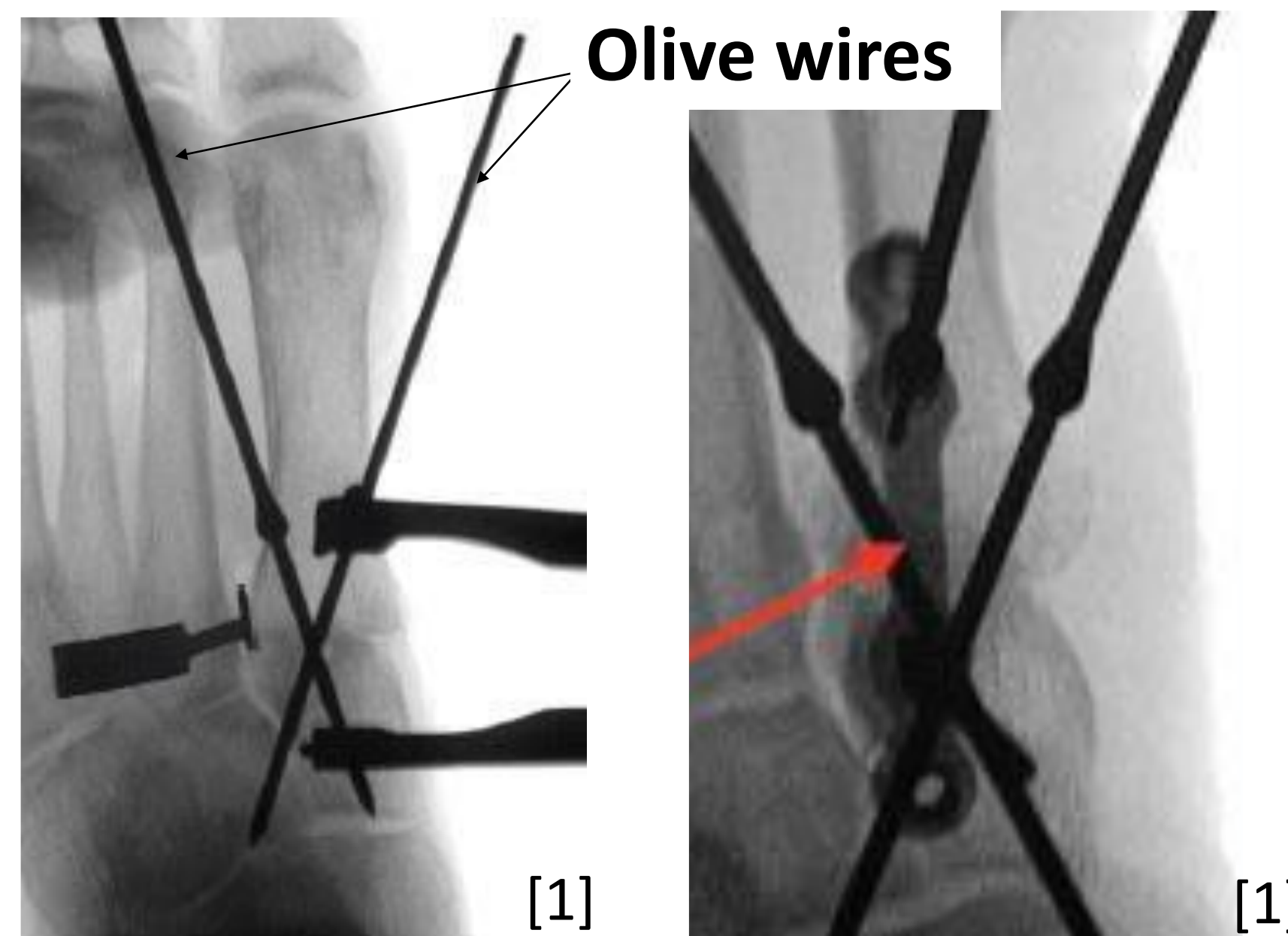


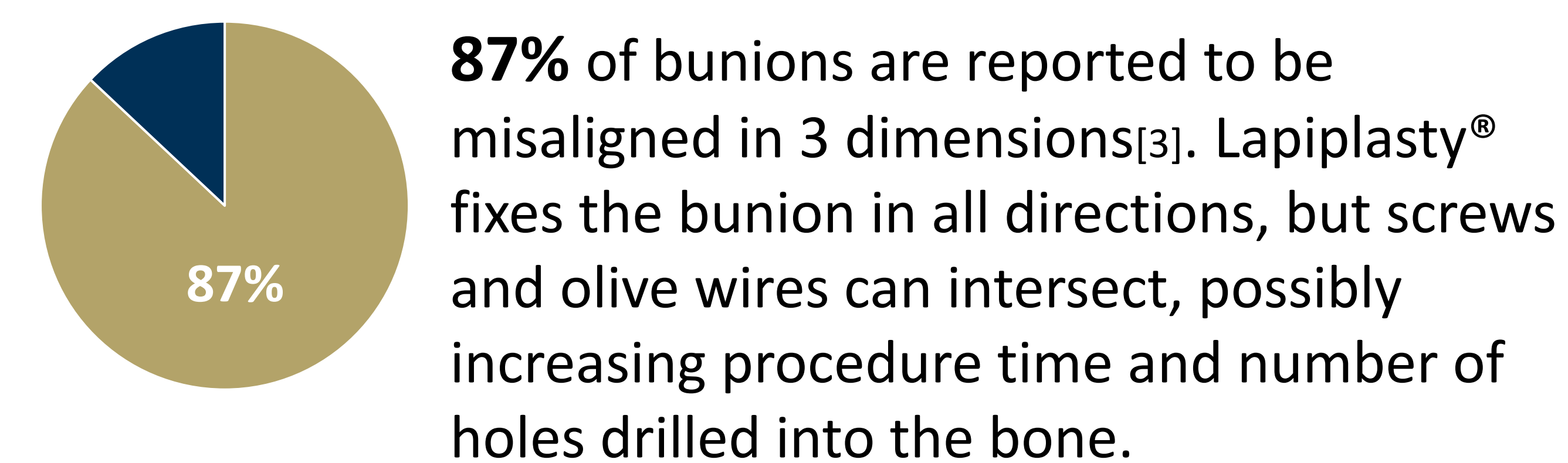
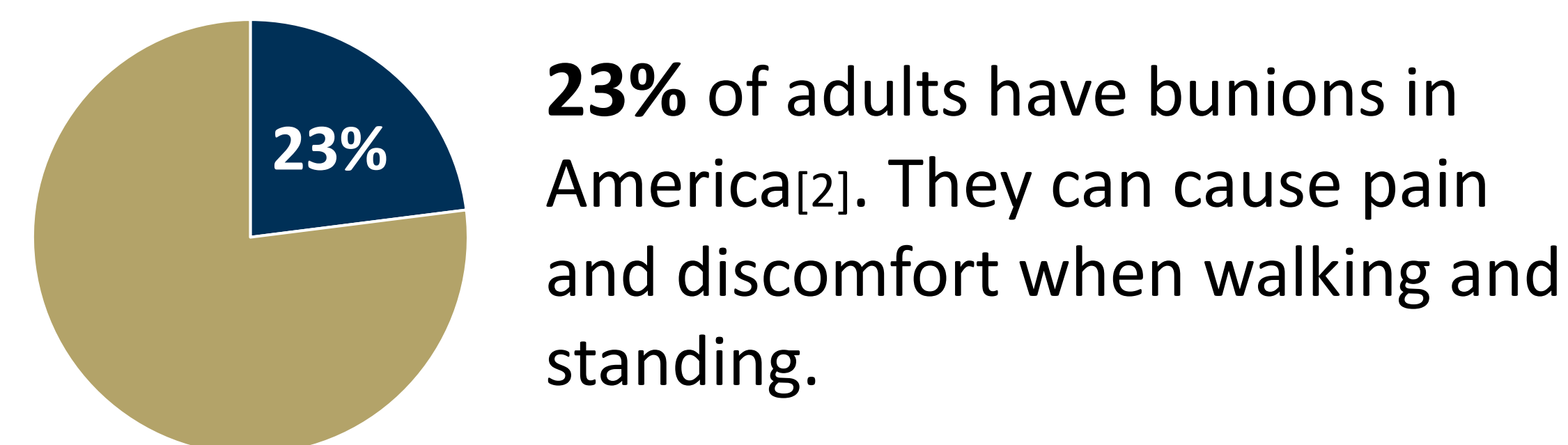
Alignment Tool for Non-Interfering Screw Placement in Lapiplasty®

Problem Definition

Create alignment tool for use in Lapiplasty® bunion correction procedure to **prevent screws and olive wires from intersecting** during surgery.



Background/Market Research

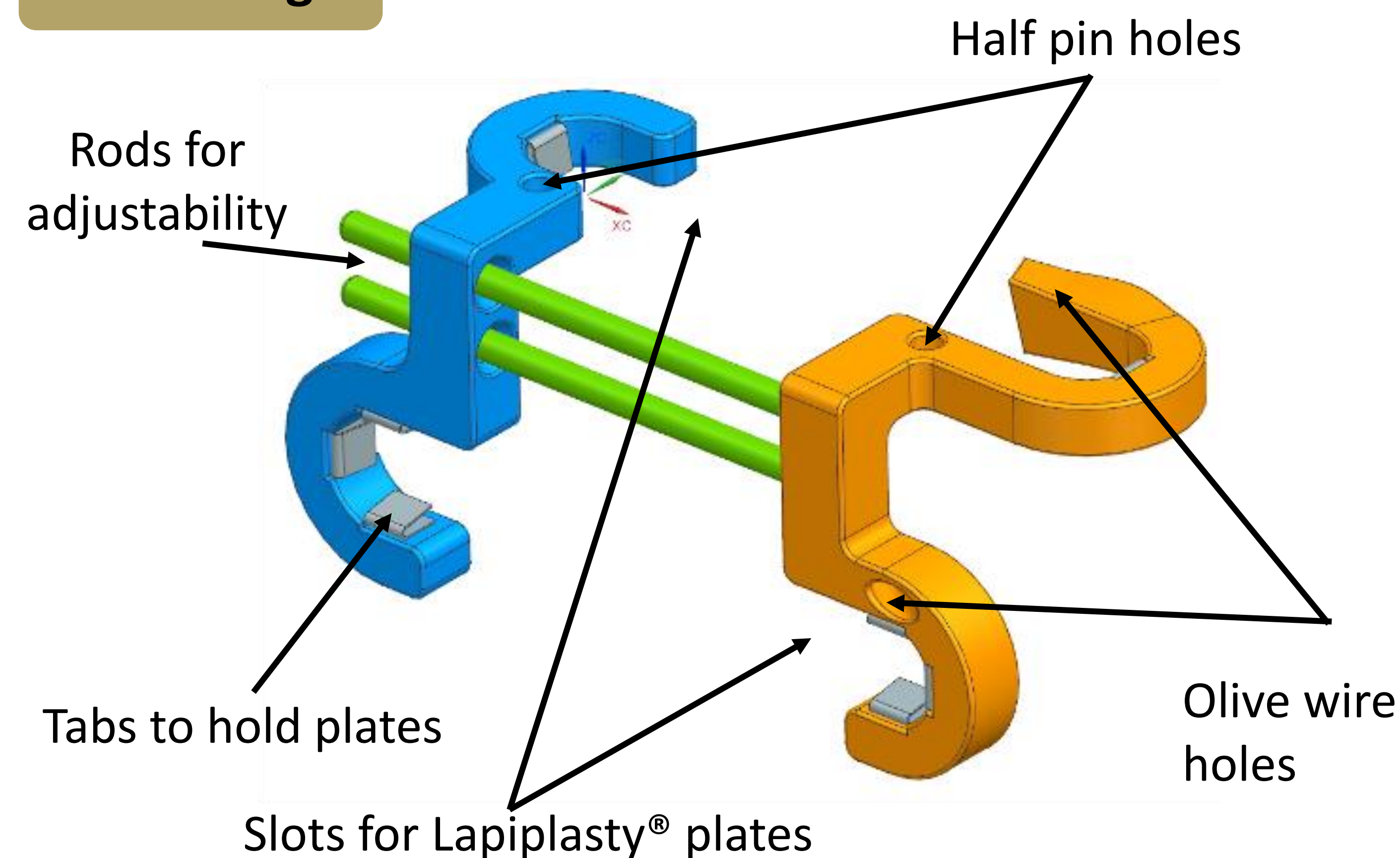


Device Goals and Specifications

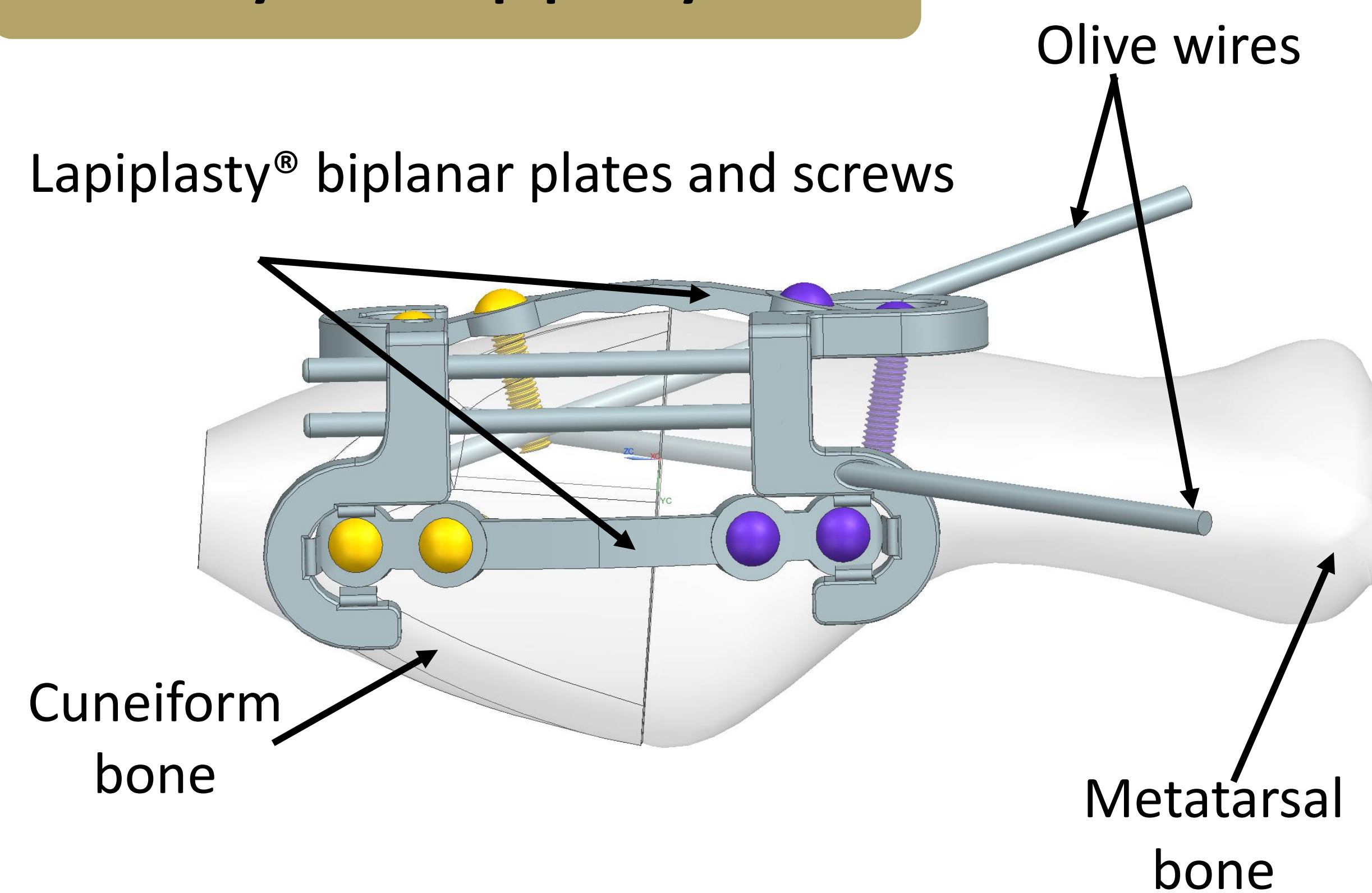
- Accuracy in preventing misalignment
- Meet medical safety regulations and standards
- Ability to be sterilized
- Ease of use and ergonomics
- Compatibility with current procedure
- Reusability and lack of deformation
- Low failure rate

Final Design and Assembly

Final Design



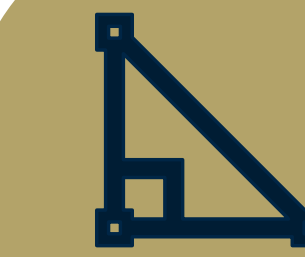
Assembly with Lapiplasty® Tools



Future Work

- Machine physical prototype
- Evaluate compatibility of physical tool with current Lapiplasty® kit
- Evaluate tool use on different foot sizes through use of cadavers

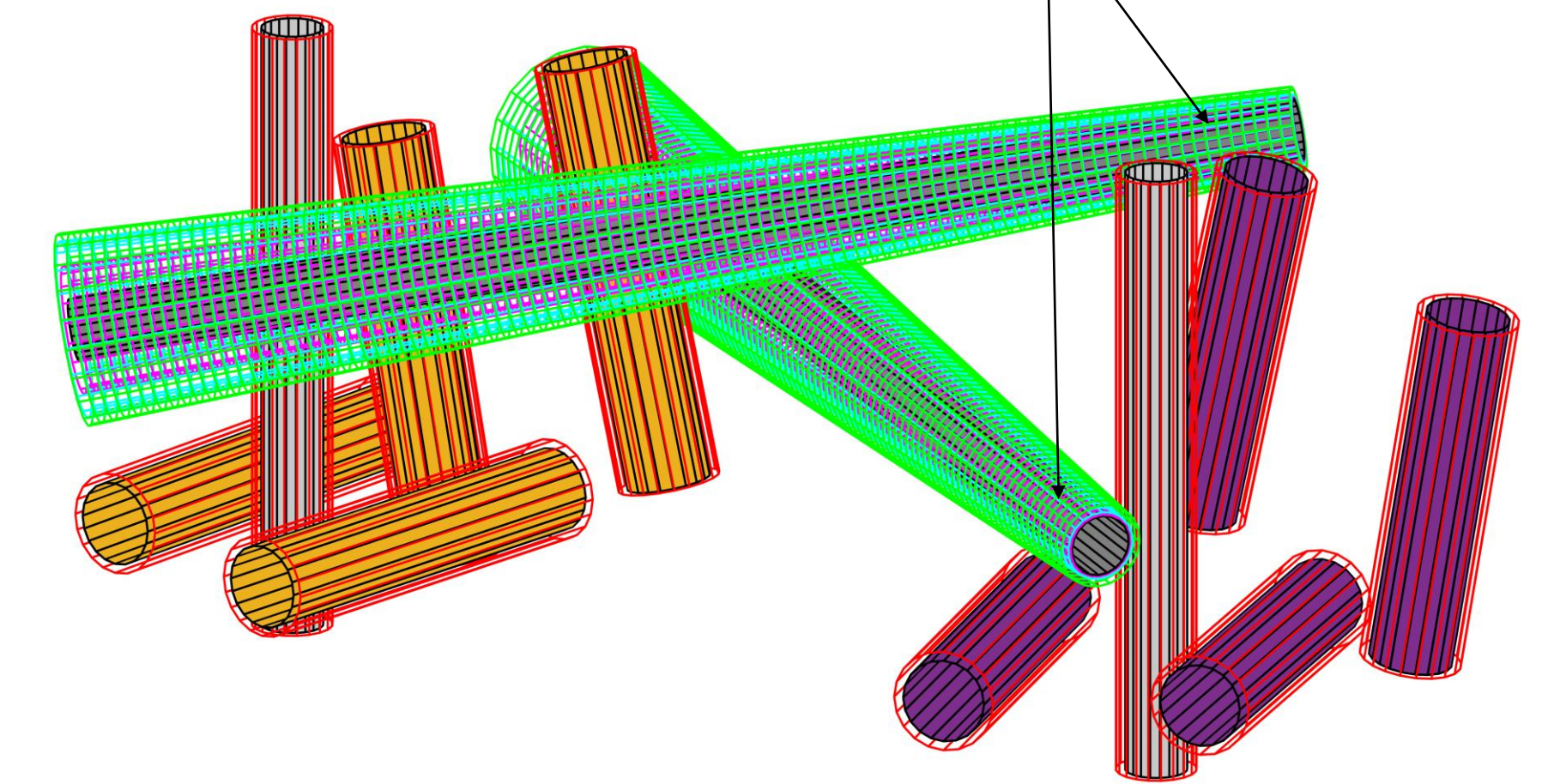
Design Evaluation



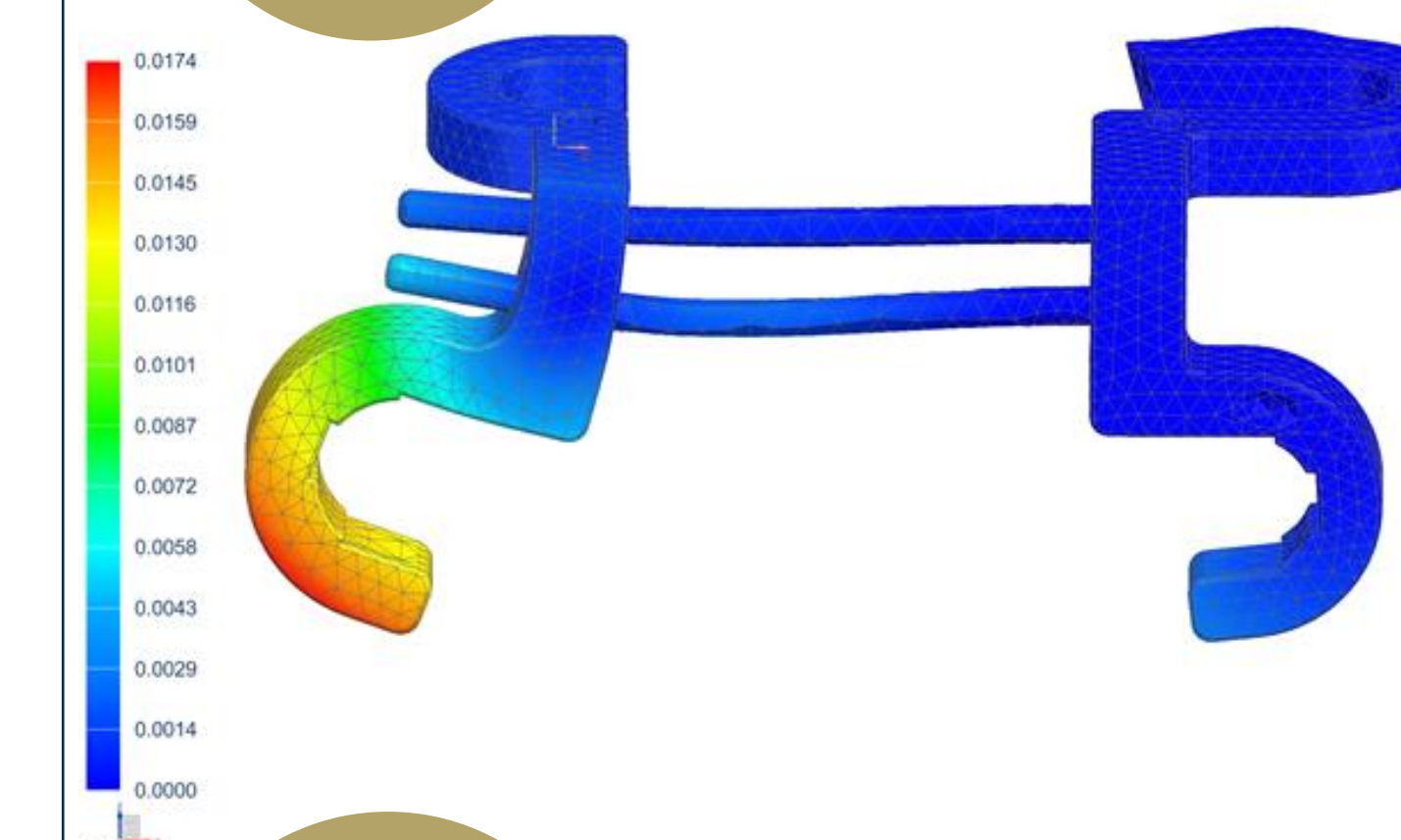
Geometric

3D Modeling of intersecting parts and allowable tolerances to avoid intersection

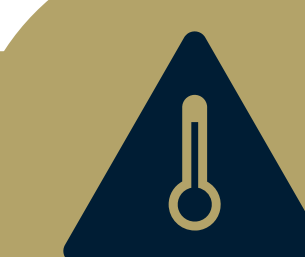
Olive wire tips and maximum allowable error



Deformation

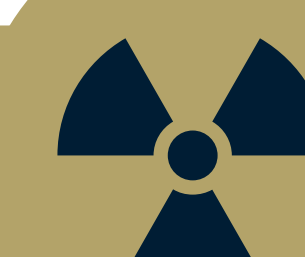
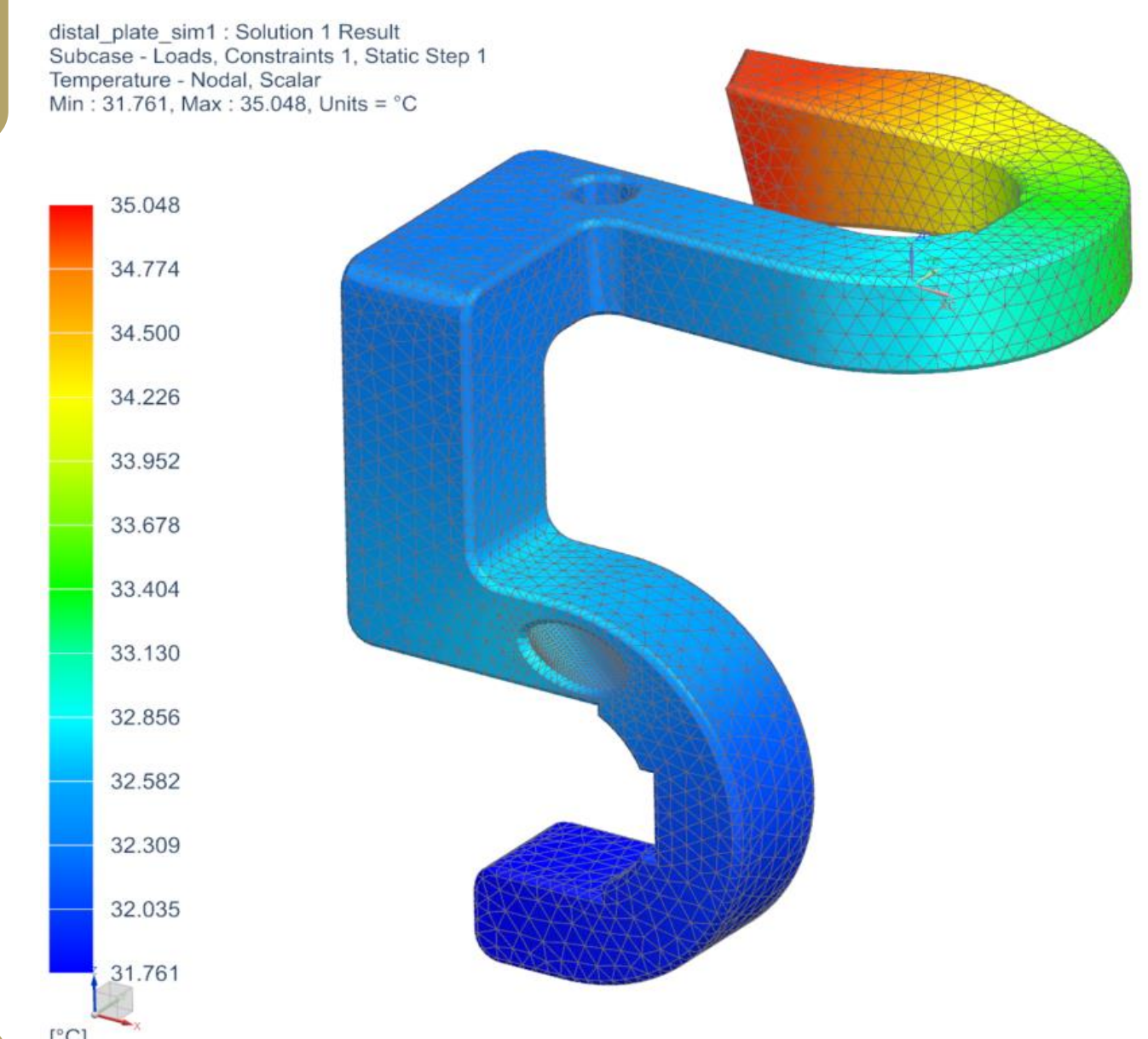


Max Deformation: 0.0176mm
Accounted for by tabs and tolerancing
Max Stress: 205.99MPa
Acceptable for selected material



Thermal

Finite Element Analysis for impact of drill force on tool during surgery



Biocompatibility

Annealed AISI 304 Stainless Steel
ISO10993: Biocompatibility
ASTM F899: Standard Specification for Wrought Stainless Steel for Surgical Instruments

Citations

- [1] Treace Medical Concepts, Inc., "Lapiplasty® Procedure Key Steps & Fluoro Checks," [Online]. Available: https://www.lapiplasty.com/uploads/2021/02/LBL-1405-9018D_Lapiplasty-Key-Steps_Final.pdf. [Accessed 21 April 2021].
- [2] P. D. Dayton, "Evidence-based bunion surgery: a critical examination of current and emerging concepts and techniques," Cham, Switzerland, Springer, 2018, pp. 1-2.
- [3] Treace Medical Concepts, Inc., "Lapiplasty® 3D Bunion Correction™," [Online]. Available: <https://patients.treace.com/lapiplasty-3d-bunion-correction>. [Accessed 31 January 2021].