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Seminar Title	: Fabrication of TiC reinforced SS434L composite part by Selective Laser Melting (SLM)
Speaker	: Dikshyanta Sahoo ( Rollno : 523me1005)
Supervisor	: Prof. Manoj Masanta
Venue	: Mechanical Department Seminar Room (ME 001)
Date and Time	: 06 Feb 2025 (4.30 PM)
Abstract	: Additive manufacturing (AM) has revolutionized the modern manufacturing system, which enable to produce intricate and high-performance components with variety of materials for a wide range of applications. Among various AM techniques, Selective Laser Melting (SLM) become prominence due to its ability to fabricate near-net-shaped metallic parts with decent mechanical properties. The present study focuses on the fabrication and characterization of ferritic stainless steel (SS434L) reinforced with TiC. A customized powder bed system was designed to ensure controlled fabrication inside an inert atmosphere using a 100 W general purpose laser machining system. The SS434L-(10 wt.%)TiC powder blend was processed by varying the laser power, stand of distance and layer thickness to optimize the single layer deposition. Thereafter, two distinct scanning strategies were implemented to fabricate a 3-dimensional part and their effects on the product quality and material properties were analysed. Microstructural analysis revealed un-melted and partially melted TiC particles integrated into the steel matrix and the formation of carbide phases ( $Cr_7C_3$ , $Cr_{23}C_6$ , FeC) induced by high-temperature laser processing. Mechanical testing showed significant improvements in microhardness, increasing from 180 HV to 554.61 HV for the composite. Furthermore, 94% relative density was achieved under specific parametric condition and scan strategy.