National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Feasibility Analysis of Hybrid Bayesian Network for Optimal WEDM Process Parameters Prediction to Fabricate Single Crystal Tungsten
Speaker	: Sk Aman Ali
Supervisor	: Porf. Mohit Lal, 2856
Venue	: CAD LAB, ID
Date and Time	: 05 Feb 2024 (02:00PM)
Abstract	: Adiabatic Demagnetising Refrigeration has the edge over other refrigeration techniques to achieve a temperature in the mili-kelvin range. Tungsten, Beryllium, Cadmium, and Gallium are the most suitable magneto-caloric materials for regulating the heat flow efficiently in the cryogenic range (below 10 K). However, pure and single-crystal Tungsten is preferable to be used as a switching element in a magneto-resistive Heat Switch (MRHS). Encountering challenges during the machining of tungsten is an inherent and well-recognized aspect of this process. Literature suggests Wire EDM to be the most appropriate unconventional machining process for the machining of single-crystal tungsten. It seems no mathematical correlations which is universally accepted are there that can estimate the process parameters of Wire EDM which guarantees not to lose the crystallinity of tungsten. In this paper, a Bayesian Network in the continuous domain is developed to estimate the process parameters of Wire EDM of tungsten. The experimental database available in the literature has been trained by adopting a machine-learning algorithm. The developed Bayesian Network is capable of estimating the input machining parameters (i.e., pulse on, pulse off time, arc off time, water pressure, wire feed, wire tension, gap voltage) based on the desired output (i.e., MRR, surface roughness, Kerf) parameters given by the user. The accuracy of the network can be increased by re-training the experimental data after machining tungsten. In the current age of manufacturing advancement, the industrial relevance of the current research can be extended to estimate the other manufacturing process parameters using the developed Bayesian Network Model.