Bio for Prof Glancey

- Associate Professor in Bioresources Engineering and Mechanical Engineering
- Teaching:
  - Various Design Courses
  - Computer-Aided Drafting
- Research Areas:
  - Automation for Composites Manufacturing
  - Autonomous Device for Environmental Monitoring
  - Integrating Engineering Polymers into Hand and Power Tools
  - Several Ag Projects with Case-New Holland, Inc.
- PE – Delaware and Maryland

Automated Capping Station

- Presentation Overview
  - Introduction – Dental Cement
  - Manufacturing/Assembly/Packaging
  - Process Diagram
  - Prototype Layout
  - Operation (Movie)
  - Summary of Benefits Resulting From Automation
IRM Adhesive

- Intermediate Restorative Material
- Temporary Filling for the Dental Industry
- Manufactured by Densply-Caulk, Milford, DE
- Clean Room Quality
- More than a 500,000 capsules sold annually

IRM Manufacturing Station
Process Diagram

Capsules

Capsule Inserted Into Stainless Puck

IRM Powder

Capping Station

Caps

Boxes

Trays

Package Assembly Station

Design to Reality . . .
Automated Assembly Transfer Systems

Figure 38.29 Transfer systems for automated assembly: (a) rotary indexing machine, (b) in-line indexing machine. Source: G. Boothroyd.

Automated Capper
Automated Capping *Sequential Control*

- Cap Delivered
- Wheel Indexes
- Plunger Cycles
- Cap Check
- Capsule Check
- Cue Check
- Homing (1st per rev)
System Components in Automation

- Controller (PLC, PC)
- Sensors (Inputs)
- Actuators (Outputs)
- Operator Interface (Screen/TouchPad)

PLC & Motor Controller
Proximity Sensors
Pneumatic Cylinder
Touch Pad & E-Stop
Servo Motor

Benefits of Automated IRM Cap Assembly

- Productivity
  - Overall cycle time reduction (1.2 to 0.8 sec/capsule)
- Ergonomics
  - Repetitive motion operation eliminated
  - Less injury (carpal tunnel, neural and muscular disorders)
- Reduced Cost
  - One operator transferred to another manufacturing process
  - Payback period less than 1 year