

Maryland Ligasure Device Jaw Pressure

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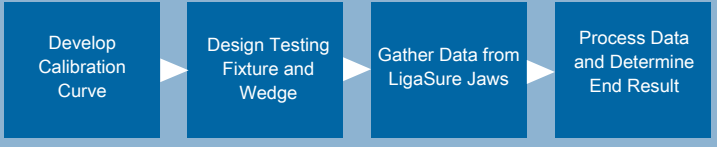
Background

The LigaSure Maryland Jaw Open and Laparoscopic Sealer and Divider with Nano-coating is an industry leading, single-use surgical device used in everyday clinical practice. The jaws grasp, cut, dissect and reliably seal tissues and vessels using RF energy. Medtronic wanted to study pressure distribution within the jaws.

Objectives

Determine if Interlink Electronics FSR 400 Round Force Sensing Resistors are a viable and reliable option for measuring pressure at the Maryland LigaSure Jaw scale. Develop universal calibration curve for FSRs to convert force to voltage. Design a repeatable testing setup to gather data from a Maryland LigaSure device. Achieve insight into how the Maryland LigaSure devices jaws behave in at small angles with operator variation at two separate locations (proximal and distal).

Method

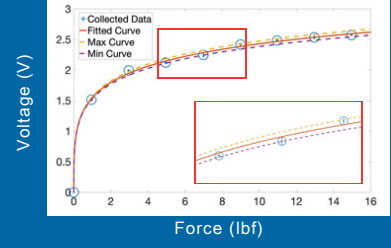


Calibration Curve

Testing Requirements

- Universal calibration curve for both proximal and distal location
- Force range is 0 - 15 lbf
- Verified sensor reliability
- High FSR repeatability
- Negligible drift
- Uniform sensor de-loading

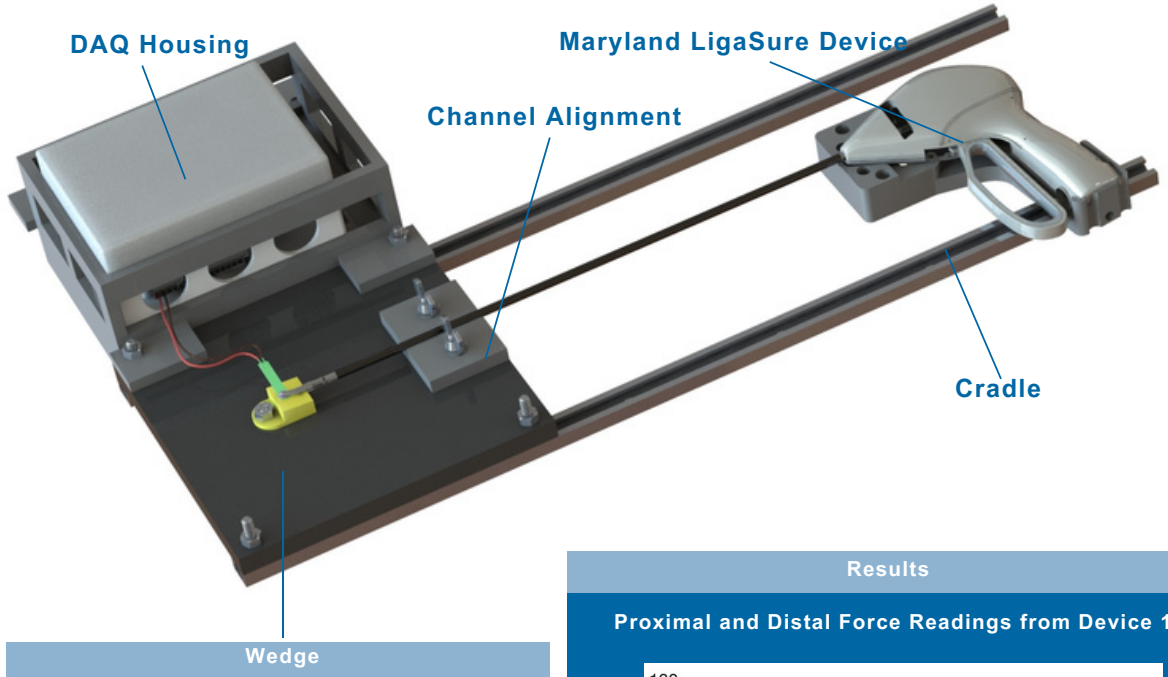
Universal Calibration Curve



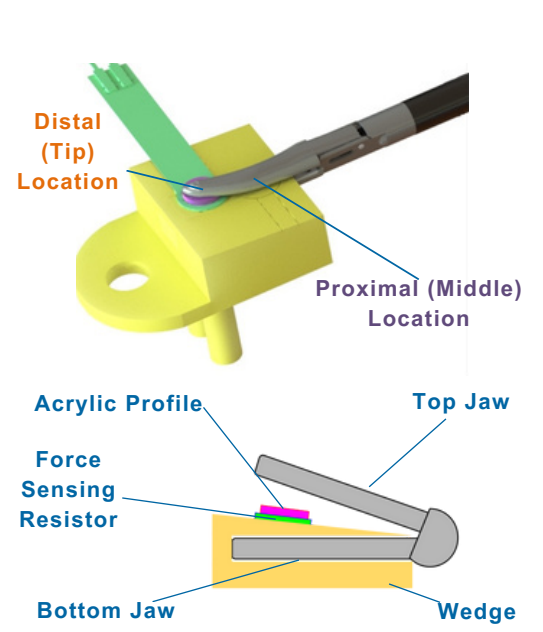
Wedge Design

Medtronic currently uses a single measurement to analyze a device. Pegs secure plate interface and restrict rotation during testing. Front slot houses and stabilizes the bottom jaw for consistent results. Location etchings establish consistent sensor placement and orientation. SLA material provides high strength and low ductility. Proximal and distal locations:

- Two locations characterize the middle and tip of the jaw; which is more comparable to clinical use
- Two wedges tested with individual proximal and distal locations respectively
- 4-degree incline simulates clinical usage

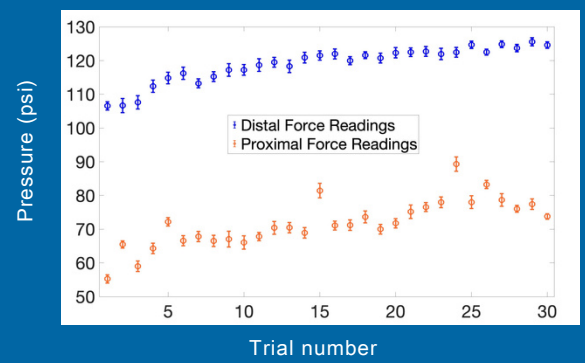


Wedge



Results

Proximal and Distal Force Readings from Device 1



Pressure readings differ between sensor locations along the jaw:

Proximal Data Average:
75 ± 14 psi

Distal Data Average:
125 ± 7 psi

Conclusions

- Each LigaSure Maryland device behaves differently
- Individual device readings differ based on number of actuations
- Data performance was indicative of "good" readings from LigaSure devices

