

Editorial

A New Open-Access Journal of Intelligent and Sustainable Manufacturing (ISM)

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The traditional manufacturing industry is currently facing high costs and low efficiency, low flexibility and innovation, human resource problems, as well as serious waste of energy and resources, environmental pollution and other issues, so a transformation and upgrading of the manufacturing industry is inevitable. In response to enormous demand for manufacturing in the global economy, Germany presented the “industry 4.0” strategy back in 2013, in order to seize the first opportunity in the new round of the industrial revolution. With the rapid development of cloud computing, big data, the Internet of Things, artificial intelligence, machine learning, and other technologies, the manufacturing technology is embracing intelligent transformation. Intelligent manufacturing will play a key role in the economy and efficiency of the manufacturing process, the mitigation of climate change, energy and labor shortages and pollution, and will also bring about disruptive changes in the processing of key manufacturing systems and components for automobiles, aerospace, ships, etc.

The extensive use of cutting fluids in machining processes can effectively reduce machining temperatures, and thus solve the problem of burning parts at the boundary of high thermal coupling. Cutting fluids have been used in the manufacturing industry for hundreds of years, resulting in a worldwide consumption of more than 4 million tons of cutting fluids per year. However, most of these cutting fluids are mineral oil-based emulsions, which are not environmentally friendly and renewable, so that their use is a major challenge for sustainable manufacturing. Currently, sustainable manufacturing is a hot topic in the machining industry, especially due to international strategy called “peak carbon dioxide emissions”, which is also an inevitable trend for the future development of the manufacturing industry.

Currently, according to Journal Citation Reports by Clarivate, the number of journals in the field of mechanical engineering reached 180 globally, among which there are 66 manufacturing journals. However, there is still a gap in terms of combining intelligent manufacturing and sustainable manufacturing. In addition, there are more than 20,000 universities worldwide, and tens of millions of engineers and technicians working in various engineering industries, but the results of intelligent manufacturing and sustainable manufacturing as emerging engineering technologies, are still relatively few. Therefore, our new journal of Intelligent and Sustainable Manufacturing (ISM) was established to close this gap and create a new platform for the development and innovation of intelligent and sustainable manufacturing.

Intelligent manufacturing technologies (e.g. data sensing technologies, smart machine tools, adaptive manufacturing systems, etc.) and sustainable manufacturing technologies (e.g. drying conditions, low-temperature cooling, minimum quantity lubrication) are increasingly being reported and initially also validated. However, there are some limitations under different conditions (e.g. grinding, cutting, milling) and application areas (e.g. automotive and aerospace industries). The journal aims to enhance original research and pioneering reviews in the field of manufacturing by various novel technologies with the aim of carbon reduction or decarbonization. More specifically, the journal includes experimental and numerical studies focused on improving machining and manufacturing performance (e.g., reducing energy consumption, improving efficiency and quality, suppressing machining defects) by combining existing smart technologies (e.g., deep learning, computer vision, data mining and processing), green technologies (e.g., green manufacturing models, green factories), and

assistive technologies (ultrasonic, electrostatic atomization, and nano-enhanced bio-lubricant). And to understand unknown mechanisms (e.g., atomization, permeation, film formation, and thermal stability of bio-lubricants). In addition, the journal welcomes pioneering review studies that summarize and discuss the latest trends in the field of sustainable machining and manufacturing, covering different types of workpiece materials (e.g., difficult-to-cut materials), different conditions (e.g., milling, drilling, molding, machining), and the relationship between machining performance and the physicochemical properties of lubricants. Research related to smart manufacturing technologies, new lubricants and methods to improve sustainable manufacturing applications at the fundamental, material, component and system levels is welcome.

We hope that the journal will provide researchers with new ideas and approaches in the field of manufacturing based on emission and carbon reduction. We also hope that the journal will promote further research in artificial intelligence, machining theory, cutting tools, lubricants, clean cutting equipment and key functional components, which will ultimately lead to the application and transformation of manufacturing technology in the aerospace, automotive and marine sectors.