



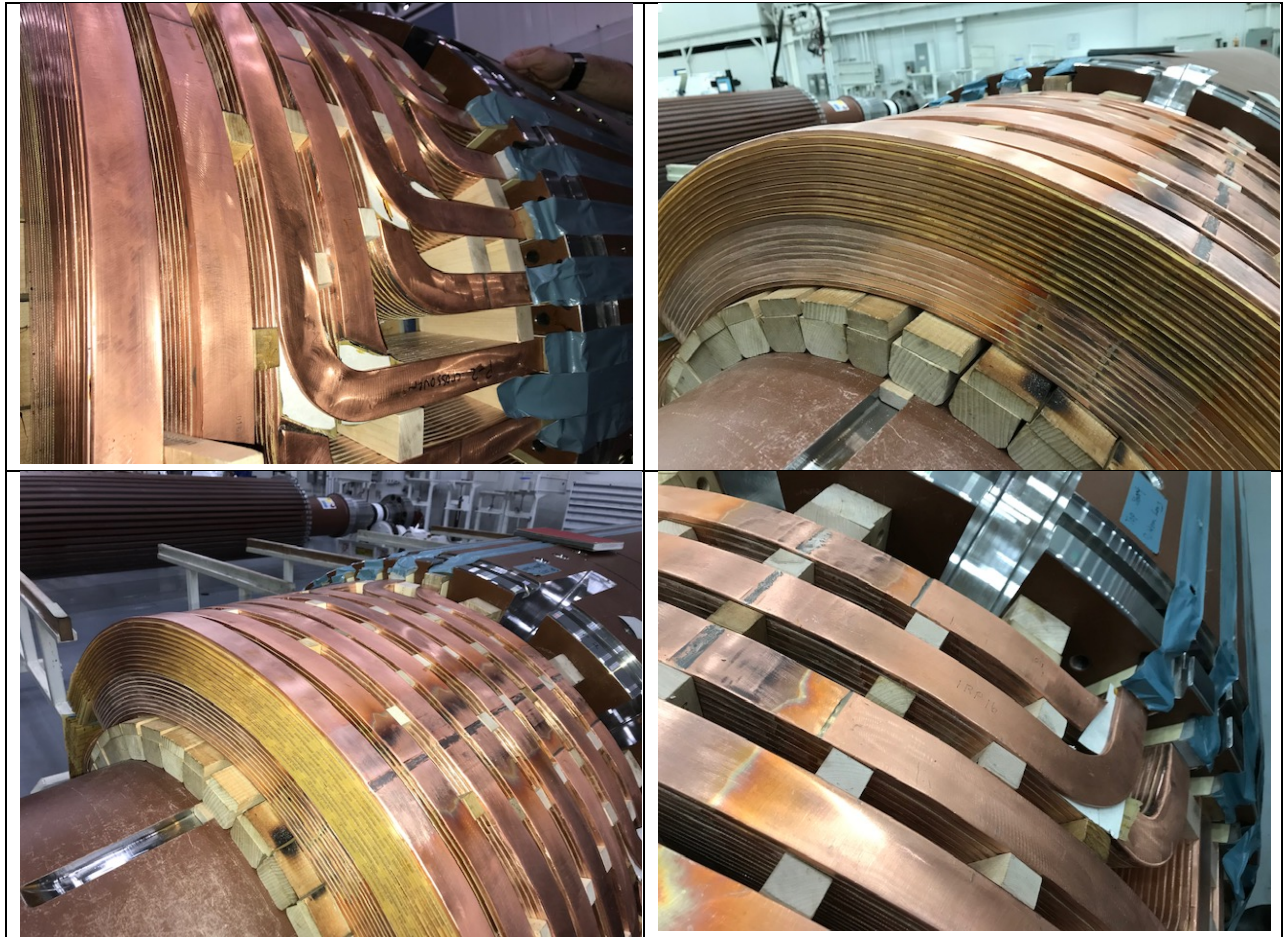
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The project is sponsored by the Siemens Generator Manufacturing department in Charlotte NC. The project will analyze the strain experienced on the copper bar windings on a generator core.

Project Requirements:

See photos below of the copper windings found with a rotor for a utility scale generator:

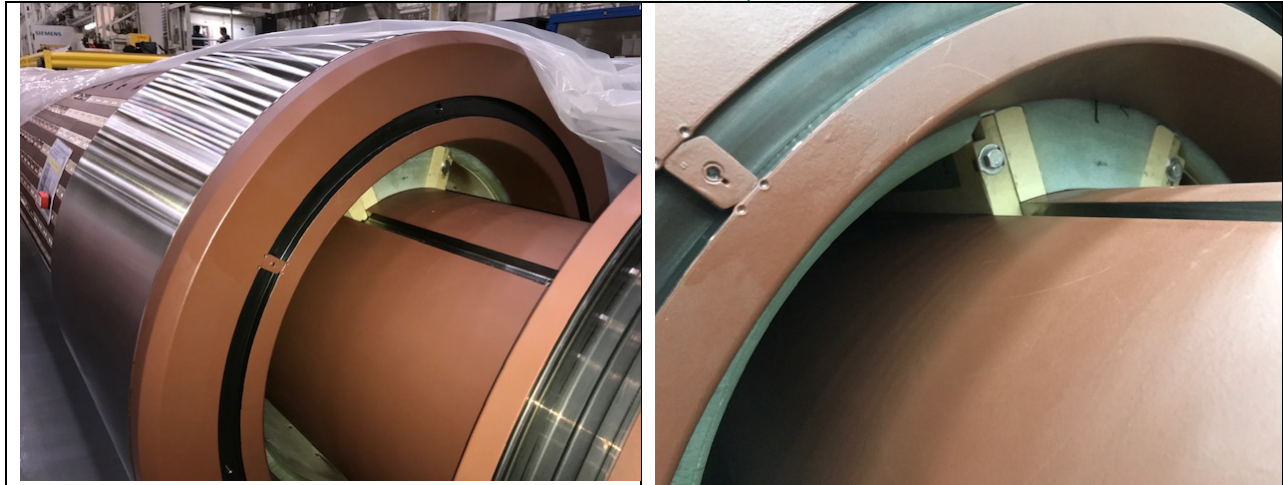


These windings are held secure during the operation with a large metal ring before the rotor enters service:



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As the rotor spins at 3600 rpm (60 Hz systems) there is a significant amount of heat from the electron flow and air friction. This cause thermal stress to the copper coils. Given the tight spacing of these coils, it is very important to understand the thermal stresses that can build up in these coils. Siemens has developed a sophisticated FEA model of the rotor coils to predict the thermal stresses and the mechanical impact. The objective for this project will be able to design a way to instrument and capture actual operational data which can be used to validate the model. As you can see from the pictures, space is tight, the rotor is rotating and the environment is challenging.

Student team must thoroughly understand the mechanics of the coil design, the FEA model predictions and then develop a methodology to take reliable data in this challenging operational environment.

Expected Deliverables/Results:

- Design of a test plan and instrumentation that will meet this objective
- Physical instrumentation set-up to run tests
- Implementation and testing at Siemens facility on an actual rotor in a test bed
- Comparison of predicted model performance against actual data and an analysis of the results and recommendation for model revision or refinement.

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):

- Energy concentration
- Interest in Finite Element Analysis
- Ability to travel to Siemens facility in Charlotte for multiple data gathering and test implementation trips