National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Development of Ni-based Hybrid Coatings by Electrodeposition/Laser Cladding Followed by Ultrasonic Shot Peening
Speaker	: Adarsh Kushwaha (Rollno : 519mm1005)
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Venue	: MM214
Date and Time	: 09 Apr 2025 (5:00 PM)
Abstract	: The ultrasonic shot peening (USSP) technique is a reliable post-treatment method for various industrial components to prevent functional failures by imparting residual compressive stresses, texturing, roughness modification, surface nano-crystallization, and compaction. This study aims to develop hybrid Ni-based coatings and cladding on mild steel using Electrodeposition/laser cladding (LC) and USSP techniques. Morphological studies reveal that the coatings and claddings exhibit enhanced closure of pores/cracks, increased micro-hardness, and improved corrosion and scratch resistance after peening. XRD analysis confirms the presence of compressive residual stresses, as well as grain refinement and texturing effects after the peening. After undergoing USSP treatment, the average surface roughness increased by up to 6 μm due to the formation of dimples. Furthermore, compared to the Ni/Ni-TiO2/Ni-Cr coatings and claddings, the hybrid coatings exhibit a hydrophobic character linked to improved corrosion resistance and better in-depth roughness profiles. Furthermore, the research endeavors to improve their mechanical and electrochemical properties by employing USSP's varied process parameters in a hybrid approach.