ASME Technical Brief Outline:

A **technical brief** reports results that are of significant and archival value to the engineering community; however, these works are more limited in scope and length than a research paper. A technical brief may contain any of the following:

* preliminary report of a result not yet fully developed or interpreted
* commentary on a technical issue of potential interest to readers

Technical briefs undergo full peer review. A technical brief may also be known as a technical note or a brief note.*Recommended Length: 2500 words*

Reference: “Lowering the Barrier of Surgical Endoscopy With a Novel Articulating Retractor”

Or

Neurotology and Otology – more appropriate for the intended audience (TEES surgeons)

**Abstract:**

*Background:*

*Clinical Motivation:*

* TEES is a minimally invasive surgical technique – list benefits
* One-handed surgery
* Tools for TEES (such as...) are being developed but according to Needs Analysis study they are still not sufficient to facilitate the technique
* Need: low adoption due to learning curve thus need better instruments to facilitate the surgery

*Design Constraints:*

* Current tools used: incorporate suction with dissector tip, round knife, but their tip geometry doesn’t enable reach in hard to reach hidden recesses within the middle ear where cholesteatoma is usually found – need to reach areas visualized by the endoscope (as per needs paper)
* reach required
  + include picture of 3D model with endoscope and current tools (double bend Thomassin and show that it is unable to reach and barely fits within the ear canal with its double bend)
* Tip forces required (brain surgery tissue forces paper and middle ear surgery forces paper)
* Size required: 2.7 mm endoscope + tool inside of 5mm average diameter ear canal

**Overview of Instrument Design:**

<Figure (picture and CAD?) of instrument with tip and handle labeled>

*Tip Design:*

* OD/ID for suction
* size to fit alongside endoscope in ear canal
* bending angle to reach boundary of endoscopic viewing field
* material NiTi for superelastic property and biocompatibility
* length is same as current instrument – Rosen Needle
* can withstand tissue forces during dissection or (suction or laser)

*Handle Design:*

* single-handed operation
* ergonomically comfortable handle held like a pen in order to perform precise microscopic movements and so it is used similar to other instruments in ear surgery

*Operation of the tool:*

* describe how tool works with figures
* map the finger piece to bending
* laser and suction (if being included)

*Fabrication Methods:*

* laser cutting nitinol tube
* 3D printing parts (list them)
* milling parts (list them)

**Methods and Results**: - outline testing methods to validate the tool:

*Mechanical Testing:*

* Tip force (blocking force) experiment
  + What direction at tip?
  + 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
  + Results:

*Performance Testing:*

* Reach test protocol: print temporal bones with highlighted targets, ask surgeons to reach targets with endoscope, count how many targets were reached COMPARED TO EXISTING TOOLS
  + Will compare number of targets reached for new instrument vs. Thomassin, Panetti, Rosen needle which are commonly used tools as per “Instrumentation and Technologies in Endoscopic Ear Surgery”, “Pediatric endoscopic ear surgery in clinical practice: Lessons learned and early outcomes”, “Introducing Endoscopic Ear Surgery into Practice” where experienced TEES surgeons review TEES techniques
  + Results:

*Surgeon Feedback:*

* Survey that asks surgeons to rate performance, ergonomics, safety of tool
  + This would add length to the paper
* Results:

Discussion:

* Limitations of the design, and areas of improvement
* Test results
* Innovation

Conclusion: