

 **smith&nephew**  
**LEGION<sup>®</sup>**  
Revision Knee System



# Comprehensive, Efficient and Designed for Revision

The highly variable – and often highly compromised – anatomical terrain of each revision procedure requires broad intraoperative options if success is to be achieved. Yet the unique complexity of each revision scenario also demands familiar instrument ergonomics and overall intuitive simplicity, so nothing distracts the surgeon from the procedure.

The LEGION® Revision Knee System was designed to strike a perfect balance – providing simple, efficient instruments specific to revision and a broad range of implant options to address even the most demanding surgeries.

## Comprehensive

With more screw-on wedges, augments, stems and offset options than any other system, the LEGION Revision Knee System provides the comprehensive implant options needed to devise almost any anatomical scenario.

## Efficient

The LEGION System was designed to make revision surgery more efficient. Next-generation instrumentation, consolidated surgical steps, and well organized trays help decrease OR time.

## Designed for Revision

The LEGION System was designed from the ground-up concentrating specifically on revision issues. Revision-specific instrumentation and OXINIUM® Oxidized Zirconium material help surgeons give their patients the potential for better outcomes.





## Comprehensive Choice of Implants

### More Ways to Match the Anatomy

Modularity of implants has been a great advantage to orthopaedic surgeons by providing the flexibility to customize the prosthesis intraoperatively.<sup>1-3</sup> This advantage has allowed the surgeon to adequately fit the prosthesis to the patient without the expense or lead time of a custom implant.<sup>1,4,5</sup> The LEGION Revision Knee System further expands on this advantage by offering a larger selection of components, offsets, augments and stems.

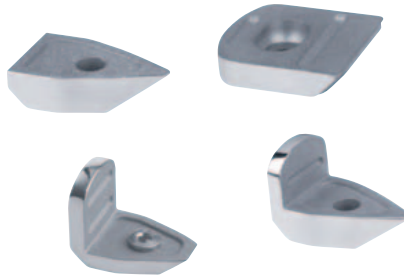
#### Screw-on Tibial Augments

- Hemi stepped – 5, 10, and 15mm
- Hemi angled – 20° and 30°
- Full stepped – 10 and 15mm
- Full angled – 7°
- Composed of Ti-6Al-4V



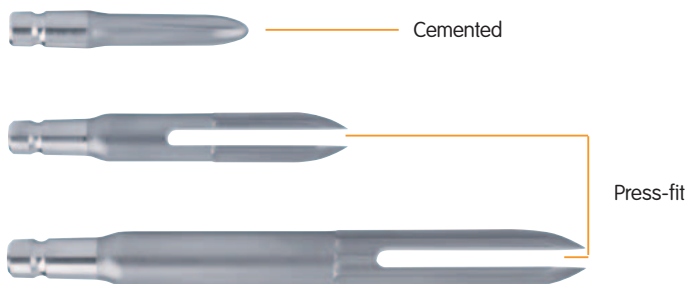
#### Screw-on Femoral Augments

- Distal femoral wedges: 5, 10, and 15mm
- Posterior femoral wedges: 5 and 10mm
- L-wedge combinations:  
5x5, 10x5, 15x5, 5x10, 10x10, 15x10mm
- Composed of Ti-6Al-4V



#### Stems

- Cemented stems (120 and 160mm long)
  - 2mm increments in 10-20 diameters
  - Composed of CoCr
  - Cement grooves
- Press-fit stems (120, 160, and 220mm straight; 220 and 280mm bowed)
  - 1mm increments in 9-16mm diameters
  - 2mm increments in 18-24mm diameters
  - Composed of Ti-6Al-4V
- Short stem extension (80mm)
  - 10, 12 and 14mm diameters
  - Composed of Ti-6Al-4V



## Interchangeability

Femoral components and tibial baseplates utilize the same stems and offset couplers, simplifying inventory and increasing operative efficiency.

Available in 2, 4, and 6mm offset



All offset couplers/stems can be used on any femoral/tibial component

## Choice of Constraint

The LEGION® Revision Knee System shares the same articulation as the GENESIS® II components and has the ability to utilize any of the GENESIS II inserts. The LEGION Revision Knee System is recommended for use with P/S, P/S high-flex or constrained inserts.



P/S high-flex



P/S constrained



P/S

## Diminished Tip Pain

In order to reduce the stiffness of the end of the stem, the LEGION Revision Knee System includes a slotted press-fit stem design with a bullet tip. These slots reduce distal bending stiffness in the sagittal plane in the femur and coronal plane in the tibia. The rigidity of the stem becomes more compliant with the surrounding bone, which in turn may reduce incidence of tip pain.



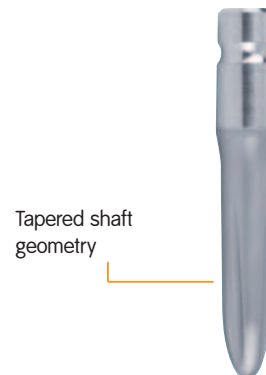
Slot geometry varies with size to achieve proper stiffness

Bullet tip

## Multiple Stem Options

The LEGION Revision Knee System further expands the choice for surgeons by offering stems in cemented and press-fit straight or bowed.

Cemented stems are manufactured from CoCr to minimize stress transferred to the cement mantle and reduce cement cracking. Tapered shaft geometry and grooves provide rotational stability of the stem in the cement and also help reduce micro-air pocket formation during insertion to minimize the potential for cement cracking.



Cemented stems made from CoCr

Tapered shaft geometry

Cement grooves provide rotational stability

LEGION® Revision Knee System



Fully interchangeable stems

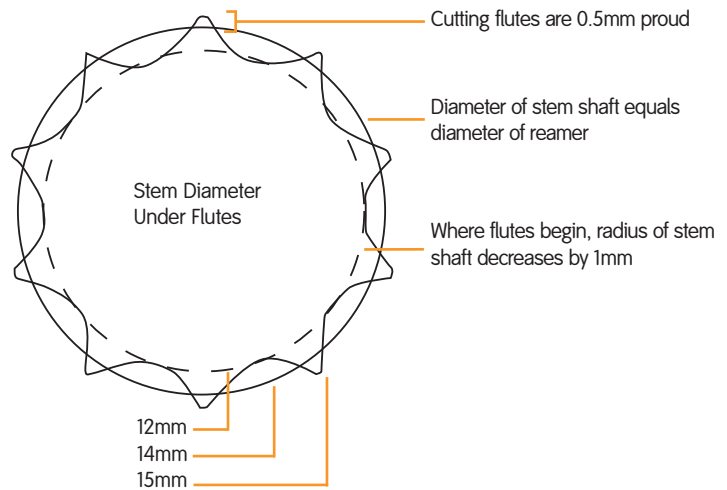
More cemented, press-fit and short stem options

Increased distal, posterior and L-wedge options

## Enhanced Press-Fit

To obtain rotational stability, press-fit stems include cutting flutes. The stem interlock provides ample initial rotational stability and subsidence resistance, along with proper induced stress to mating bone. Cutting flutes simply “bite” into cortical bone for stabilization – promoting healthy long-term fixation.

Flutes are designed to be 1.0mm larger than the diameter of the last reamer used (0.5mm per side) so that they engage the diaphyseal cortex. To engage this cortex, the stems must be long enough so that the fluted region extends beyond the metaphysis. Stem lengths and diameters for the tibia and femur are designed to achieve engagement in the diaphysis.

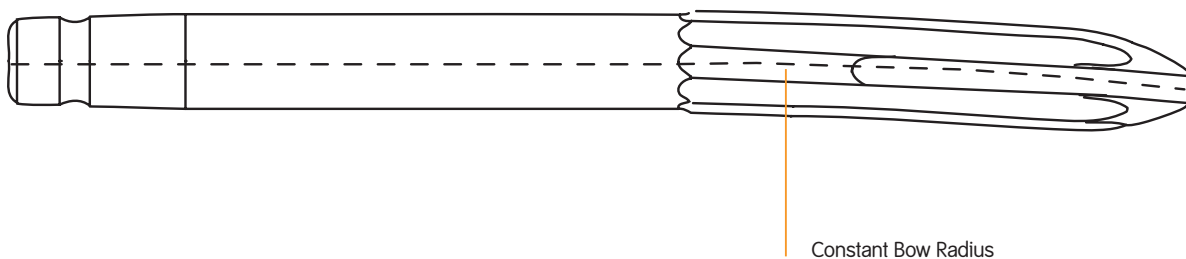


### Example Dimensions (Size 14mm Stem)

|   |      |
|---|------|
| Diameter of Largest Reamer Used           | 14mm |
| Diameter of Unfluted Region of Stem Shaft | 14mm |
| Stem Shaft Diameter Where Flutes Begin    | 12mm |
| Diameter of Cutting Flutes                | 15mm |

## Bowed Press-Fit Stems

Bowed stems are designed to produce a best-fit bow radius and bow starting point. The unique design is a single, continuous radius bow that best fits the patient population and a flexible distal slot with a bullet tip to help the stem easily adjust for patient anatomy. The bullet tip and distal slot allow for gradual stress transfer, reducing the likelihood of tip pain as a result of using a long unslotted stem<sup>6-14</sup>.



## Simple, Efficient Instrumentation

### More Efficient Methods to Reproducible Results

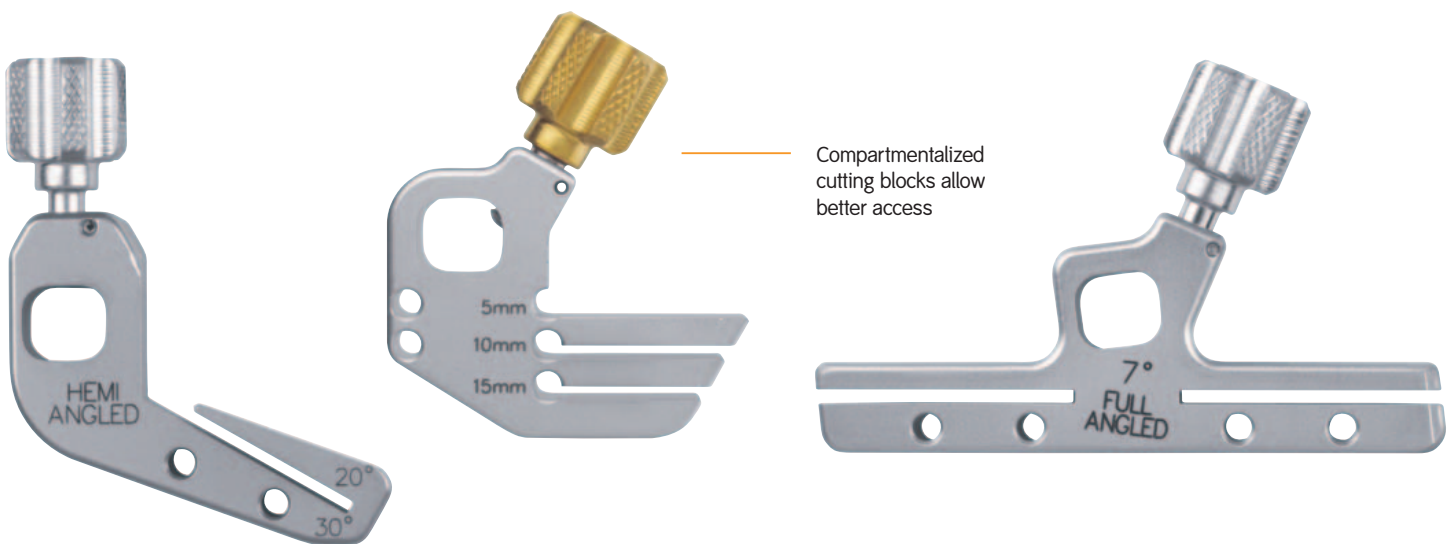
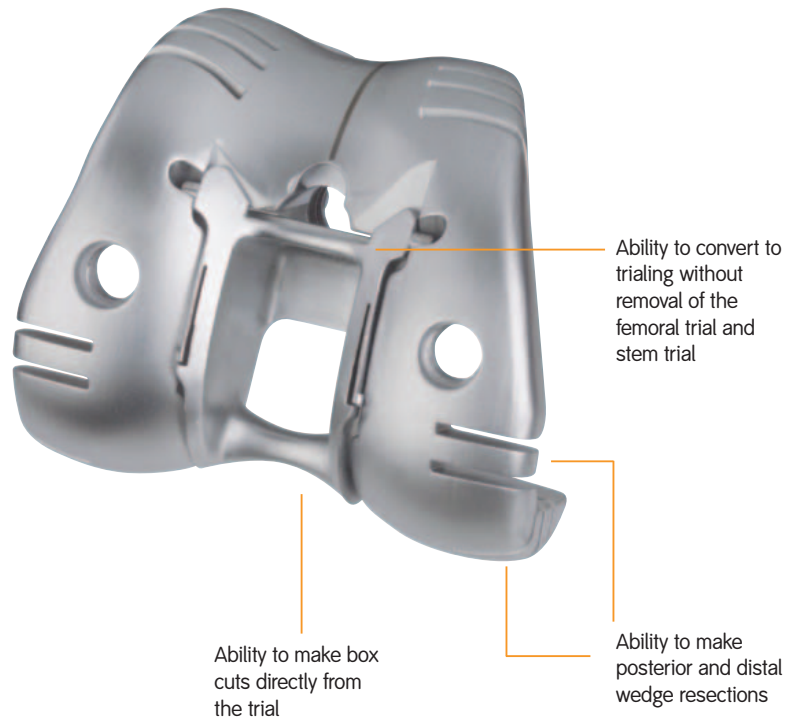
Instruments were designed for ease of use by both surgeon and the surgical staff. Instrumentation and tray layouts are organized and engineered to help decrease OR time by reducing and streamlining steps.

With some systems, the surgical technique requires the threading or screwing together of multiple parts to construct the surgical trials. The LEGION System Instrumentation utilizes innovative, quick-connect bayonet attachments for fast, one-step connections.

The femoral trial allows distal, posterior wedge resections and constraining box geometry cuts to be prepared directly from the femoral trial.

### Enhanced Access and Visualization

The low-profile design is easier to handle and allows access to the surgical area of choice more quickly. Compartmentalized hemi-wedge resection guides allow resection from the medial or lateral side to stay clear of the extensor mechanism.





## Instrument Stability Regardless of Bone Loss

With substantial bone loss, true stability becomes increasingly difficult to achieve. The LEGION® Revision Knee System Instrumentation allows the surgeon to establish primary fixation from the medullary canal. This fixation allows less reliance on pinning blocks in already compromised bone.

## Reduced Surgical Steps

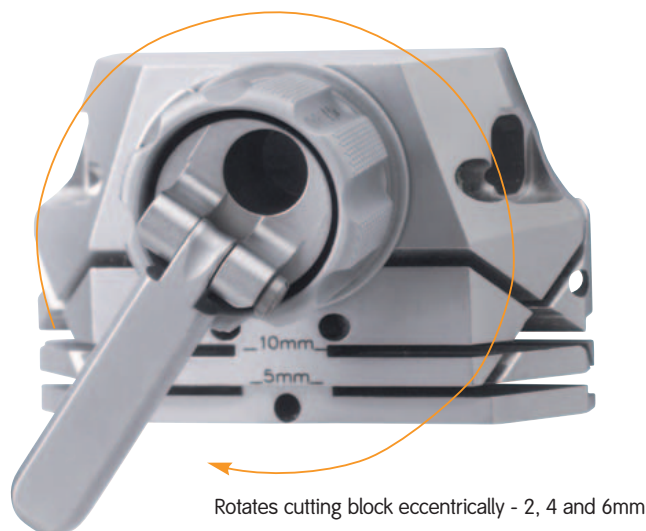
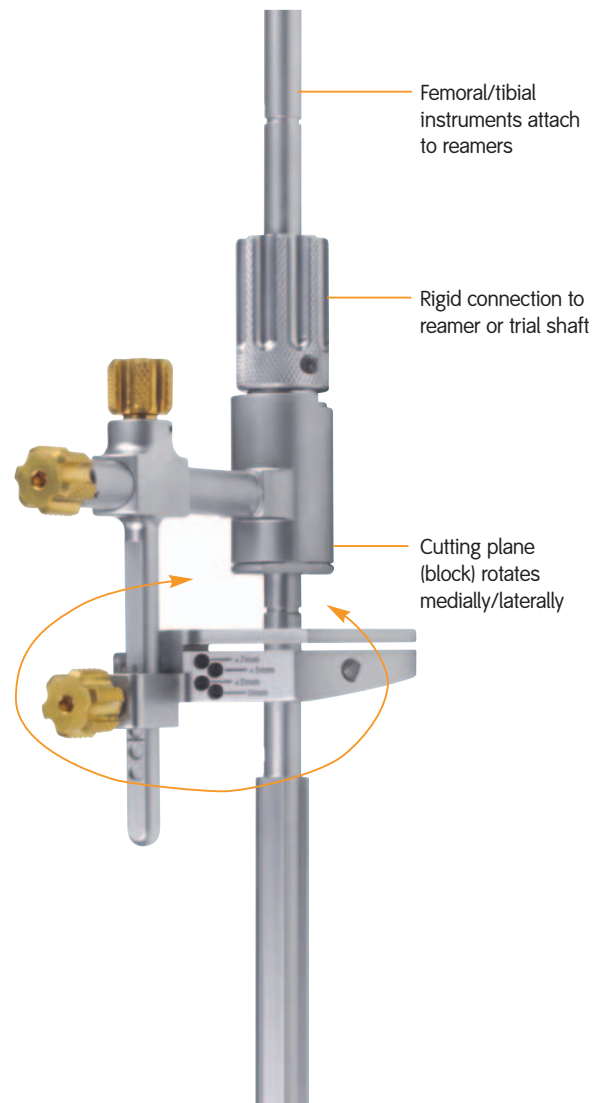
In order to reduce the amount of steps in the surgical technique, instrumentation was designed to connect to reamers allowing for a once-in/once-out technique. Once the final reamer is inserted, all of the instruments attach to the reamer. After the preparations are made the reamer is removed.

## Better Access

The tibial cutting block has the ability to swing medially and laterally to accommodate the patellar tendon when preparing the proximal tibia.

## Optimal Offset Coverage

Offset couplers are designed for fast, full-range orientation to provide optimal coverage. A broader range of offset couplers allows for 360° tibial and femoral offset orientation. Offset couplers are available in 2, 4, and 6mm offsets.



## Designed for Revision

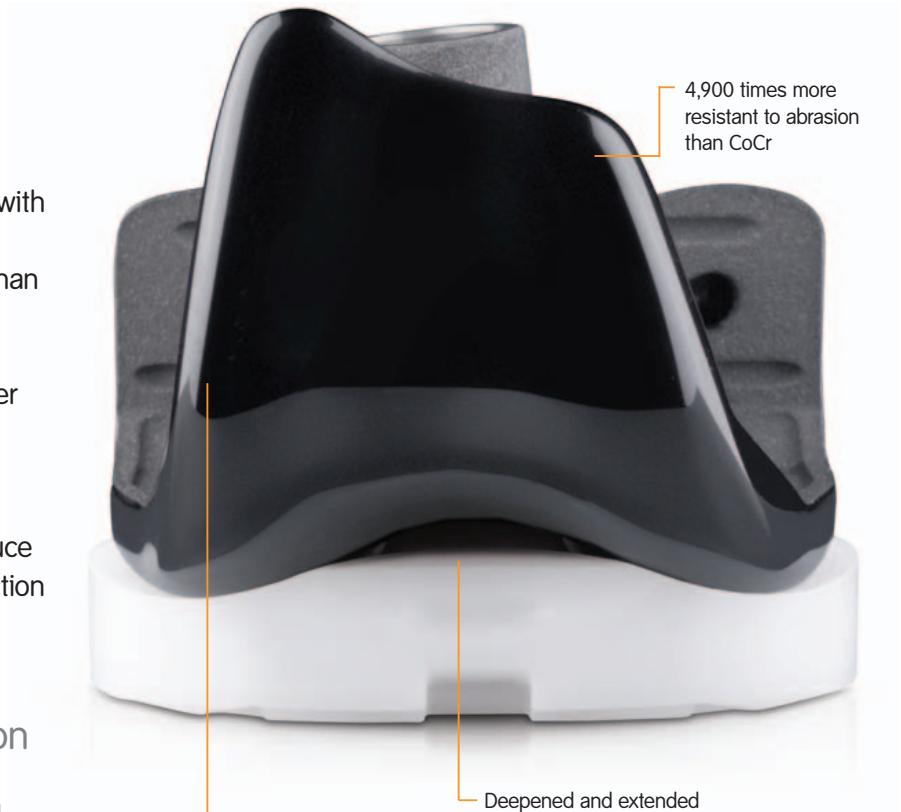
### Potential for Less Abrasion and Wear

The LEGION Revision Knee System offers femoral components that are available only with OXINIUM<sup>®</sup> advanced bearing material. Since OXINIUM material is harder and smoother than cobalt chrome, and has been shown to be 4,900 times more resistant to abrasion than cobalt chrome<sup>15-17</sup>, it potentially performs better than cobalt chrome in revision situations. OXINIUM material can reduce polyethylene wear by 85%<sup>18</sup>. Even in abraded conditions, OXINIUM material femoral components reduce polyethylene wear rates by 89% (44% reduction in number of particles produced)<sup>19</sup>.

### Better Match to Patient Population

The LEGION Revision Knee System sizing is based off of the trusted GENESIS<sup>®</sup> II A/P and M/L dimensions. In a population, larger numbers of “average” sized patients will be concentrated in the middle of the distribution. To match this population, the LEGION System offers sizes 3-6 with smaller incremental differences in the A/P and M/L dimensions than other sizes.

Sizes are concentrated in the middle of the bell curve where more patient sizes are available, so that the implant provides a better fit which helps to reproduce proper kinematics.



4,900 times more resistant to abrasion than CoCr

Deepened and extended trochlear groove

OXINIUM material reduces polyethylene wear by 85% in lab testing

## Minimized Bone Resection

The LEGION® Revision Knee System femoral components were designed with varying anterior chamfer angles to minimize bone resection and maximize the deepened patellar groove. The cam on the constrained femoral component has been positioned closer to the distal surface and more posteriorly resulting in a smaller box requiring less bone removal.

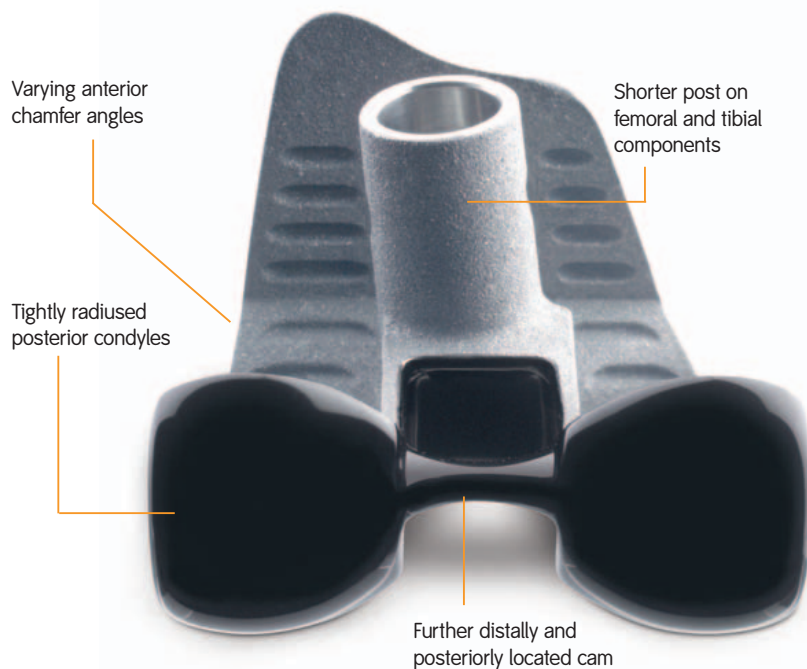
## Stronger, Shorter Female Taper

Designed and sized to provide increased strength, the new female taper allows for a larger selection of stem sizes. The new taper has a shorter post compared to the GENESIS® II Total Knee System which allows surgeons a better metaphyseal offset fit. The taper also includes a secondary locking mechanism for postoperative security.

## Proper Kinematics

The deepened and extended trochlear groove of the LEGION Revision Knee System femoral component is the same lateralized design as the GENESIS II – which allows for added patellofemoral contact area and greater subluxation resistance.

Posterior condyles are tightly radiused to maximize flexion.



LEGION® Revision Knee System

1mm incremental stems to match patient anatomy



OXINIUM® femoral components have no detectable nickel content, diminishing poor outcomes due to metal sensitivity



OXINIUM material reduces polyethylene wear rates by 85% in lab testing



Highly polished titanium tibial baseplate



## Metal Sensitivity and Revision Patients

According to a review in *The Journal of Bone & Joint Surgery*, 60% of patients with a failed or poorly functioning metal implant have at least a mild metal sensitivity – roughly six times the rate in the general population (Figure 1)<sup>20</sup>.

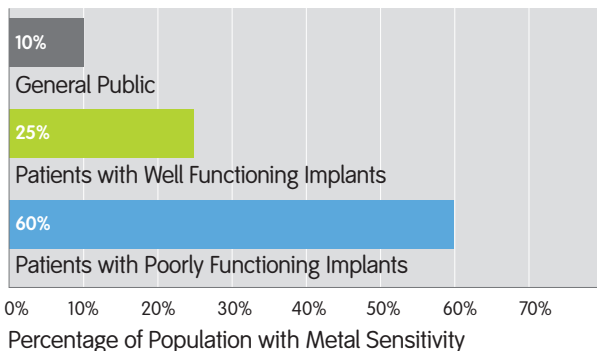
Severity and symptoms vary, and causality is incompletely understood, but it is clear that the odds are stacked against revision patients.

## Maximum Biocompatibility

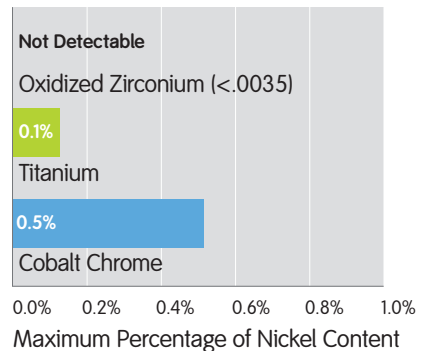
Nickel is the most common metal sensitizer in humans, which can be as high as 0.5% in CoCr implants<sup>20</sup>. The femoral component of the LEGION® Revision Knee System is made of OXINIUM® Oxidized Zirconium material. Combining 97.5% zirconium and 2.5% niobium – two of the most biocompatible metals known – OXINIUM femoral components contain no detectable levels of nickel or cobalt chrome (Figure 2).



Metal Sensitivity (Figure 1)



Maximum Nickel Content (Figure 2)



## Correct Tibial Coverage

The proximal tibia is asymmetric in shape. In order to cap the proximal tibia and provide support, the LEGION System tibial implants incorporate an asymmetrical shape, which has been shown to provide more tibial coverage than symmetric designs<sup>21-26</sup>.

Asymmetric left and right baseplates allow a precise patient fit<sup>27</sup>. This anatomical shape helps to correctly cover the tibia, provide even stress distributions in the proximal tibia, and limit irritation of soft tissues.

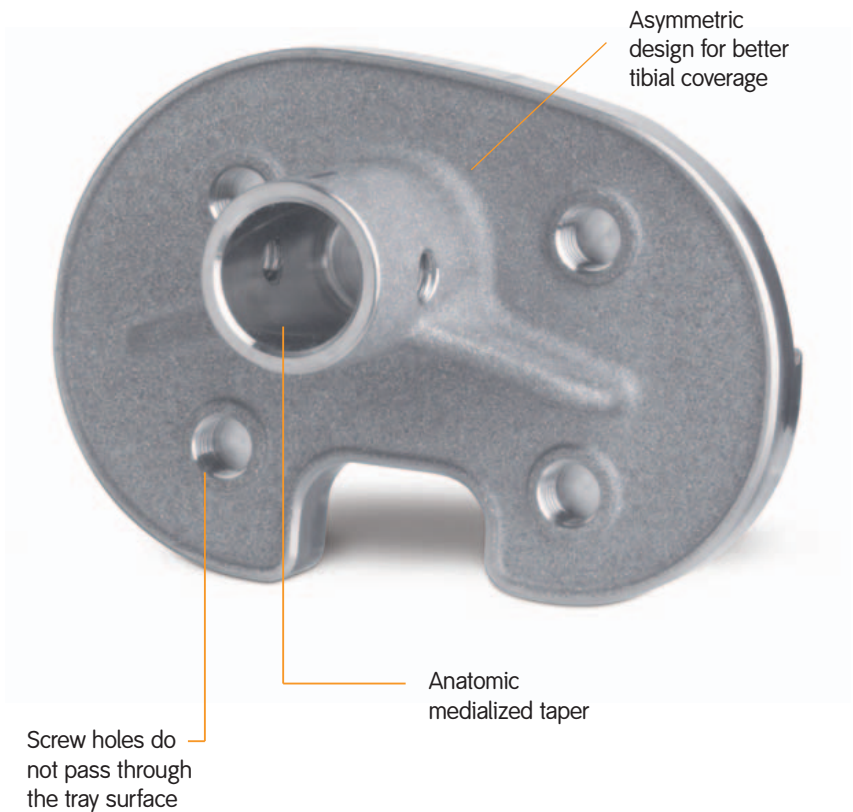
Studies have determined that it is beneficial to duplicate the original tibial cross-sectional geometry more precisely in order to evenly distribute stresses across the proximal tibia<sup>28-32</sup>. Proper coverage of the proximal tibia, particularly in the posteromedial quadrant where UHMWPE wear is most often seen, is improved with the LEGION System because of the improved anatomical shape.

## Accurate Tibial Placement

Researchers have noted that the IM canal of the tibia is slightly medialized as it moves distally. All tibial bases offered in the LEGION Revision Knee System have a proportionally medialized taper for better placement of the tibial baseplate and long stems.

## No Pathway for Debris, But Still Accepts Screw-on Wedges

Some systems have holes through their tibial tray allowing debris to pass through the tray, as well as increased cold flow and creep<sup>33</sup>. The LEGION Revision Knee System offers screw-on tibial augments and wedges secured via blind holes helping to prevent third-body passage of particulate to the tibia. This may have the potential of reducing osteolysis. The tray still has the ability to accept screw-on wedges via four bosses.



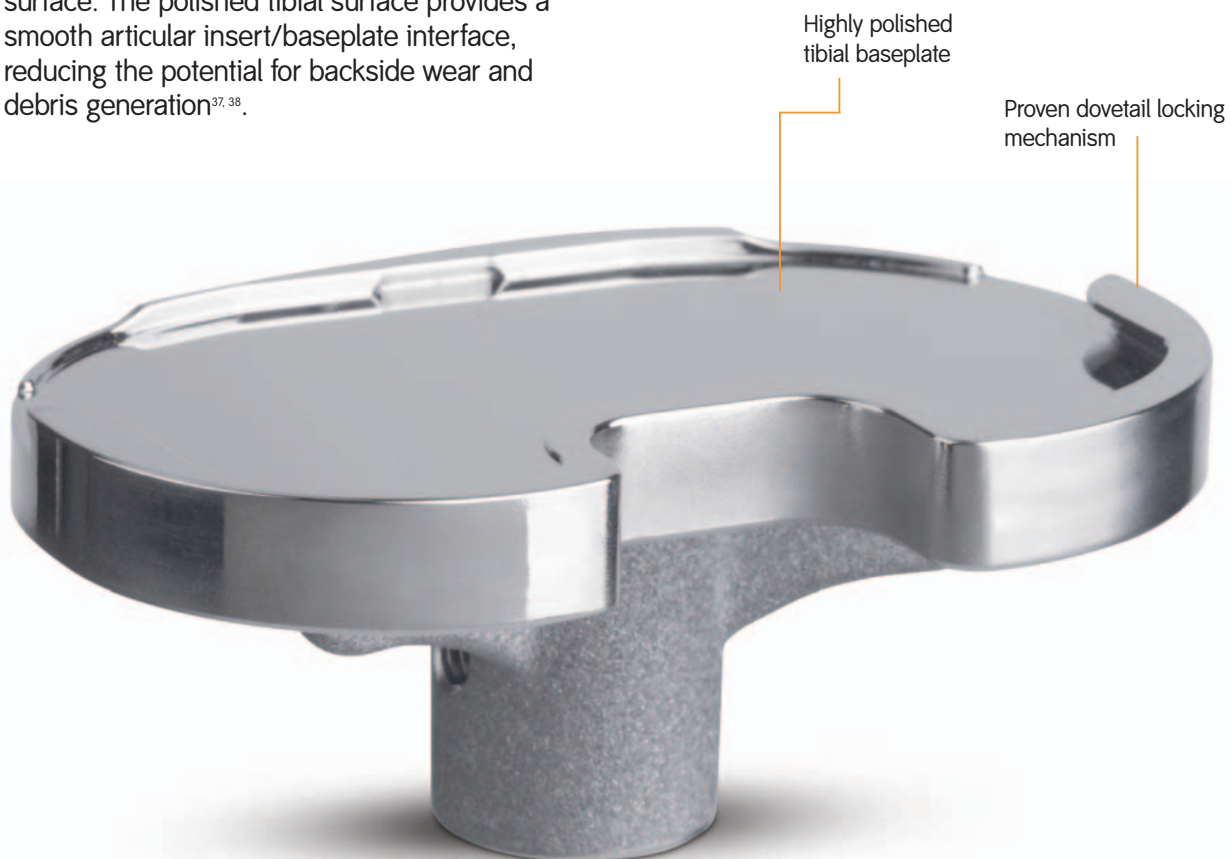
## Safe and Secure

The LEGION® Revision Knee System tibial baseplate is made from forged titanium alloy (Ti-6Al-4V), which provides superior strength, corrosion resistance and exceptional biocompatibility<sup>32</sup>.

A dovetail locking mechanism is used to secure the articular insert to the metal baseplate. The LEGION Revision Knee System articular insert and tibial baseplate incorporate both an anterior and posterior dovetail. This combination of locking surfaces, along with the peripheral nature of the lock, provides increased attachment between the insert and the tibial baseplate. The locking mechanism has been tested to show that it is more than adequate for *in vivo* loading<sup>34-36</sup>.

## Reduced Micromotion

While the dovetail design of the tibial locking mechanism reduces micromotion, there is no way to completely eliminate it between two mating parts. We have addressed this minute micromotion with a highly polished baseplate surface. The polished tibial surface provides a smooth articular insert/baseplate interface, reducing the potential for backside wear and debris generation<sup>37, 38</sup>.

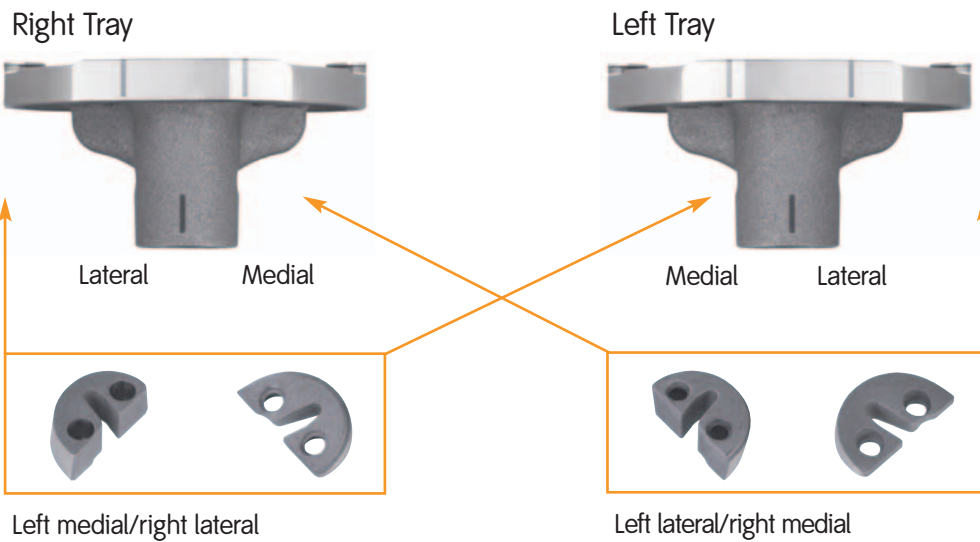


### Smooth Transition

Side-specific coned wedges provide a smooth tray-to-bone transition, reducing wedge overhang and potential for pain.

The tapered sides on hemi stepped wedges and the screw path on hemi angled wedges prevent the same wedge from augmenting both the medial and lateral plateaus of the tibial tray. Specific wedges are included for the left medial/right lateral and left lateral/right medial tibial tray plateaus.

### Anterior View







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