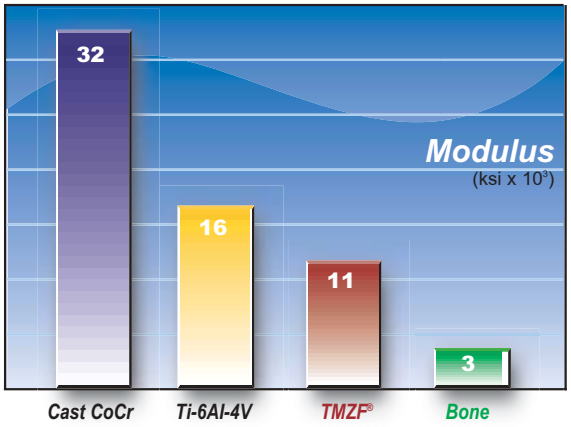
# TMZF® Alloy: A Titanium Alloy Optimized for Orthopaedic Implants

# Translating Advanced Metallurgy Technology...

**TMZF®** alloy is an advanced titanium alloy developed in 1986 through Howmedica Osteonics' innovative research in orthopaedic metallurgy. With a unique composition of titanium, molybdenum, zirconium, and iron, it achieves a superior combination of flexibility, strength, and notch resistance when compared to other alloys used in orthopaedic implants, including Ti-6Al-4V. In laboratory testing with Ti-6Al-4V, TMZF® alloy further demonstrates improved wear resistance, reducing the potential for generation of particulate metallic wear debris.[1] ***TMZF® alloy is specifically tailored for high performance in orthopaedic applications, optimizing the material properties that are key elements in the comfort of your patients and the long-term clinical success of the implant.***

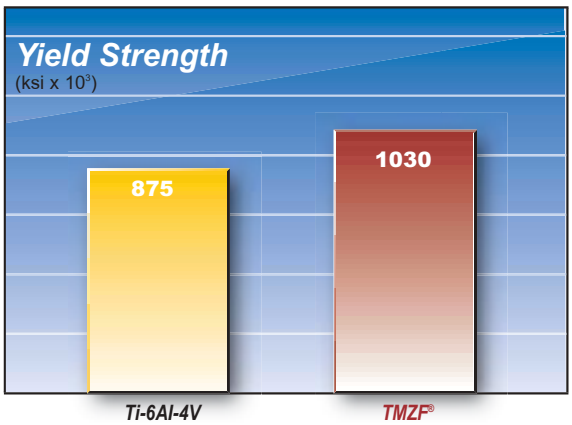
## Increased Flexibility

The modulus of implant materials is a core factor in adequate transfer of stress to the surrounding bone. Decreasing material modulus, thereby increasing elasticity, enhances implant-to-bone stress loading and can minimize bone atrophy due to stress shielding. *TMZF® alloy, when compared to other alloys used in orthopaedics, has a modulus closer to that of bone,* improving stress transfer and potentially decreasing thigh pain in patients which results from implant tip contact with the cortices.



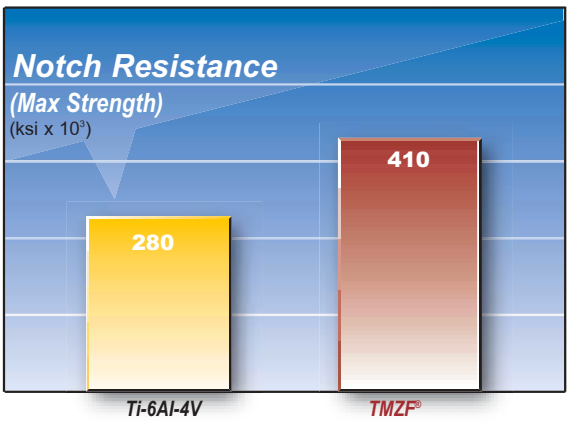

## Greater Strength

Material elasticity is only useful when combined with suitable material strength. *TMZF® alloy offers increased implant flexibility without sacrificing component strength.* In fact, TMZF® alloy has up to a 20% higher yield strength than Ti-6Al-4V alloy.[1]




## Improved Notch Resistance

Improved notch resistance provides better tolerance to surface stress concentrations caused by the rigorous biomechanical forces experienced by an implant over time. *Results for notched samples show that TMZF® alloy is far superior to Ti-6Al-4V alloy, with a 47% higher fatigue strength.*[1] This notch resistance, coupled with improved wear and abrasion resistance, builds a better foundation for implant longevity.




**With its demonstrated advantages in material properties, TMZF® alloy, combined with Howmedica Osteonics' clinically successful implant geometries and coating technologies, takes orthopaedic design to new standards of performance.**

# ... Into Orthopaedic Solutions

Howmedica Osteonics offers many implant choices in TMZF® alloy, with geometries and coating technologies designed to accommodate the specific needs of your patients.

## Fit & Fill

### Meridian® TMZF® Femoral Component

- Two distal diameters available for each proximal body support a broader patient population
- Roughened titanium plasma spray coating mechanically designed to lock the bone and implant to enhance bone ongrowth and initial stability
- Distal split and grooves are designed to improve patient comfort by further reducing distal stiffness without affecting component strength

## Anatomic

### Citation® TMZF® Femoral Component

- Enlarged anterior geometry and built-in proximal anteversion offers a highly stable fit in the femoral canal
- Howmedica Osteonics' clinically successful PureFix™ HA coating[2] on a titanium plasma spray surface provides an optimal surface for bone ongrowth
- Small polished neck offers greater ROM with the potential for reduced polyethylene wear

## Tapered

### Accolade® TMZF® Femoral Component

- Tapered body geometry designed to create a bone-conserving, medial-lateral taper wedge fit which has been successful in 13-year clinical results[3,4,5,6]
- Incremental neck lengths and standard/extended offset options provide better intra-operative flexibility for adjusting tissue-tensioning and leg length
- Small, trapezoidal neck results in greater ROM in flexion and internal rotation
- PureFix™ HA coating on a titanium plasma spray surface creates further potential for bone ongrowth

## References


[1] Wang K, Gustavson L, Dumbleton J. The Characterization of Ti-12Mo-6Zr-2Re — A New Biocompatible Titanium Alloy Developed for Surgical Implants. In: Beta Titanium Alloys in the 1990s, Edited by Eylon D. Boyer RR, Koss DA. **The Minerals, Metals & Society, 1993.**

[2] D'Antonio JA, Capello WN, Manley MT, Geesink R. Hydroxyapatite Femoral Stems for Total Hip Arthroplasty: 10- to 13-Year Follow Up. **Clinical Orthopaedics and Related Research.** 393:101-111, 2001.

[3] Hozack W, Rothman R, Eng K, Mesa J. Primary Cementless Hip Arthroplasty with a Titanium Plasma Sprayed Prosthesis. **Clinical Orthopaedics and Related Research.** 333: 217-225, 1996.

[4] McLaughlin J, Lee K. Total Hip Arthroplasty in Young Patients: 8-13 Year Results Using an Uncemented Stem. **Clinical Orthopaedics and Related Research.** 373:153-163, 2000.

[5] Sakalkale D, Eng K, Hozack W, Rothman R. Minimum 10-Year Results of a Tapered Cementless Hip Replacement. **Clinical Orthopaedics and Related Research.** 362:138-144, 1999.

[6] Keisu KS, Hozack WJ, et al. Primary Cementless Total Hip Arthroplasty in Octogenarians. **The Journal of Bone and Joint Surgery.** 83A:359-363, 2001.


## Also available in TMZF® alloy from Stryker Spine:

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