

Case Study

Large Generator Voltage Regulator Retrofit

E² Power Systems, a wholly owned subsidiary of Basler Electric, performed a retrofit of the existing voltage regulators and power system stabilizer excitation equipment on a large generator in the Midwest.

The retrofitted equipment consisted of Basler voltage regulators, which incorporated the power system stabilizers.

As part of the project’s tasks, E² Power Systems provided the IEEE model for the new equipment. The Siemens modeling software PSS/E-34 was used with a selection of the IEEE exciter model AC7B, underexcitation limiter model UEL2 and power system stabilizer model PSS2A for this Basler voltage regulator system

Scope

Provide the turnkey interface design, demolition and installation details, onsite system installation, testing, startup, MOD-026 modeling, PRC-019 modeling, PSS modeling, and final documentation for NERC compliance. E² Power Systems supplied a new Basler Electric dual voltage regulator system (with the power system stabilizer enabled) for the upgrade of the existing dual voltage regulator system on a large generator in the Midwest.

Schedule

The Basler voltage regulator, MOD-026 report, and PSS modeling along with the tuning and commissioning of the unit took place in 2018.

Design and Solution

The large generator has had the voltage regulator/ excitation equipment retrofitted with Basler voltage regulator equipment. to reflect those changes.

This new equipment resulted in changes to previously performed modeling of the generator relative to the associated excitation system and power system stabilizer. A new model was developed to reflect those changes.

The parameters entered into the model of the Basler Electric exciter were translated into factors, with help of Basler Electric’s drawings that include the mathematical per-unit model of the DECS Excitation System.

With equipment in place, the exciter and control cabinet were rebuilt and system testing began.

Data related to the rotating exciter generator was not provided. A photo of the nameplate was taken during the installation process. This nameplate, along with the previous settings of the voltage regulator and actual data recorded during the system startup, provided for the typical FSNL exciter field amperes and a calculated exciter field resistance in ohms. The exciter field values at the air gap main field operating point were determined. From these measurements and assumptions, the base exciter field voltage could be concluded.



Figure 1 - Large Midwestern Generator