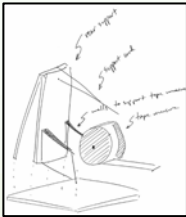


The faculty and students in the Design, Manufacturing, and Product Development Area study and teach about engineering processes for developing successful products. Their interests span a broad array of subjects from entrepreneurship and innovation to mechanical design to best methods of production.

Creativity and Innovation



Faculty are involved in a broad range of experimental, theoretical, and computational studies of creative and innovative processes. We are also developing new computer-based tools and systems as well as enhanced processes to support creative design activities. Simulations and experiments focus largely on design teams and the results are often interpreted using recent theories from cognitive science.

Faculty: Professors Frey, Magee, Seering, Wallace, Yang

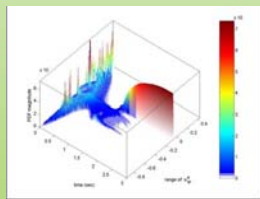
Processes for Product Development



In developing new products, engineers are constantly balancing the needs for high levels of quality and performance, low product cost, and rapid development time. Faculty and students in Area 2 work in close collaboration with colleagues at an array of corporate sites to understand, evaluate, model, and modify the processes by which products are brought to the market. Among the areas of study are product architectures and platforms, networked design processes, effective product testing, risk management, and global development strategies.

Faculty: Professors Frey, Magee, Seering, Wallace, Whitney, Yang

Computation in Design



A cogent design process for systems has to address operating in uncertain conditions. These include parametric, loading, use, and environmental unknowns. Especially for complex and large-scale systems, where the role of simulation is critical, efficient computational methods must be employed for assessing interactions, statistics, and the sensitivity of optima. These methods need to seamlessly connect the computer representations of the design suitable for conceptual, preliminary and detail design stages. These representations need to effectively allow topological, geometric, and property changes during initial design, facilitate modularity and reuse of components, as well as automated analysis, and provide documentation of the design rationale and resulting configuration.

Faculty: Professors Chryssostomidis, Frey, Gossard, Hover, Patera, Patrikalakis, Sarma, Wallace

Design, Product Development and Manufacturing Faculty and Principal Research Staff:

Antonio Buonassisi	Tim Gutowski	Emanuel Sachs	David Trumper
Martin Culpepper	Franz Hover	Sanjay Sarma	David Wallace
C. Chryssostomidis	Chris Magee	Mark Schattenburg	Dan Whitney
Dan Frey	Anthony Patera	Warren Seering	Maria Yang
Dave Gossard	Nick Patrikalakis	Alex Slocum	Kamal Youcef-Toumi

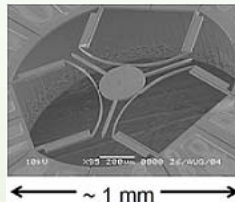
Environmentally Conscious Design and Manufacturing



Environmentally Conscious Design and Manufacturing are areas of growing importance. In particular, issues related to global warming and sustainability are now front and center. Product design and manufacturing can make positive contributions in two ways: 1) by reducing the footprint of the products and the processes, and 2) by contributing new technologies that can be used as part of the solution.

Faculty: Professors Buonassisi, Gutowski, Sachs, Wallace.

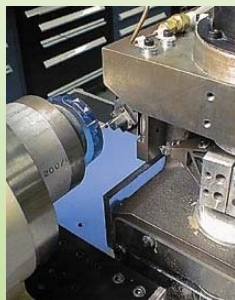
Precision Design



The MIT Precision Engineering Laboratories research new methods, instruments, and equipment which improve mankind's ability to make, manipulate, and measure in applications that possess high scientific or economic impact. We create new technologies for (a) high-speed mechatronics, (b) biomedical instruments, (c) micro-/nano-engineering, (d) optical systems, and (e) manufacturing equipment. Basic and applied research are combined with invention to enable the creation of high-performance machines that increase the pace of scientific discoveries and improve the pace and quality with which discoveries are put into practice.

Faculty: Professors Culpepper, Slocum, Trumper, Youcef-Toumi, Schattenburg

Manufacturing Processes, Equipment, and Systems



Manufacturing research at MIT combines physical principles, economic principles, societal issues, and a systematic understanding of the complex interactions between the many facets of manufacturing enterprises. Our research yields new knowledge, methods, and technologies that advance mankind's ability to convert raw materials into improved products and/or new types of products. Basic and applied research projects are conducted within the context of manufacturing processes, manufacturing equipment, information management systems, energy management/conversion systems, and manufacturing system design.

Faculty and senior research staff: Professors Anthony, Brecht, Brock, Buonassisi, Chun, Coughlin, Culpepper, Gershwil, Graves, Gutowski, Hardt, Kim, Sachs, Saca, Sarma, Schick, Slocum, Trumper

Course Offerings in Design, Product Development, and Manufacturing

2.00AJ Fundamentals of Engineering Design: Explore Space, Sea and Earth	2.745 Invention
2.00B Toy Product Design	2.75 Precision Machine Design
2.007 Design and Manufacturing I	2.76 Multi-Scale System Design and Manufacturing
2.008 Design and Manufacturing II	2.760 Multi-Scale System Design and Manufacturing
2.009 The Product Engineering Process	2.782J Design of Medical Devices and Implants
2.017J Design of Electromechanical Robotic Systems	2.800 Tribology
2.019 Design of Ocean Systems	2.810 Manufacturing Processes and Systems
2.038J The Art of Approximation in Science and Engineering	2.813 Environmentally Benign Design and Manufacturing
2.082 Ship Structural Analysis and Design	2.821J Fabrication Technology
2.22 Design Principles for Ocean Vehicles	2.830J Control of Manufacturing Processes
2.372J Design and Fabrication of MEMS	2.83 Environmentally Benign Design and Manufacturing
2.703 Principles of Naval Ship Design	2.851J System Optimization and Analysis for Manufacturing
2.704 Projects in Naval Ship Conversion Design	2.852 Manufacturing Systems Analysis
2.705 Projects in New Concept Naval Ship Design	2.853 Introduction to Manufacturing Systems
2.706 Sailing Vessel Design	2.854 Introduction to Manufacturing Systems
2.71 Optics	2.875J Mechanical Assemblies: Their Design, Manufacture, and Role in Product Development
2.710 Optics	2.882 System Design and Analysis
2.717J Optical Engineering	2.888 Professional Seminar in Global Manufacturing Innovation and Entrepreneurship
2.72 Elements of Mechanical Design	2.890J Proseminar in Manufacturing
2.722J D-Lab: Design	2.96 Management in Engineering
2.737 Mechatronics	2.961 Management for Engineers
2.739J Product Design and Development	
2.744J Product Design	