Analysis of the Joint between Blade and Stator Disc in Steam Turbine

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The use of a new method of attaching fixed blades to a stator disc led to the need for evaluating the strength of a riveted joint. Conventional mechanical testing revealed large variations in the strength of this joint. After sectioning the joint, it was found that the shank did not fill completely the hole in the shroud of the disc. Further investigation involved numerical simulations using the DEFORM software, because securing additional samples for physical examination was complicated. The first simulation task focused on determining the tearing-out force, taking into account work hardening of the shank material due to plastic deformation. The second simulation task aimed to identify optimum initial dimensions of the shank. The goal was to ensure that the rotary upsetting process causes the shank to completely fill the hole in the shroud. As a result, the joint strength would be improved and, above all, the variation in strength eliminated.

Keywords: turbine, blade, numerical simulations, DEFORM

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