

Atraumatic grasping instrument –Product Design Specifications

Team:

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Function: Current minimally invasive laparoscopic surgical tools are insufficient in their ability to grasp and hold a large amount of the bowel without causing injury to the patient when performing surgery. A new tool suited to this task by providing feedback (auditory or tactile) to the surgeon is necessary. The goal is to reduce injury due to excessive pressure to the bowel organs during laparoscopic surgery.

Client requirements:

- . • “floatable” jaw to reduce pinching of bowel
- . • Provide feedback of pinching pressure
- . • must fit through 5mm port
- . • must be about 30 cm long
- . • optional ratcheting for locking
- . • autoclavable or disposable

Design requirements:

1. Physical and operational characteristics

- a. *Performance requirements:* The design must be able to grasp a large portion of bowel without causing damage, and provide feedback of the pinching pressure. The option to lock or not lock the grasper in place would also be preferable
- b. *Safety:* The design must not be hazardous to surgeons or the patient. The design must be sterilized, decontaminated, and disinfected so the risk to patient safety is minimized. The grasping end must not have separate or loose parts that could possibly get lost in the patient.
- c. *Accuracy and reliability:* Accuracy is an important aspect of this design, but precision is not a major concern. It must be precise enough to ensure that no damage is done to the tissue. The grasping mechanism must be solid with little slack.
- d. *Life in service:* The final design will be used repeatedly during surgery. It must be made of durable material such as stainless steel. The circuit should need little maintenance.
- e. *Shelf life:* This device should last several years in a hospital environment.
- f. *Operating environment:* The design must be autoclavable, and easy to use in an operating room.

- g. *Ergonomics*: The handle should be easy to use and grasp by a surgeon.
- h. *Size*: This device must fit through a 5mm port and measure about 30 cm. long.
- i. *Weight*: The design should not be heavier than a pound.
- j. *Materials*: Autoclavable parts must be used for the grasper, such as stainless steel. Other materials may be used, for parts that could be detached, as long as it can be sterilized and not compromise patient safety.
- k. *Aesthetics, appearance, and finish*: The device will look like a regular laparoscopic instrument.

2. Product characteristics:

- a. *Quantity*: One model will be prototyped; if successful, it can be manufactured and used for future use.
- b. *Target product cost*: The cost of building the prototype should be under a few hundred dollars.

3. Miscellaneous:

- a. *Standards and specifications*: FDA approval is not required.
- b. *Customer*: The client would prefer the model to be inexpensive, and reusable.
- c. *Patient-related concerns*: Sterile equipment must be used to ensure patient safety, thus the device must be autoclavable.