Department of Material & Metallurgical Engineering

IIT Jodhpur

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BUILDING AN LAPAROSCOPIC HAND GRASPING INSTRUMENT

Design Credit Project Report

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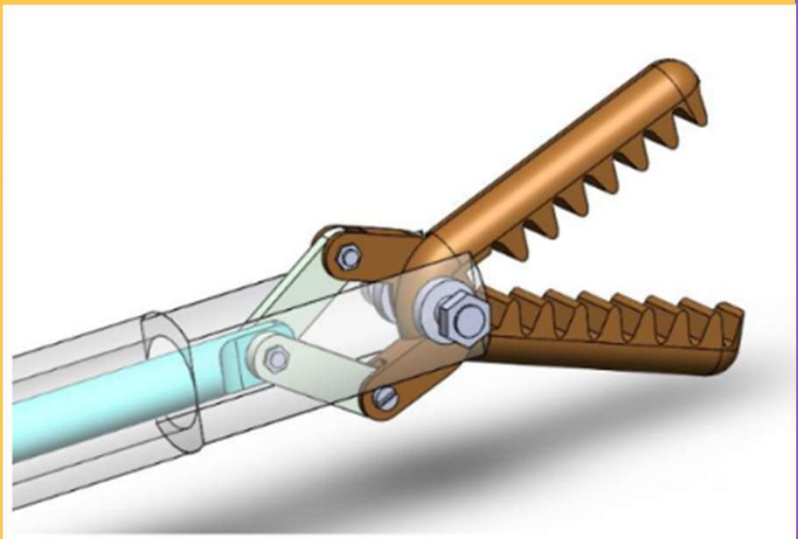
Laparoscopy

A laparoscopy is a procedure that involves making small incisions in the belly or pelvis and utilising a camera for assistance. With a few tiny abdominal incisions, the laparoscope facilitates diagnostic procedures.
Laparoscopic instruments are specialized tools that are used in laparoscopic surgery, a type of minimally invasive surgery.



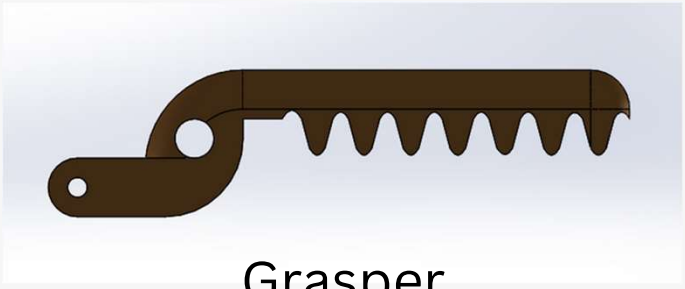
Objective

The primary objective of laparoscopic hand grasping surgery instruments is to allow the surgeon to grasp and manipulate tissues and organs during laparoscopic surgery.The objective of this project is to make such laparoscopic devices with more than 1 degree of freedom or independent directions to move.

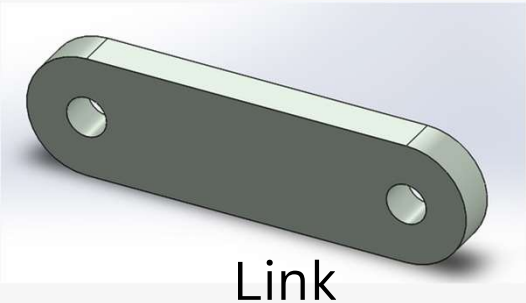
Da Vinci Surgrical Robot

ArtiSential Bipolar

Design Parts



Grasper



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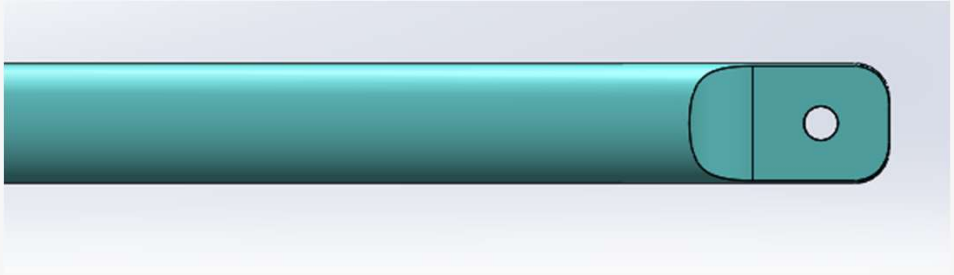
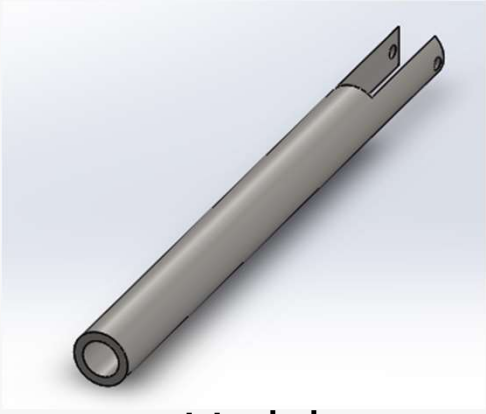


Shaft



Holder

The work was done in 3 parts:

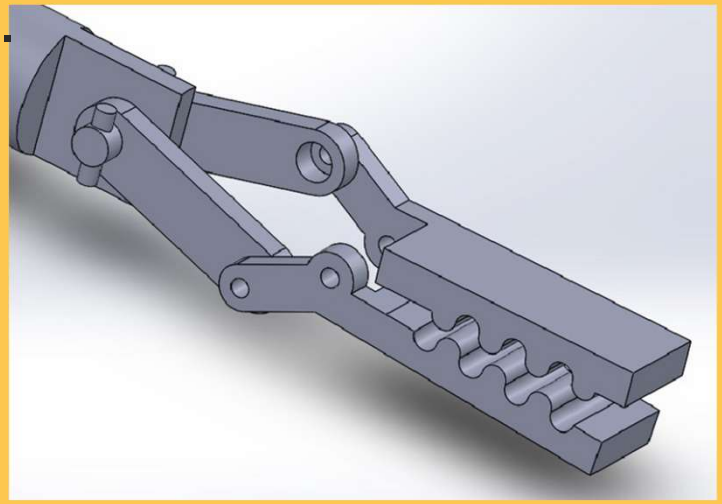
- **Research**
  The designing of laparoscopic instruments and already made instruments by private companies. Firstly, I studied the different types of instruments available and their uses.

- **Design**
  In this part, we have used the knowledge gained in the research part to design a mechanical model of the laparoscopic instrument with the help of a 3D modelling software 'SolidWorks'.

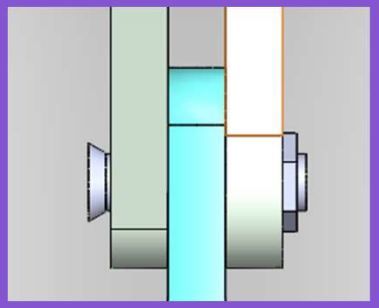
- **Analysis**
  After making the model, it's movement was observed in SolidWorks.

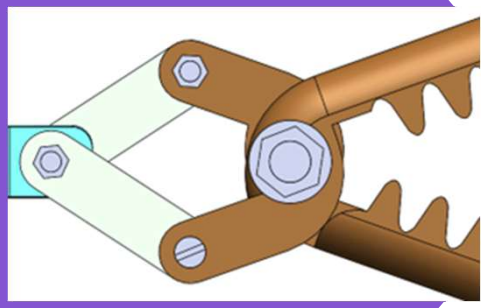
Design Part

The design was complex; a major problem arose in the alignment of different small parts. We can see the figure below where the grasper dimensions were large, due to which proper alignment didn't occur. The more the dimensions are, the lower the manufacturing cost will be high. Also, we can't have a very large size.



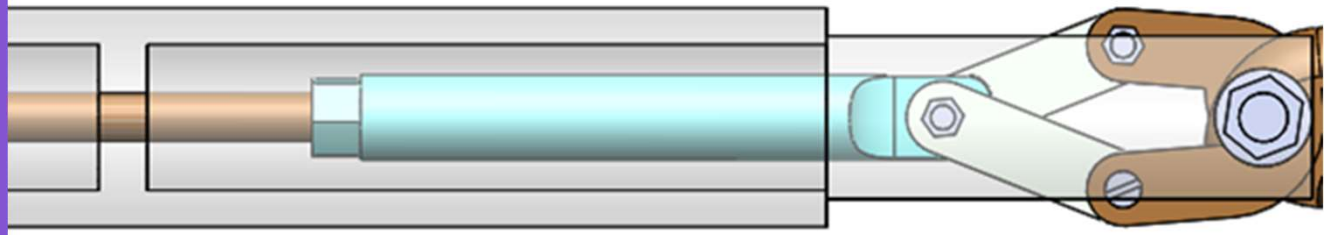
Joints & Model



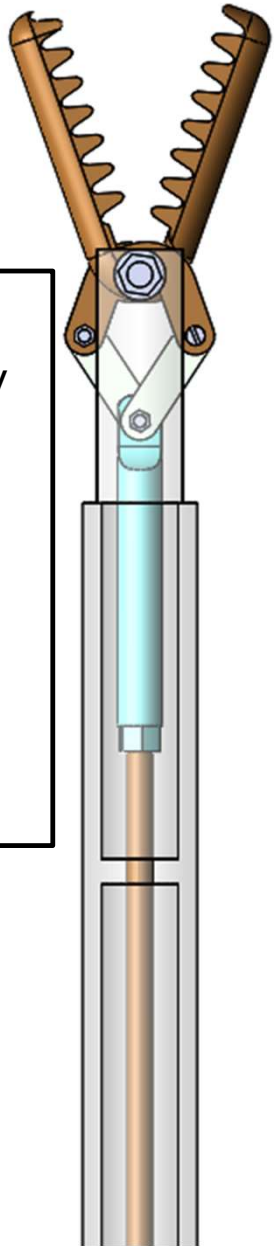


Roller Joints

Till now, we have successfully made a model with 1 degree of freedom. To make it with multiple degrees of freedom, I am working on its design.



Prismatic Joints



Thank You