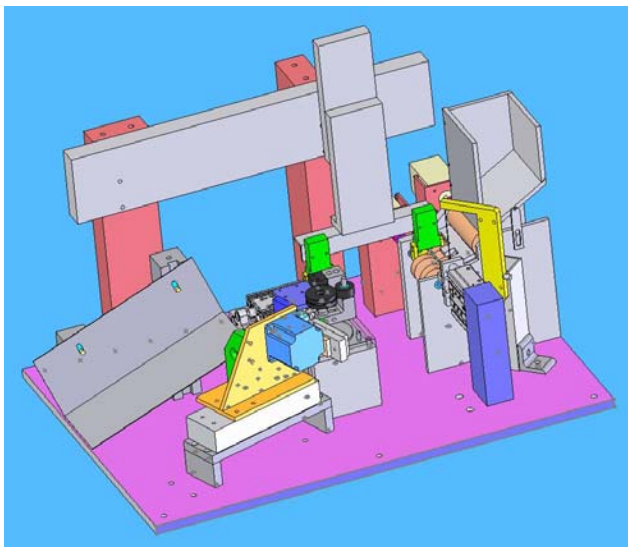
Medical Device Automated Manufacturing Cell

Sponsor: Restore Medical
Sponsor's General Mission or Business Statement: Restore Medical, Inc. manufactures and markets medical devices to treat sleep apnea and snoring, mission is to be the leader in minimally invasive treatments of sleep disordered breathing.
Sponsor's Advisor, Title, and Phone Number: Kurt D. Krueger R&D Manager, Product Development (651) 634 3084
Sponsor's Address: 2800 Patton Rd., St. Paul, MN 55113
University of St. Thomas School of Engineering Academic Advisor: Dr. Christopher S. Greene
Team Member Names: Jacob R. Braegelmann (EE), James B. Hull (ME), Dustin J Olynyk (ME), T. Berker Tas (EE)
Senior Design Clinic I-II (ENGR 480-1) 2005-6 Project Mission Statement: Achieve complete automation of the Pillar® needle subassembly manufacturing procedure: rotational orientation, burr compression, bending, and capping. Operations must be performed in a repeatable fashion while maintaining quality assurance requirements and conforming to all safety regulations.

Major Design Requirements:

1. Complete automation – user loads needles in hopper, picks up final product
2. No damage to the needle
3. Must use only materials suitable for clean room environment
4. Machine must run unattended
5. Rotationally orient needle such that operations do not touch tip
6. Compress burr such that a specified gauge ball will pass through unobstructed
7. Bend needle such that the true position of tip falls within the specified .140'' diameter circle
8. Place cap on such that it stays on through injection molding
9. User interface must be simple and intuitive
10. Machine must comply with UL safety standards

Senior Design Project Summary: This project required a design focused multidisciplinary engineering team with an understanding of the medical device industry and its specific requirements. After conceptually designing a custom system to perform the necessary operations a significant amount of mechanical design was performed using Solidworks. Occurring in parallel was the control theory, research into machine components, and research into auxiliary system components such as user input and sensory options. After procuring the necessary components through vendors, machine shops, and fabrication the components went through initial assembly and unit testing. Once each unit functioned correctly the components were integrated and a final series of tests were conducted. All mechanical components are custom designed. A dedicated real-time controller oversees operation of the system, while the user interface is provided through a Windows based application and touch screen. Project success required a focused schedule with the ability to adapt, good documentation, skill with external resources, leadership from all group members, and creativity in design.



Three-dimensional drawing of automation system