

LONG RING MODIFICATION

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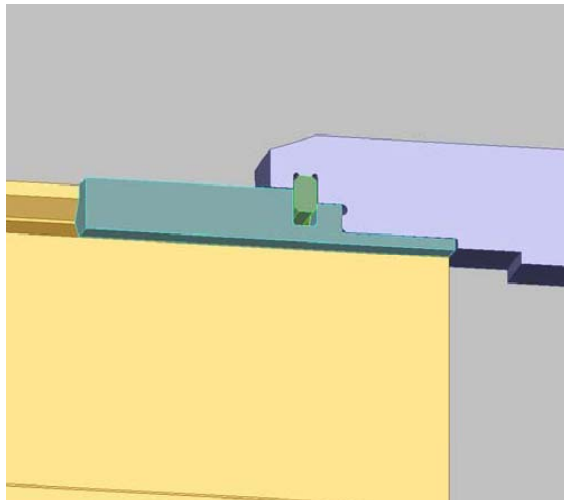
A company located in Germany, recently contracted ReGENco to perform Finite Element Analysis (FEA) and Cumulative Fatigue Analysis on the tooth tops of a Siemens generator rotor. The tooth tops act as a shrink fit surface for the retaining rings. Between tooth tops, wedges are engaged which carry the load of the copper coils. Hence, the tooth carries the shrink load from the retaining ring as well as coil load through the wedge.

Due to high loads and the thin cross-section of the teeth, cracking has been a known issue in these types of generator rotors. Typically, the cracking is due to low cycle fatigue from start-stop cycling. Therefore, the cracking has been more prominent in those generators which are cycled more often than the others. A base loaded unit generally undergoes about 10 start-stops per year. This unit is planned for 200 start stops per year in the future!

The customer emailed drawings of the parts to ReGENco. A 3D computer model was created and analyzed with Cosmos FEA and in-house fatigue programs. Inspection of the teeth showed cracks, verifying the high stress in the FEA model and hence, low fatigue life (<300 starts-tops).

The customer anticipated the need for a short ring modification, and requested analysis of this modification. Based on the computer analysis, ReGENco concluded that a short ring modification would not extend the fatigue life of the rotor to the next major outage. ReGENco recommended a long ring modification.

The difference between a short ring and long ring modification is the extent of the machining required, and the transfer of load through the assembly. A long ring modification always results in higher fatigue life but has the disadvantage of the requirement for two new retaining rings.



The customer accepted the recommendation and requested an analysis of this alternative. A design was generated and analyzed. ReGENco recommended an inspection interval of additional 5000 start-stops. The customer was very satisfied with the recommendation. Design drawings were emailed to Germany, and forwarded to the eventual customer in Holland. Two retaining ring forgings were shipped from ReGENco. They created machining drawings based on the ReGENco design. ReGENco reviewed the machining drawings as a final check on the process. Then the customer completed the repair on the rotor.

*Long Ring Modification Section View(1) Retaining Ring ,
(2) Snap Ring, (3) Wedge,(4) Rotor Tooth are shown*