

Robotic Surgery Sterile Interface Module

Medtronic

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Background

- Medtronic's Hugo RAS system assists surgeons with laparoscopic, minimally invasive surgeries
- Sterile interface module (SIM) is device that maintains sterile barrier between Hugo
- Current set-up has reusable sterile interface module (SIM) connect to a reusable instrument attachment. The instruments are difficult to clean and as expensive
- Redesign SIM and instrument interfaces to be cheaper, disposable, and easier to sterilize

Requirements

- Combine SIM and instrument gearbox into reusable part
- New SIM still attaches to Hugo RAS
- Design quick connect for disposable instrument shaft
- Instrument rods will withstand 200 Newtons of tension
- Maintain original electrical circuit

Design

Hugo RAS Connection

Connection to the Hugo RAS arm allows rotational inputs to be delivered to SIM

Instrument-SIM Connection

Simple and quick push-in connection and twist-and-pull disconnect mechanism

Barbs

Metal, ramped barbs that allow rotation from screws in SIM to translate into pull force on wire connectors

Wire Connectors

Bent wire hooks that are connected to and move the end effector

Anti-Rotation Spacers

Bent wire hooks that are connected to and move the end effector

Input Translation

Spring lock connection from the bell housings to the lead screw allowing rotational translation from the Hugo arm

SIM Housing

Reusable SIM component with instrument gearbox now included

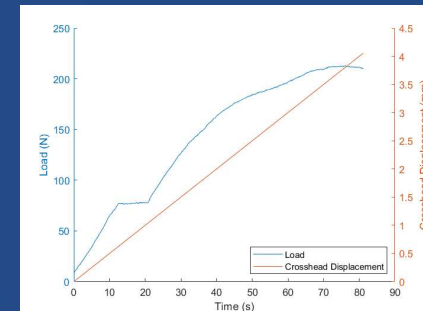
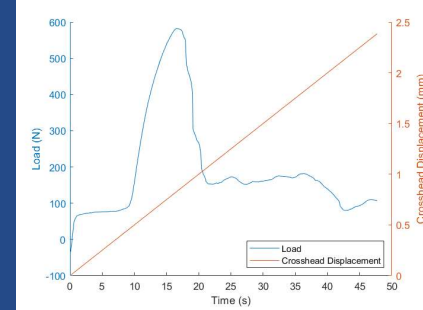
Release Buttons

Allows the Instrument to be disconnected easily from the SIM

Instrument Housing

Disposable part that contains the wire connectors and instrument circuit

Testing



Outcomes

- Compatibility and functionality TBD after we try operating it with Medtronic's Hugo Friday
- Instrument rods can withstand 190 to 210 N of tension
- Patent pending