Computing in Industry, Technology, and Design

Instructor: Dmitri A. Gusev

Fall 2007

CS 210: Computing and Culture

Discussion 1, September 12, 2007

Computer-Aided Design/Drafting (CAD)

- **Computer-aided design (CAD)** is the use of a wide range of computer-based tools that assist engineers, architects and other design professionals in their design activities. CAD originally meant Computer Aided Drafting because of its original use as a replacement for traditional drafting. Modern functions of CAD systems include
  - 2D technical drawing of physical components
  - Engineering of 3D models
  - Conceptual design and layout of products
  - Strength and dynamic analysis of assemblies

Fields of CAD Use

- Architecture, civil engineering, construction
- Mechanical engineering: MCAD
- Electronic design automation (EDA): ECAD
- Electrical engineering
- Manufacturing process planning
- Industrial design (furniture, automotive, etc.)
- Fashion design: Apparel and Textile CAD
- Garden design, etc.

Computer-Aided Manufacturing (CAM)

- The abbreviation **CNC** stands for **computer numerical control**, and refers specifically to a computer "controller" that reads G-code instructions and drives the machine tool, a powered mechanical device typically used to fabricate metal components by the selective removal of metal. The operating parameters of the CNC can be altered via software load program. CNC was preceded by NC (Numerically Controlled) machines, which were hard wired and their operating parameters could not be changed.
- **Computer-aided manufacturing (CAM)** is the use of a wide range of computer-based software tools that assist engineers and CNC machinists in the manufacture or prototyping of product components. Traditionally, CAM has been considered as an NC programming tool wherein 3D models of components generated in CAD software are used to generate CNC code to drive numerical controlled machine tools. CNC machines today are controlled directly from files created by CAM software packages, so that a part or assembly can go directly from design to manufacturing without the need of producing a drafted paper drawing of the manufactured component.

Computer-Integrated Manufacturing (CIM)

- Computer-integrated manufacturing (CIM) is a method of manufacturing in which the entire production process is controlled by computer. Typically, it relies on closed-loop control processes, based on real-time input from sensors.

Product Lifecycle Management (PLM)

- Product lifecycle management (PLM) is the title commonly applied to a set of application software that enables the New Product Development (NPD) business process. Within PLM there are four primary areas:
  - Product and Portfolio Management (PPM)
  - Product Design
  - Manufacturing Planning (MPM)
  - Product Data Management (PDM)

Information Technology (IT)

- **Information technology (IT)** is the study, design, development, implementation, support or management of *computer-based information systems*, particularly software applications and computer hardware. A few of the duties that IT professionals perform may include:
  - Data management
  - Computer networking
  - Computer engineering
  - Database systems design
  - Software design
  - Management information systems
  - Systems management or System administration
  - Voice over IP (VoIP)

Networking and Intellectual Property (IP)

- **Intellectual property (IP)** is a term encompassing legal entitlements which attach to certain names, written and recorded media, and *inventions*. United States Patent and Trademark Office (USPTO) provides an online patent database at http://www.uspto.gov/patft/

Embedded Computers/Microprocessors

- An **embedded** system is a special-purpose computer system designed to perform one or a few dedicated functions. Embedded systems require relatively little human-computer interaction. In contrast, a general-purpose computer can do many different tasks depending on programming.
- Embedded microprocessors are found in household appliances, automobiles, cellular phones and other electronic devices. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants.