Proceedings of the 11th World Congress on Mechanical, Chemical, and Material Engineering (MCM'25)
Barcelona, Spain - Paris, France - August, 2025
DOI: 10.11159/icmie25.003

Global Challenges in Mechanical and Industrial Engineering

Dr. Virgílio Cruz Machado
Universidade NOVA de Lisboa, Portugal

Abstract

Mechanical and industrial engineering will face transformative shifts over the next years. Emerging technologies (AI, IoT, robotics, additive manufacturing, etc.) promise productivity gains but also require new skills and workforce adjustments. Governments and industries are imposing stricter environmental and safety regulations (net-zero targets, circular-economy mandates, cybersecurity rules, etc.), forcing engineers to redesign products and processes. At the same time, aging populations and skills gaps are causing labor shortages even as industries demand more interdisciplinary, data-driven abilities. Complex global supply chains remain vulnerable to geopolitical, economic and climate shocks. Finally, innovation itself may stall: funding shortfalls and the "valley of death" between lab research and production threaten to slow commercialization of new technologies. Each of these challenges – technological, educational/workforce, sustainability, supply chain, standards/regulations, and innovation funding – will be discussed, drawing on recent forecasts and industry/academic analysis.