UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description

Company Name	Siemens Energy, Inc.	**Date Submitted**	May 16, 2018
Project Title	Fatigue Endurance Improvement for 18-18 Steel (SIEM_18-18)	**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	
Computer		Systems	
Other ( )			

Company and Project Overview:

The Siemens Charlotte Energy Hub is the company's worldwide hub for 60 Hz power generating equipment. Opened in 1969, the facility has manufactured and serviced generators and steam turbines for the power generation market for decades. In November 2011, the facility celebrated the opening of a new expansion, adding gas turbine production and service capabilities. The new Gas Turbine facility was designed based on LEAN manufacturing principles and certified for U.S. LEED Gold green building standards, making it the most advanced gas turbine production plant in operation. The expansion represents a $350 million total investment in Charlotte, adding 1,000 jobs. With its current workforce of 1,500 and more than one million square feet of space under roof, Siemens Energy in Charlotte has become the largest manufacturer in the city and the second largest among the 250+ Energy companies based in Charlotte.

This project is sponsored by Siemens Energy, Inc. in Charlotte, NC. The goal of the project is to identify a manufacturing process which can improve the fatigue endurance of 18Mn-18Cr alloy steel rings with radial holes.

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Project Requirements:

High-strength 18Mn-18Cr alloy steel rings are used within Siemens generator products to constrain the field windings against centrifugal load due to steady rotation at synchronous speed. Radial-oriented holes can be incorporated within these rings for ventilation purposes in order to cool the generator field endwinding. However, these radial holes will lead to stress concentration and can be critical locations for fatigue failure. The design team is asked to identify manufacturing processes (cold expansion, for example) which can improve the fatigue endurance of these 18-18 alloy steel rings in the vicinity of the radial hole.

Expected Deliverables/Results:

- Technical report including:
  - Executive summary of the manufacturing concept and project results.
  - Materials testing results for selected manufacturing concept.

Disposition of Deliverables at the End of the Project:

Technical report and material testing results to be provided to the sponsor at project end.

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

- None.