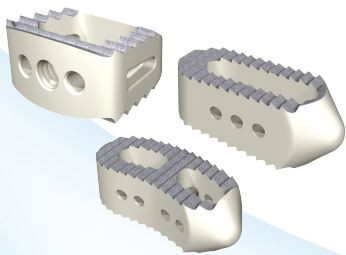


# CALIX<sup>PC</sup>™ Competitive Products



## X-spine Calix-PC with Ti-Grip Technology

- 1) Combines the osteo-equivalent modulus of PEEK with the bone contact qualities of titanium
- 2) Frictional titanium plasma coating on bone contact areas
- 3) 79% increased expulsion resistance compared to non-coated PEEK
- 4) Metallic surface allows for fluoroscopic endplate visualization
- 5) Coating is .005-.010" with a fine "grit" Ti spray to allow for optimal performance



## Amedica Silicon Nitride

- 1) 20x harder than PEEK elastic modulus
  - Makes for a brittle device
  - Solid Ceramic
  - Could possibly add to the risk of subsidence and/or fracture
- 2) Smooth Surface
  - Minimal teeth for initial stability
  - Could aid in the misplacement of implant as it has no grip until bone growth



## Zimmer Trabecular Metal (Tantalum)

- 1) Porosity of 70-80%
- 2) No bone graft enclosure offered in TLIF
- 3) Difficult to reposition
- 4) Can't assess fusion
- 5) Porous surface generates a friction coefficient that is 76% greater than a sintered bead coating
  - The implant surface makes implantation force extremely high adding additional stress to the vertebral bodies
- 6) Elastic modulus closely resembles to cancellous bone
  - Softer construct until osseointegration takes place



## Spinal Elements Ti-Bond

- 1) Only coated on the ridge portion of the cage
- 2) Only offered in TLIF and PLIF cages
- 3) Larger "grit" Ti spray which leads to the filling in-between the teeth



## Titan Spine

- 1) Acid etched titanium surface
  - Does not translate into a uniform surface
  - Acid etched surface hinders the ability to have directional teeth to guide the cage in a straight line
- 2) 100% Titanium
  - Strength of cage could add to the risk of subsidence



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# Ti-Grip Technology

## ☒ Design Rationale / Biomechanical Performance:

The addition of plasma sprayed titanium combined with PEEK gives additional stability, visualization and performance.

- The stability of a 79% increase in expulsion strength, Fig 1.
- The ability to precisely visualize the location of the cage relevant to the endplates, Fig 2.
- The combined performance of the osteo-equivalent modulus of PEEK with the bone contact qualities of titanium, Fig 4.

Plasma sprayed titanium has established biocompatibility and a history as a preferred material in biomedical applications for over 30 years in the orthopedic field. The titanium coatings are applied via an arc plasma spray that confers unique structural and functional performance within human bone.

In the Calix-PC application, these qualities lead to improved bony apposition and improved expulsion resistance as shown in Fig 1. All Calix-PC cages are coated during the manufacturing process using a proprietary plasma spray procedure. Small particles of 0.1-0.2mm are utilized to preserve surface frictional features of the underlying PEEK substrate.

The application process and titanium coating do not negatively affect cage strength or biomechanics in compression, torsion or expulsion. All data points recorded (ASTM 2077) are statistically equivalent to standard PEEK. The expulsion strength increased as predicted by 79%. While expulsion does not specifically have an identifiable standard, the tests performed used the same conditions and test settings as previously performed tests on standard PEEK. Setup pictures for expulsion testing can be seen below in Fig 3.

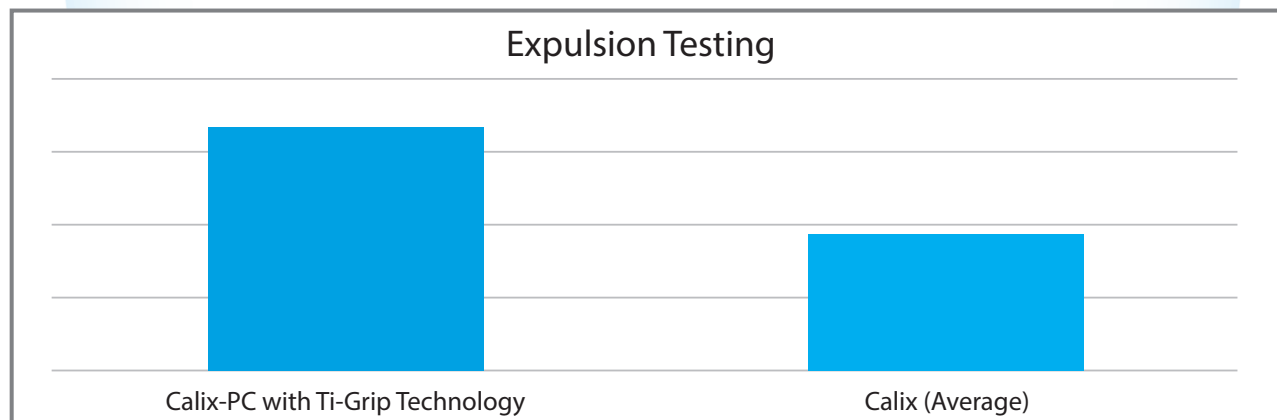


Fig 1 : 79% increased expulsion resistance compared to non-coated PEEK



Fig 2 : Lateral View

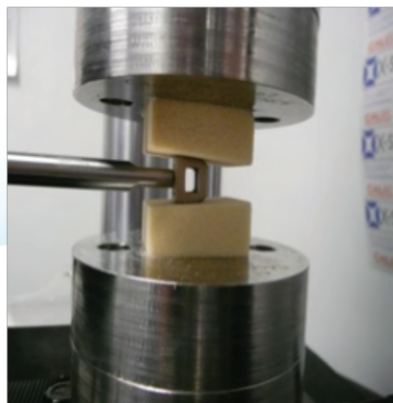


Fig 3 : Biomechanical Performance Testing (Expulsion)

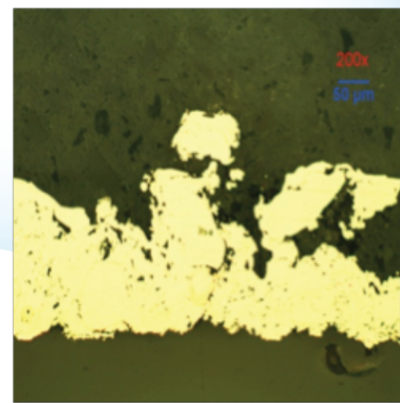


Fig 4 : 200x view of Plasma Coating on PEEK



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