding the need to handle hoses every time a move is made, the technicians can be more productive.

Will there be something that they can prototype?

Carrier will be open to considering testing on an actual unit assuming the risk is determined to be acceptable. Otherwise, a smaller scale prototype can be used to demonstrate capability.

Expected Deliverables/Results:

- At least 3 options with pros/cons of each option
- A comprehensive financial assessment (Payback Yrs, ROI, IRR)
- A proposal for a mock-up demonstration (scaled) if actual tests (product) can't be acquired

Disposition of Deliverables at the End of the Project:

Results will be provided to the Industry Supporter at the end of the Expo unless the Supporter directs otherwise.

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

Design Reviews are required to be held at Carriers Charlotte NC location.

Other skills that will be utilized or required:

Planning / Milestones – clear and consistent communication to Supporter.

SEGR 2106 – Engineering Economic Analysis