

## UNC Charlotte – Lee College of Engineering Senior Design Program

### Senior Design Project Description

<b>Company Name</b>	<i>Ingersoll Rand</i>	<b>Date Submitted</b>	<i>06/11/2019</i>
<b>Project Title</b>	<i>Compressor Heat Recovery and Energy Storage System - CHESS</i> <b>IR CHESS</b>	<b>Planned Starting Semester</b>	<i>Fall 2019</i>

#### 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	4	Electrical	2
Computer		Systems	
Other (                    )			

#### Company and Project Overview:

At Ingersoll Rand, we're committed to meeting the world's growing critical need for clean and comfortable air, safe and fresh food, energy efficiency and sustainable business practices. We're passionate about building a better future - a world of sustainable progress and enduring results. To deliver on the needs of our customers and the communities where we operate, and to achieve premier performance, we will:

#### **Build a Winning Culture**

Build a winning culture by living our values, creating a progressive, diverse and inclusive environment, enabling innovation and creativity, and the development of customer solutions that engage all employees in Ingersoll Rand's mission.

#### **Grow Strategically**

Grow strategically through technology and innovation, sales excellence and product management by delivering sustainable solutions and services addressing unmet needs for comfort and efficiency across the globe.

#### **Deploy Operational Excellence**

Deploy operational excellence to add value as defined by our customers through a relentless emphasis on continuous improvement.

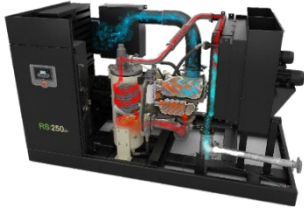


**Oil-Flooded Rotary Screw Air Compressors**

Ingersoll Rand oil-flooded rotary screw air compressors offer the very best of time-proven designs and technologies with new, advanced features that ensure the highest levels of reliability, efficiency and productivity available. Applications include painting in auto body shop, sanding, making snow at ski hills, pneumatic nail guns, pneumatic drills, hammers, powering various air tools.

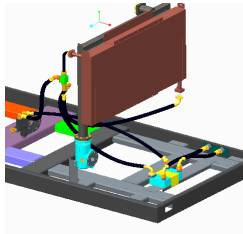
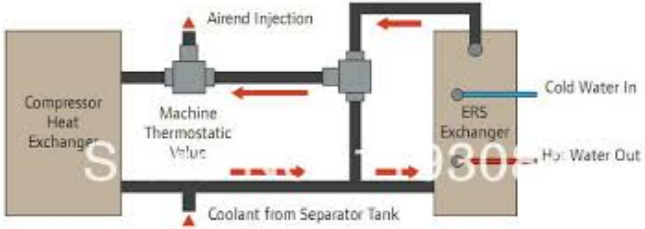


Package – Exterior



Package – Interior

**Energy Recovery System**



### **Project Requirements:**

- The goal of this project is to recover the heat loss from our Oil flooded Screw Compressors and store as energy in an alternative way that will be more useful and flexible for the customer. (example electrical energy locally or back to the grid)
- Ingersoll Rand currently has Energy Recovery System that yields hot water for customer applications.
- Recover heat from losses in Rotary contact cooled compressors
- Convert recovered heat to a usable non-thermal form of energy
- Local storage of usable energy for various applications or reduce energy consumption of compressor.

### **Proposed Scope of Work**

1. Complete design concept of heat recovery and/or energy storage system for an oil flooded screw compressor
2. Prototype design and test
  - a. Ingersoll Rand can provide up to 11kW compressor unit for test.
  - b. Ingersoll Rand can provide compressor and lab services in Davidson.
  - c. Alternatively, can use hot oil (up to 90 degC) flow (up to 5 GPM)) instead of compressor.

### **Expected Deliverables/Results:**

1. Project Schedule
2. Bi-Weekly report out with design concepts
3. Final design concept and alternate concepts
4. Working prototype
5. Final Design Report – (Description, Diagrams, Calculations, Schematics, P&I diagrams)
6. Display Poster for Project Team

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

All material, hardware and documentation must be returned back to Ingersoll Rand

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

- A diverse team would be preferred.