ASME Technical Brief

Goal: outline mechanical testing of the tip to characterize the tip

*Tip Curvature:*

* describe curvature of the tip (refer to ASME CCM paper)
* pictures of tip taken from microscope
* include figure of tip reaching sinus tympani and attic

*Mechanical Testing:*

* Bending Shape assessment
  + For different bending angles, measure cable displacement (how much the finger piece rotated) and radius of curvature - schematic
* Tip force to break experiment
  + At straight (0deg), halfway bent, fully bent \*\*this hasn’t been tested before
  + Direction: along shaft, perpendicular to bending direction, into/away from bending direction
  + Compare to forces encountered during middle ear surgery, force to dissect soft tissues, etc. (generally <2N)
  + Results:
* Cyclic loading experiment
  + How many cycles until the tip breaks
  + Method: motor (maxon motor 408356) powered by the RoboClaw and Arduino (Uno) system.
    - Goal: cyclically load the wrist to determine how many cycles it can bend before fatigue
    - Method: Bend the tip to fully bent and count how many times this is achievable before fatigue using the maxon motor/roboclaw/Arduino
      * Step points: 100, 200, 300, 400, 500, 1000, 1500,2000, 2500, 5000,10000
      * Velocity: quick loading is extreme condition
  + Results:

|  |  |  |
| --- | --- | --- |
| Number of cycles | Microscope picture of wrist under all angles | Fatigue? |
| 100 |  |  |
| 200 |  |  |

* Torque experiment
  + When the instrument is introduced into the ear, the tip twists, and thus this test was performed to measure how much it can twist before it breaks or plastic deformation
  + Use Torque testing jig in the lab
  + Results: