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Simulation and Optimization Methods in Machining and Structure/Material Design

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This Special Issue presents recent advancements in simulation and optimization methods for machining and structural/material design. As manufacturing becomes increasingly digitalized and performance-driven, accurate modeling and intelligent optimization have become critical tools. The collected works span a broad range of topics—from finite element modeling and molecular dynamics to surrogate modeling and artificial intelligence—addressing complex multi-physics phenomena, microstructure evolution, and material behavior across different scales. Topics include heat and stress modeling, friction stir welding, selective laser melting, deformation mechanisms, cutting behavior, energy efficiency, and process control. This Special Issue also features intelligent design approaches for lightweight components and energy-efficient production systems, and reflects current efforts to enable smart manufacturing through simulation-enhanced predictive control and optimization-driven material innovation.

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