



Company Information

Company Name	<i>Vulcraft-SC, Division of Nucor</i>	Date Submitted	<i>11/19/2021</i>
Project Title	<i>Comprehensive Energy Audit and Recommendations for Improvements (NUC_AUDIT)</i>	Planned Starting Semester	<i>Spring 2022</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	3	Electrical	2
Computer		Systems	1
Other ()			

Company and Project Overview:

Nucor Corporation is a producer of steel and related products based in Charlotte, North Carolina. It is the largest steel producer in the United States, as well as the largest "mini-mill" steelmaker (i.e. it uses electric arc furnaces to melt scrap steel as opposed to blast furnaces to melt iron). It is also the biggest recycler of scrap in North America. Nucor operates 23 scrap-based steel production mills. In 2019, the company produced and sold approximately 18.6 million tons of steel and recycled 17.8 million tons of scrap (Wikipedia). Vulcraft is a division of Nucor located in Florence, SC.

Vulcraft has a long history of success in the steel joist and deck industry. Founded in 1946, Vulcraft is the largest producer of open web steel joists and joist girders in North America. It also is one of the oldest operating divisions of Nucor Corporation. Vulcraft employs the latest technology in manufacturing and fabricating in its quest to provide quality products on time and



to exact specifications. Vulcraft desires to increase the environmental sustainability of its operation which is the focus of this project.

Project Requirements:

Vulcraft consumes energy in many forms including electricity, natural gas, water and air pressure. Utility costs are one of the highest costs that Vulcraft has in running this location. In its efforts to run a more sustainable and environmentally friendly business, Vulcraft goal for this project is to examine every use of energy and utilities to understand individual consumption usages and then analyze and recommend strategies to reduce energy consumption without negatively affecting quality, safety or production efficiency. Team is to implement recommendations as agreed with Vulcraft to validate savings. If implementation is not practical due to investment required or time allowed, then analysis will be performed to validate. Goal to develop a minimum of \$25,000 in cost savings recommendations.

Expected Deliverables/Results:

- Comprehensive documentation of energy and utility consumption usages.
- Recommendations for energy savings in all areas
- Implementation of changes as agreed with Vulcraft and validate of predicted results.
- For changes that require capital approval timing outside the project, an engineering economy analysis report prepared justifying the investment cost and payback financial calculations.
- For changes that cannot be implemented in the course, written implementation plans to be provided for each recommendation.

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):

- (For SEGR students) SEGR 2106 - Engineering Economic analysis will be utilized for Return on Investment calculations in recommendations, this course area will be useful.
- Ability to travel to Vulcraft facility in Charlotte to gather baseline data, multiple trips are expected
- The facility is a heavy industrial facility and safety is of paramount concern. All safety procedures must be followed without exception.