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Generator retaining ring steel (Mn18Cr18N) prepared by powder metallurgy

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The retaining rings are used to protect coils wounding on both ends of the generator rotor from damaging and they suffer huge centrifugal force which increases with generator size. So far, most rings failed due to stress corrosion cracking under comprehensive action of stress concentration and corrosive environment. Thus, it is necessary to require retaining ring materials with good stress corrosion resistance and high yield strength (above 1200 Mpa). Currently, Cr18Mn18 austenitic non-magnetic steels with good ability to resist stress corrosion and high mechanical properties are often used to prepare the retaining ring of large capacity generator. Electroslag remelting combined with subsequent 10-20 times forging is a typical routine to prepare these rings, during which the forging cracks are easily produced on the surface of the rings due to high content of alloy elements, leading to its low yield and high cost. The powder hot isostatic pressing (HIP) forming technology is used to convert powder in the solid state to fully dense components, resulting in better properties than those achieved by traditional melting or press and sinter manufacturing technologies. Powder can be encapsulated in shaped sheet metal and HIPed to produce near-net shape parts. HIP, in recent years, has become an advanced technology for making large complex shape products and high-performance materials. This paper mainly researched the preparation of generator retaining rings by HIP near net shaping process, including powder preparation and the optimization of HIP parameters. In the end, HIP process is evaluated by a performance comparison with traditional process.

Biography

Shubin Ren has completed his PhD from USTB (University of Science and Technology Beijing) China and currently working as an Associate Professor in USTB. He has published more than 20 papers in reputed journals.

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