Data-Driven Smart Manufacturing for High-Performance Machining

报告时间：2026 年 7 月 2 日 9：00-10：00

报告地点：机电工程学院 A507

主办单位：机电工程学院

报告人简介：Qianxi He is a tenure-track faculty member, principal investigator, and PhD supervisor in the Department of Mechanical Engineering at McGill University, Canada. Dr. He conducts research on smart manufacturing, high-performance machining, cutting tool coating design, surface engineering, and process optimization. Dr. He received her PhD in Mechanical Engineering from McMaster University, Canada. Her research addresses key challenges in the machining of difficult-to-machine materials, including tool wear, coating failure, surface integrity control, and process parameter optimization. In recent years, Dr. He has integrated artificial intelligence, data-driven modeling, advanced characterization, and manufacturing experiments to establish relationships among tool materials, coating structures, process parameters, wear behavior, machining performance, and surface quality, with the aim of developing intelligent prediction and optimization methods for complex machining environments. Dr. He's research outcomes have been published in leading journals in advanced manufacturing and materials, including Wear, Journal of Materials Processing Technology, Journal of Manufacturing Processes, and Journal of Materials Research and Technology. Dr. He also serves as an Early Career Editorial Board Member of Micromachines, a Topical Advisory Panel Member of Materials, and a guest editor and reviewer for several international journals. These contributions demonstrate a strong academic profile at the intersection of smart manufacturing, high-performance machining, and surface engineering.

报告内容简介：

With the increasing demand for high-efficiency, high-quality, and reliable machining of difficult-to-machine materials, smart manufacturing has become essential for overcoming the limitations of conventional trial-and-error process development. This lecture focuses on data-driven smart manufacturing for high-performance machining, with particular emphasis on tool wear, coating failure, process stability, and surface quality control. Using high-speed turning, end milling, and threading operations as representative processes, the lecture will discuss how machining experiments, advanced characterization, tribological analysis, wear characterization, and manufacturing data modeling can be integrated to establish correlations among tool wear behavior, service performance, process parameters, and machined surface quality. The lecture will further explore the integration of artificial intelligence with mechanistic understanding to improve the reliability, interpretability, and engineering applicability of predictive models. It aims to demonstrate the transition from empirical process optimization to a mechanistically informed and data-driven smart manufacturing paradigm, providing new perspectives for efficient machining, tool life enhancement, quality consistency, and sustainable manufacturing of difficult-to-machine materials.

欢迎全校师生参加！