

Anti-Corrosion and Prevention of STS 316L Pipes using Ultra-Precision Magnetic Abrasive Finishing

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The importance of surface quality remains significant in mechanical components, as it plays a crucial role in enhancing the uniformity of flow within interior workpieces. This ensures that the surface meets the required specular specifications, long-lasting, facilitating efficient flow within the tube. This study introduces a polishing method through an ultra-precision magnetic abrasive finishing process as a surface treatment in order to polishing a corrugated pipe's interior surface. This technique includes an abrasive media, light oil, oscillation, and rotational speed. Finite element method was utilized to simulate the magnetic field between the N and S poles in a 2D and 3D modelling. Magnetic field play a significant role in generating a magnetic force to pull and push the abrasive in form of nano/micro cutting during rotated. An abrasive ratio was utilized to get the smoothest outcomes possible from the experiment, which looked at finishing examinations of crucial factors affecting surface roughness Ra. The results demonstrated that the abrasive ratio could process the lowest surface roughness value up to 0.1514 μm in 24 minutes, that the groove area was improved more than the ridge area, and that the profile surface roughness was minimized correspondingly. A comprehensive immersion test was executed with the primary objective of categorizing and understanding the correlation between the level of surface roughness and the subsequent corrosion rate.

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