

# Two On-Site Solutions for Generator Rotor Tooth Top Cracking and Extended Operating Life

Almost at the same time stress corrosion cracks were discovered in the high strength, nonmagnetic rotor coil retaining rings, fatigue stress cracks were found at the rotor wedge support areas. Retaining rings with stress corrosion cracks can be replaced by GMS with 18Mn-18Cr stainless steel rings.

During the running and stopping of the generator rotor (start/stop cycling), the high compressive stresses at standstill change to tensile stresses at speed. These start/stop cycles eventually cause low cycle, high stress fatigue cracks in the "TT" areas of rotor tooth tops (Fig. 1) at the retaining ring fit ends of the rotor.

These defects brought to the Electrical Utility Industry a need for cost efficient repairs in the shortest amount of generating unit down time.

## First Solution — Stress Relief Machining of "TT" Areas

The running life of the rotor tooth tops can be extended by machining off the tooth shoulder (Fig. 1). This modification can be applied to the tooth tops if NDE tests prove that there are no crack indications, or crack starts within limits.

GMS can provide this on site modification with experienced technicians. This work scope consists of components disassembly, complete inspection and NDE testing, machining of "TT" areas, reassembly of original retaining ring, or machine and assemble new 18Mn-18Cr stainless steel rings, complete reassembly, electrical testing and balancing (if required) of the rotor.

The new configuration is designed for a minimum of 10,000 start/stop cycles.

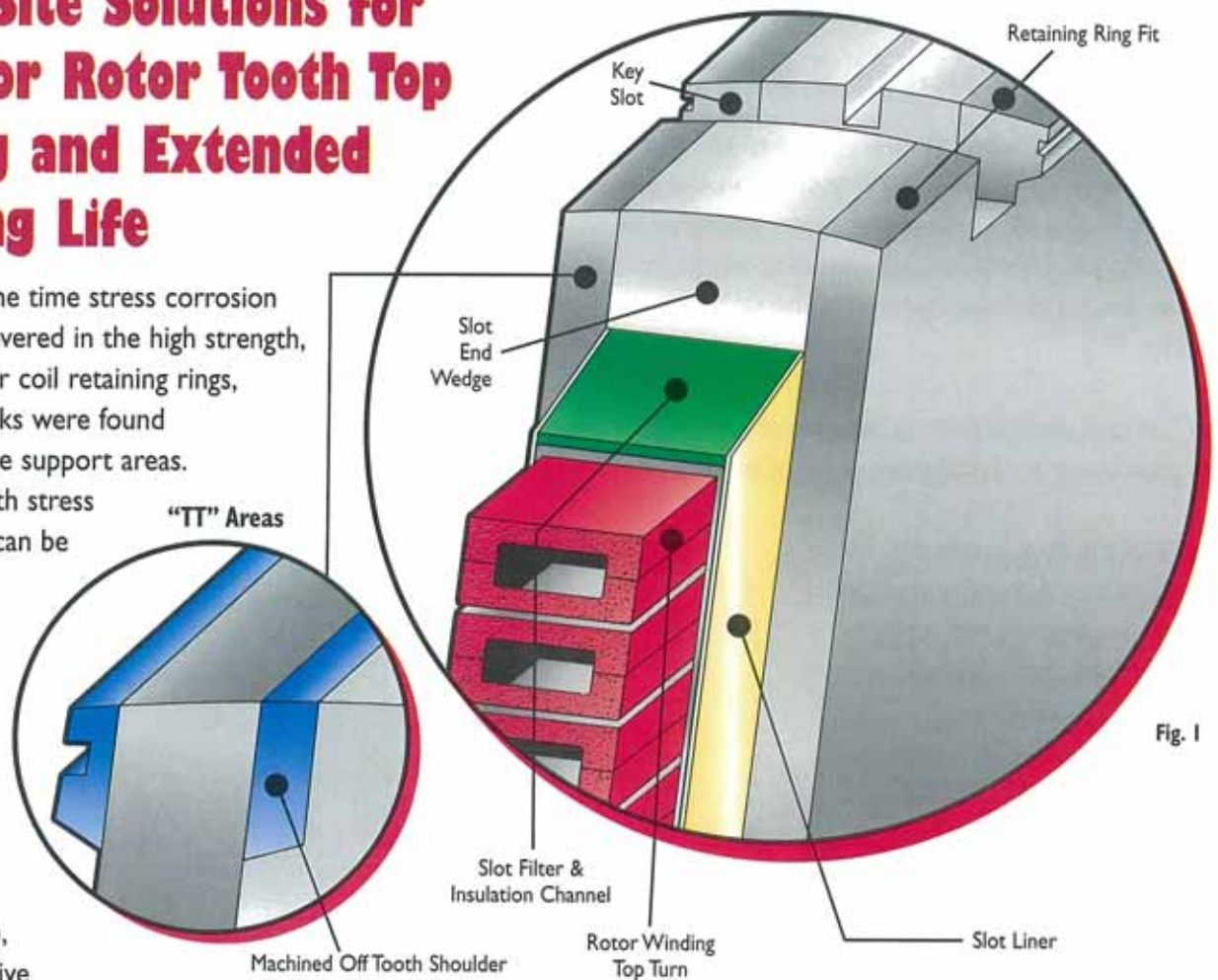


Fig. 1

## Second Solution — New Shrink-Fit Geometry

If low cycle fatigue has already caused cracks and if the cracks are too deep to apply the First Solution, the geometry of the rotor teeth are modified to remove all existing cracks and high stress concentration points from the forging at the retaining ring shrink-fit area (Fig. 2).

The new configuration is designed for a minimum of 10,000 start/stop cycles.

With the new design, the deflection of the slot insulation will also be reduced during base load, cyclic operation or overspeed balancing. This design requires new 18Mn-18Cr stainless steel retaining rings.

GMS can provide this one site modification with experienced technicians. This work scope consists of components disassembly, complete inspection and NDE testing, machining of new retaining ring fit, machining and assembly of the new 18Mn-18Cr stainless steel rings, complete reassembly, electrical testing and balancing (if required) of the rotor.

(Both procedures without rewinding rotor are protected by U.S. Patent No. 5,174,011).

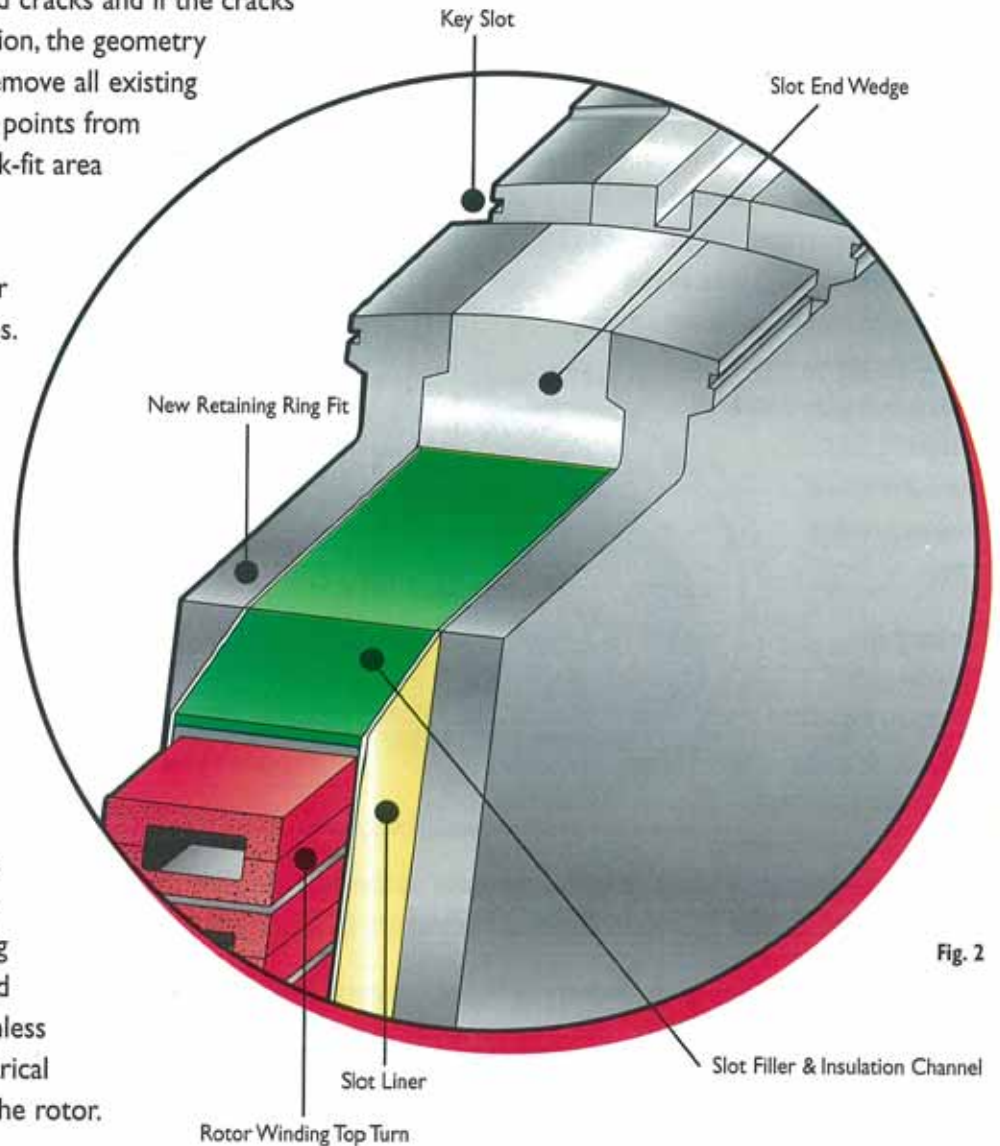


Fig. 2



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