

Seminar Title	: Modification of microstructural and surface-mechanical properties of nickel-coated copper by peening
Speaker	: Sivasubramanian J (Rollno : 521mm1003)
Supervisor	: Prof. Anindya Basu
Venue	: M. Tech. Class Room, Annex Building, MM Dept.
Date and Time	: 15 Feb 2024 (5:15 PM)
Abstract	: The current research aims to develop a hybrid surface engineering process combining electrodeposition and severe surface plastic deformation (SSPD) via peening treatment to enhance surface-mechanical properties and coating strength. A thin nickel coating was deposited on the copper substrate through an electrodeposition process and the coating contained few micro-cracks and pits. The obtained coating was plastically deformed by different peening techniques such as ultrasonic shot peening (USP) and laser shock peening (LSP). The microstructural evolution, phase analysis, surface hardness, and scratch resistance of nickel coatings and peened coatings were characterized and discussed. The impact of peening based on duration, the number of shots (ball), and different laser peening powers and passes that induced grain refinement and compressive residual stress on the surface of the coating have been investigated. The multi-impact shots at a high velocity strike the coated surface and reduce the thickness of the electrodeposited nickel, creating better adhesion. The peening treatment resulted in enhancing the micro-hardness of the coated nickel. The tensile residual stress of coated nickel has been converted into compressive stress after peening. The plastic deformation developed on the coated surface by USP and other factors lowered the coefficient of friction and enhanced the scratch resistance of the coating. Based on the result it was established that USP, LSP has a broad and effective strengthening approach for the nickel coating deposited on soft substrate to increase its compactness and strength.