Georgia Tech
Precision Machining

http://pmrc.marc.gatech.edu/

by

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PMRC Mission and Objectives

Enabling Technology
- Process Analysis and Optimization
- Machine Tool Design and
  Calibration
- Fixturing
- Mechanics of Materials Machining
- Open Architecture Control
- Metrology
- Process Monitoring and
  Diagnostics

Needs
- Throughput
- Maximization
- Cost Reduction
- Part Error Control
- Part Quality
- Improvement

Industry
- Product Manufacturers
- Machine Tool Makers
- Cutting Tool Makers
- Part Suppliers

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Research Topics

Process Analysis and Optimization
Deflection of tool, machine and part; dynamic stability; cutting force prediction; machining process optimization; tribology in machining.

Open Architecture Control of Machine Tools
PC-CNC systems; proprietary process models and process control strategies; plug and play sensors and controllers.

Environmentally Conscious Machining
Effects of cutting fluid, chip, and scrap on factory ecology; control and optimization of machining process by-products.

Machine Tool Design and Calibration
Machine tool components and structures; fixturing; machine stiffness and accuracy; thermal deformation; positioning error; tool condition; static and dynamic calibration; error mapping; micro machine tool design.

Mechanics of Materials in Machining
Cutting forces; surface integrity; metals, super alloys, intermetallic compounds; micromachining.

Metrology
On- and off-line characterization of part surface, form, and mechanical properties; and coordinate measurement methodologies; micro metrology.

New Process Development
Micro grinding; laser assisted micro machining.

Process Monitoring and Diagnostics
Sensors and signal processing; deterministic and heuristic diagnostics; direct and indirect measurement of tool wear; tool breakage; tool runout; and chatter.
Modes of Interaction

- Research projects funded via industry/government contracts, grants to individual PMRC faculty
- Teaming with industry/national lab for government contracts
- Industry internships for undergraduate and graduate students
- Short-term on-campus internships for industry engineers

- Alcoa Fastening Systems
- Rolls Royce
- Caterpillar Precision Seals
- GibbsCAM
- Shanghai Machine Tool Company
- Los Alamos National Labs
Funding Update

Net funding till present: > $5.7M
~$432,000 in new funds in CY05-06 + Major in-kind contribution of GibbsCAM software
Plans for 2006-2007

- Seek industry partners for NSF I/UCRC

- Attract new industry sponsors and projects

- Seek industry partners to go after large funding opportunities (e.g., DoD, DoE, STTR, NSF GOALI, etc)

- Develop partnerships with machine tool vendors to obtain new machines via consignment/donation agreements
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