

SPECIAL ISSUE ON ARTIFICIAL INTELLIGENCE PREDICATION AND APPLICATION FOR ENERGY-SAVING SMART MANUFACTURING SYSTEM PART 1

PREFACE



As global awareness of energy conservation, carbon reduction, and achieving net-zero emissions continues to grow, countries are implementing corresponding policies and actions. This includes developing specific action plans based on their carbon reduction commitments, which cover various sectors such as energy, industry, and manufacturing. According to a report by the International Energy Agency, to achieve net-zero carbon dioxide emissions by 2050, countries must take immediate action, particularly in enhancing energy efficiency and reducing industrial energy consumption.

Simultaneously, with the advent of Industry 4.0, smart manufacturing has evolved from a distant vision to a current reality within the industry. It is no longer an unattainable concept but a tangible presence in every forward-thinking manufacturing company. In this era, smart manufacturing applications and software have become the driving forces behind the upgrading of the manufacturing industry and its transformation toward Environmental, Social, and Governance (ESG) goals. Smart manufacturing integrates advanced information and AI technologies with traditional manufacturing processes to achieve high efficiency, flexibility, cost reduction, and personalized production.

In this transformative process, smart manufacturing applications offer a variety of solutions, ranging from automation on the production line to supply chain optimization, ultimately leading to the intelligent transformation of entire factories and facilitating low-carbon transitions. Therefore, understanding the emerging trends in smart manufacturing, along with the roles of smart manufacturing applications and software in the current industrial landscape, is crucial for any manufacturing enterprise aiming to remain competitive. Only through continuous innovation and adaptation can we thrive in this industrial revolution. In this special issue, thirteen scholarly papers that explore smart sensing approaches for AI methodologies, energy-saving technologies, and low-carbon emission strategies are presented. Topics include applications for monitoring carbon emissions and comprehensive decarbonization analyses.

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