



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	Structure Medical	Date Submitted	Nov 28, 2017
Project Title	Automated Cleaning Device for 5 Axis Machining Centers (SM_CLEAN)	Planned Starting Semester	Spring 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	5	Electrical	
Computer	1	Systems	
Other ()			

Project Overview:

Since 2004, Structure Medical has been a leading manufacturer of spine, trauma and arthroscopic medical implant products used to treat problems with the musculoskeletal system. These medical devices make a profound difference in the lives of patients suffering from trauma, tumors, sports injuries, degenerative diseases and congenital conditions.

Structure Medical employs over 250 people at four facilities encompassing a total of 160,000 square feet of manufacturing and operational space. We have proven to be fully capable of producing virtually any implant device. On a daily basis, we service many top-tier OEMs with spine and trauma products in an innovative production environment. A solid commitment to continuous improvement, along with highly advanced, cost-effective equipment, allows Structure Medical to tap into new and emerging opportunities within the medical device industry.

Medical Implants Produced By Structure Medical Include:

- Internal Fixation Devices
- Bone Screws
- Trauma and Spinal Implants
- Rigid and Dynamic Cervical Plates



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- Hand, Wrist and Elbow Plates
- Upper and Lower Arm Fixation Devices
- Spinal Hooks and Supports
- Multiaxial Spine Screws
- PEEK Products
- Dental Implants



Structure Medical utilizes some of the most advanced technology available to produce spine, trauma and arthroscopic devices.

- **Multi-Axis Sliding Headstock Turning Centers** – With multi-axis Swiss and fixed headstock machining centers, we can create cost-effective and close-tolerance turned parts. We are able to manufacture extremely small-diameter and close-tolerance parts and threads using state-of-the-art whirling techniques.
- **5-Axis Machining** – With multiple high-speed Mikron and Willemin machines, we can manufacture the complex shapes and close tolerances required for internal fixation devices. With spindle speeds over 40,000 rpm, we can ensure top-quality surface finish. In addition, we have Robodrills, Robomates and Howa horizontal 4-axis mills for less complex machining.
- **Specialty Equipment** – Structure Medical is capable of handling the most unique manufacturing requirements, including laser welding, laser marking, EDM Wire, and die-sinking EDM.
- **Specialty Services** – Class 8 cleanroom for pre-sterile packaging and full 5-axis laser welding services.
- **Multi-Axis CNC Grinding**
- **5-Axis CNC Laser Welding**

Project Requirements:

Structure Medical is an innovator in “Lights Out” manufacturing. Using the power of automation coupled with engineering know-how, Structure Medical utilizes their multi-million dollar machines for large blocks of unattended time (weekends, holidays). Driving to increased utilization and lower defects, the company is constantly seeking innovative ways to improve their precision machining processes. During the machining process, chip removal and management of



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the waste path are critical. Currently, this process happens with shop air and it occurs within our pallet changer. The end result, is the build-up of small chips within the pallet changer that eventually transfer to a “pallet” and cause a clamping error. This occurs during “lights out” manufacturing and results in lost production hours. The objective of this project will be to design and prototype a mechanical device that can be added to the existing equipment and automate the removal of chips and oil from the machining operation in an improved manner.

Expected Deliverables/Results:

- Prototype of a device
- Results of testing of the device at Structure’s Mooresville’s facility

Disposition of Deliverables at the End of the Project:

After Expo, deliver prototype to Company

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

- Design Reviews to be done at Structure Medical’s Mooresville facility
- Interest in Precision Machining
- Knowledge of CNC Machining