



The WILLIAM STATES LEE COLLEGE of ENGINEERING

UNC Charlotte – Lee College of Engineering Senior Design Program

Senior Design Project Description

Company Name	<i>Siemens Energy, Inc.</i>	Date Submitted	07/22/2019
Project Title	<i>Design of Large Machine Tool Fixture</i> SIEM_TOOL	Planned Starting Semester	Fall 2019

Personnel

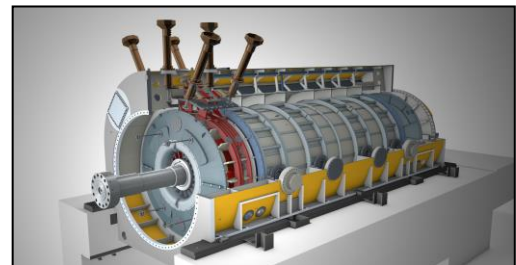
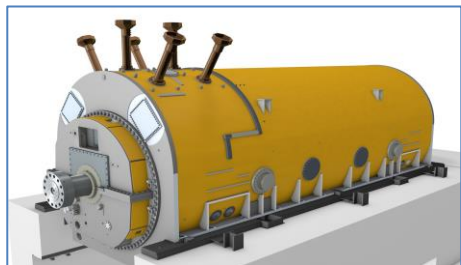
Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

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	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.



The project is sponsored by the Siemens Generator Manufacturing department in Charlotte NC. The project will design a new manufacturing fixture to hold large parts during machining operations.



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Project Requirements:

Siemens routinely machines very large and heavy parts for the products that they manufacture. To do this, they have very large fixtures that are integrated into the machine center bed and the fixture holds the part in a specific orientation while the machining operation is performed. An example of a typical fixture is shown below:



A Press Plate for a stacked stator core is an example of a part that would be held by the fixture that will be part of this project. The fixture will hold the plate in a vertical orientation. Press plate is shown at the top of this photo:





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Close up of the press plate (bottom plate, excluding the fingers):



For current operations, the factory has fixtures they are using, but do to capacity considerations, they want to manufacture a new set for certain parts. The design will be similar to the existing ones, but there are improvements desired in the new ones that will be part of the design effort. The design must interface into the machining center, must be capable of being lifted using Siemen's existing cranes, must be able to take the stresses of the operation and must be designed to be adaptable to different part configurations.

Machining Center Pictured below:



Expected Deliverables/Results:

- Complete drawing package that can be given to a machine shop to be able to fabricate and assemble the fixtures:
 - CAD drawings for every part
 - Bills of material
 - Assembly instructions
 - Recommended maintenance procedures
 - Cost estimate for fixture
- Scaled proof of concept model built and tested

Disposition of Deliverables at the End of the Project:

Models and report to be given to the Supporter after the conclusion of the Expo

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

- Mechanical design
- Capability to design for mechanical specifications including, weight, lifting, deflection, etc.