ICC Process Operations Professional II

Capstone Project Description: Rankine Cycle Project

Prof II (3 credit)

**Purpose:**

The overall purpose of the Rankine Cycle Project is to efficiently turn thermal energy into electrical potential energy. This will be completed by researching, designing, and building a portion of the Rankine Cycle. Students will utilize resourcefulness and project management techniques all while creating a positive group and learning environment.

This project will combine the thermal, boiler, and electrical concepts learned in Technical II as well as the professional skills learned in Professional II. This will build student confidence by giving them hands-on experience and will help them to further visualize the world of process operations focusing on power generation.

Students will research, design, and build a working model of the Rankine Cycle. This will include the boiler, turbine, generator, and condenser components.

**Procedure:**

Students will work in a team of 4. The procedure to be followed can be executed in four phases:

1. Students will research boilers, turbines, generators, and condensers as well as the Rankine Cycle, how each works and how each can be built.
2. Students will design possible options for each component and pick the best option.
3. Students will procure materials for and build functioning components.
4. Lastly, all the components will be combined to create a functioning model of the Rankine Cycle.

The entire project will be documented in a design report and professionally communicated at the end of the academic semester.

**Parameters:**

Budget/Materials:

Each group is budgeted $100 for the whole project. Any material that the team would like to purchase needs to be approved first by the instructor so a purchase order can be procured. A purchase order takes a few days to procure so make sure to leave enough time. For every $10, under $100 spent, the team will receive 3 extra credit points.

Any other material should come from the concept lab, someone’s garage, donations, or the junk yard. Run these items by the instructor before you use them. Try to be as creative as possible to keep the costs low.

**Timeline:**

The timeline outlines the important dates that portions of the project will be due. These dates are subject to change as the instructor sees fit.

|  |  |
| --- | --- |
| **Design Report Documentation** | **Due Date** |
| Scope Documentation |  |
| Background/Research Documentation |  |
| Initial Design Options Documentation |  |
| Final Design Explanation Documentation |  |
| Database of Material and Financials |  |
| Working Model Explanation Documentation |  |
| Working Model Initial Testing Begins |  |
| Areas of improvement Documentation |  |
| Project Conclusion |  |
| Final Test and Complete Project Report Due |  |
| Individual Learning Reflections |  |
| Presentation to Industry Professionals |  |

* Each documentation deliverable will be worth 5 points each.
* The final design report with all the combined documentation will be worth 100 points
* The working Rankine Cycle model will be worth 50 points
* The professional presentation will be worth 50 points
* The individual learning reflections will be worth 25 points

**Deliverables:**

* Working model of the Rankine cycle that meets all the requirements for each individual component
* Complete design report for the Rankine Cycle Project
* Professional presentation
* Individual learning reflections