



Guest Editorial

Special Issue: Enhanced Process–Machine Interaction Through Design, Tooling, Automation, and Modeling

Computer numerically controlled manufacturing equipment and tooling has led to process automation and significant productivity advances. Demand for high quality products and cost-effective processes continues to grow and has driven the design of new machinery, intelligent tooling, and sophisticated control and automation techniques. However, the efficiency and throughput of modern manufacturing processes still depends on the interaction of the machine and the process. This motivates research in the area of process–machine interaction. This special issue provides a platform to disseminate recent research efforts that increase our understanding of this interaction. The paper topics are wide ranging, but may be arranged by discipline.

Material Removal

- The implications of cutter runout on the cutter-workpiece engagement model;
- modeling of thermal error for a gantry milling machine ball screw;
- a voxel-based model for direct digital subtractive manufacturing;
- simulation of orthogonal cutting of unidirectional fiber-reinforced polymer composites;
- a calibration method for identifying cutter runout and specific cutting force coefficients in milling;
- the energy consumption by a five-axis machining center based on the workpiece location;
- a voxel-based cutting force simulator for cutting force in ball end milling;
- time and frequency domain analysis for real-time tool condition monitoring;
- a model for grinding wheel structure and topography;
- characterization of surfaces generated using microelectric discharge machining.

Forming

- Fractal-based toolpath planning for single point incremental sheet forming;
- Z-die design for bending processes;
- a methodology for predicting component geometry in incremental sheet forming.

Rotating Systems

- A model to predict rolling friction in bearings;
- a coupled dynamic model of the spindle bearing system.

Material Addition

- An algorithm for additive repair of components.

Heat Treating

- Tailoring the tempering process to achieve desired material properties.

Joining

- In-process tool wear monitoring in friction stir welding.

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Burak Sencer, Ph.D.
Guest Editor
Department of Mechanical,
Industrial, and Manufacturing
Engineering,
Oregon State University,
Corvallis, OR 97331



Tony Schmitz, Ph.D.
Guest Editor
Department of Mechanical
Engineering and Engineering Science,
UNC Charlotte,
Charlotte, NC 28223



Jaydeep Karandikar, Ph.D.
Guest Editor
GE Global Research Center,
Niskayuna, NY 12309



Chris Tyler, Ph.D.
Guest Editor
Boeing Co.,
St. Louis, MO 63166