Zimmer® Trabecular Metal™ Acetabular Revision System

Give Bone a Solid Hold

zimmer

Expanding options in acetabular revision surgery

Unique in the industry, the *Zimmer Trabecular Metal* Acetabular Revision System sets new standards in the way surgeons perform revision surgery. It combines *Trabecular Metal* Technology with the ability to tailor individualized solutions for each patient—a combination no other competitive system offers.

- Provides surgeons multiple options to address the wide range of bone deficiencies encountered in acetabular revision—without the need for custom implants
- A viable alternative to structural allograft, without potential for resorption or disease transmission—plus, a more economical and technically easier procedure
- Modular design increases intraoperative flexibility
- Enables an algorithmic approach to reconstructing the acetabulum

Trabecular Metal Material: Looks like bone...acts like bone

No other prosthetic material simulates bone like *Trabecular Metal* Material. It's a 3-dimensional, porous material, not merely a coating. Additionally, it's one of the most biocompatible materials in the orthopaedics industry, encouraging bone and soft-tissue ingrowth like no other. You can trust *Trabecular Metal* Implants for their:

- 75–80% porosity: a permeability similar to bone[1,2,4]
- Elasticity similar to bone, with high strength and ductility[1,2]
- Intrinsically high friction and stability[5,6]
- Enabling of osteoconduction and fixation[1,2,3]
- 10 years of on going clinical success

Modularity = Flexibility

The *Zimmer Trabecular Metal* Acetabular Revision System gives surgeons an exceptional array of options to properly address the full range of acetabular defects. The system's use of modular components enables surgeons to tailor a solution to specific patient needs without requiring the use of custom implants.

The components that make up the *Zimmer Trabecular Metal* Acetabular Revision System include *Trabecular Metal* Modular Multi-hole Shells, *Longevity*® Highly Crosslinked Polyethylene Modular Liners, *Trabecular Metal* Revision Shells, *Longevity* Highly Crosslinked Polyethylene Cemented Revision Liners, *Trabecular Metal* Augments, *Trabecular Metal* Restrictors, *Trabecular Metal* Buttress Augments, *Trabecular Metal* Shim Augments, and Titanium Cages, which are used to create the Cup-Cage Construct.

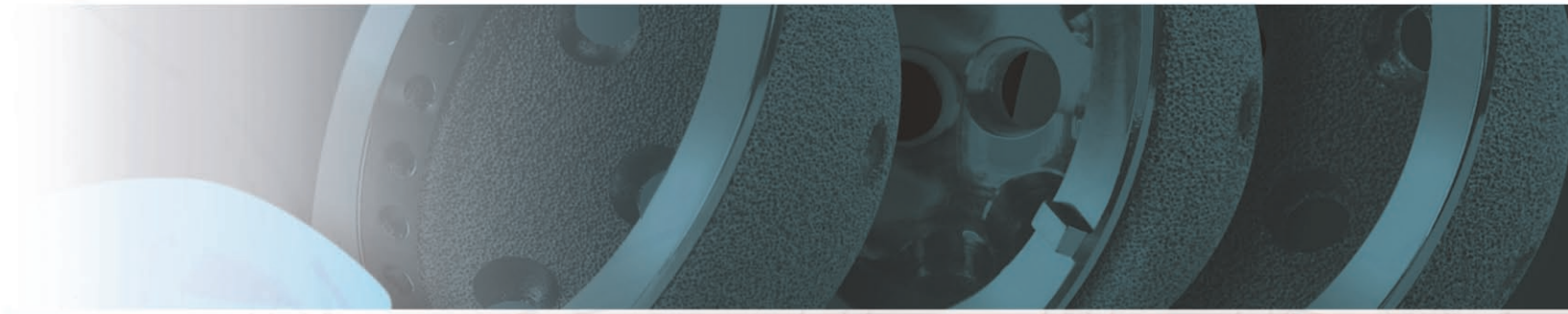
Shells and Liners

Trabecular Metal Modular Multi-hole Shells

- To create initial stability, *Trabecular Metal* Material combines an excellent coefficient of friction against bone and an elliptical shape[5,6]
- Industry-leading locking mechanism—allows liners to be snapped in and removed easily, providing intraoperative flexibility and ease of liner exchange
- *Trabecular Metal* Material offers long-term fixation via fully interconnected pores[1,2]

Longevity Highly Crosslinked Polyethylene Modular Liners

- 89% reduction in wear, compared to conventional polyethylene liners[7]
- Multiple liner options available, including neutral, 10° elevated, 20° elevated, and 7mm offset in a large range of sizes
- Large head diameters, up to 40mm, for increased joint stability and range of motion



Trabecular Metal Revision Shells

- To create initial stability, *Trabecular Metal* Material combines an excellent coefficient of friction against bone and an elliptical shape[5,6]
- High strength-to-weight ratio and low modulus of elasticity of *Trabecular Metal* Material permit physiologic loading and help minimize stress shielding[2,9]
- Designed to allow 2–3mm cement mantle, securing screws and preventing backside wear between components
- 75–80% porosity of *Trabecular Metal* Material allows excellent cement interdigitation between liner and revision shell

Longevity Highly Crosslinked Polyethylene Cemented Revision Liners

- Reduced wear, compared to conventional polyethylene liners[7]
- 0° neutral and 10° oblique liner options
- Grooved backside decreases stresses in cement mantle and provides rotational stability
- Large head diameters, up to 40mm, for increased joint stability and range of motion

Augments and Cages

Trabecular Metal Augments

- Made entirely of *Trabecular Metal* Material—no substrate
- Interfaces are cemented, creating a monolithic construct without concerns of micromotion
- Shell and Augment combination increases total implant surface area for optimized *Trabecular Metal* Material-to-host-bone contact
- Augments sized from 50 to 70mm in 10, 15, 20, and 30mm thicknesses
- Wide array of Augment sizing allows selection to fit the size of the defect, thereby minimizing bone removal

Trabecular Metal Buttress Augments

- Made entirely of *Trabecular Metal* Material—no substrate
- Addresses extensive superior segmental defects (Paprosky Type IIIA)
- Alternative to allograft, without potential for bone resorption or disease transmission
- Designed to provide a technically simpler procedure, compared to using structural allograft
- Interfaces are cemented, creating a monolithic construct without concerns of micromotion
- Host bone is conserved while implant size, position, and orientation are determined by the defect
- Allows head center to be restored for optimization of patient kinematics
- Available in straight superior and posterior/anterior column configurations
- Sizing allows use with *Trabecular Metal* Revision Shells of any size

Trabecular Metal Restrictors

- Made entirely of *Trabecular Metal* Material—no substrate
- Used to rebuild medial wall

Trabecular Metal Shim Augments

- Made entirely of *Trabecular Metal* Material—no substrate
- Placed between Buttress Augment flange and host bone to optimize the fit of the buttress device against the iliac bone
- Interfaces are cemented, creating a monolithic construct without concerns of micromotion

Trabecular Metal Cup-Cage Construct

- Cage manufactured of commercially pure titanium for optimized mechanical strength
- Left and right configurations
- Long-flange and short-flange options
- Inferior flange designed to be spiked into ischium
- Shaped to fit individual patient anatomy
- Used where *Trabecular Metal* Revision Shell alone does not provide adequate stability
- Cage spans acetabular defects and pelvic discontinuities to provide mechanical stability of the Cup-Cage construct until biological ingrowth occurs within the *Trabecular Metal* Revision Shell
- Cementing the *Longevity* Highly Crosslinked Polyethylene Liners, Cages, and *Trabecular Metal* Revision Shells together creates a single construct, without concerns of micromotion

An algorithmic approach

While other algorithmic approaches may be used to discuss acetabular revision, this brochure uses Paprosky's classification of acetabular defects to explain the usage of *Trabecular Metal* Acetabular Revision System Components. This approach provides preoperative indications to predict defects and solutions intraoperatively. It is based on the severity of bone loss and the ability to obtain cementless fixation for a given bone-loss pattern.[8] This system can be used as a guide to maximize contact between the host bone and the *Trabecular Metal* Components, thus optimizing mechanical stability.

Paprosky Classification[8]

Defect Type	Defect Characteristics
I	Acetabular rim, anterior column, and posterior column intact and supportive; small, local, contained defects
IIA	Moderate superomedial migration <3cm; >50% host-bone contact
IIB	Moderate superolateral migration <3cm; >50% host-bone contact
IIC	Isolated medial migration, medial to Kohler's line; intact rim
IIIA	Severe superolateral migration >3cm; 40-60% host-bone contact; inadequate stability; defect <½ circumference
IIIB	Severe superomedial migration; <40% host-bone contact; inadequate stability; medial to Kohler's line; risk of pelvic discontinuity
Pelvic Discontinuity	Partial or complete fracture

Reconstruction Options

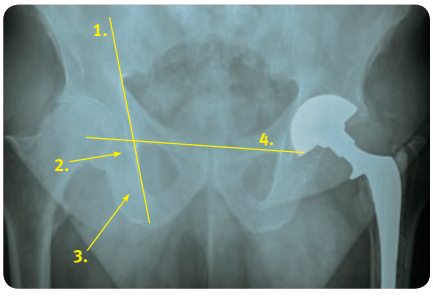
The integrity of the host-bone stock determines the reconstruction option available:

- Completely supportive acetabulum (ingrowth likely)—*Trabecular Metal* Shell
- Partially supportive acetabulum (ingrowth possible)—*Trabecular Metal* Shell with Augments
- Non-supportive (ingrowth unlikely)—*Trabecular Metal* Shell with Buttress Augments and/or Cage

Four Landmarks

Indications for component revision are dependent upon four radiographic criteria:

1. **Kohler's line**—integrity of medial wall and superior anterior column
2. **Acetabular tear drop**—integrity of medial wall and inferior portion of anterior and posterior column
3. **Ischial lysis**—integrity of posterior wall and posterior column
4. **Vertical migration**—integrity of superior dome



Clinical applications

Type I & Type II

Radiograph of Defect

Defect

Algorithmic Repair

Type I Defect
Kohler's Line: Intact
Tear Drop: Intact
Ischial Lysis: Minimal to none
Vertical Migration: Minimal to none

Type IIA Defect
Kohler's Line: Intact
Tear Drop: Violated
Ischial Lysis: Mild to moderate
Vertical Migration: Minimal to none

Type IIB Defect
Kohler's Line: Intact
Tear Drop: Intact
Ischial Lysis: Mild
Vertical Migration: <3cm

Type IIC Defect
Kohler's Line: Moderately violated
Tear Drop: Moderate lysis
Ischial Lysis: Minimal
Vertical Migration: Minimal to none

Solution 1
Trabecular Metal Modular Cup and *Longevity* Highly Crosslinked Polyethylene Liner

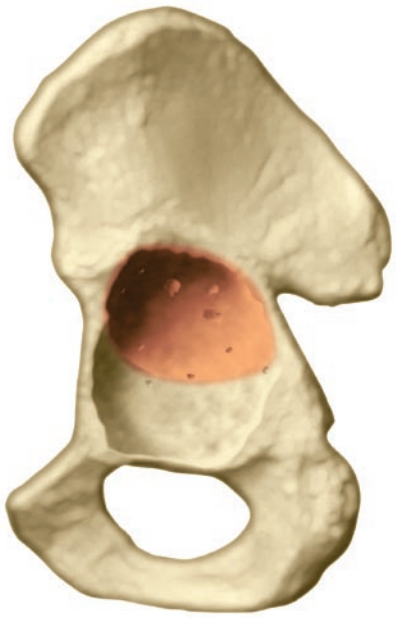
- Can be used for most Type I & II revision cases
- Large heads, up to 40mm, for additional joint stability and range of motion
- Intraoperative flexibility with a wide array of *Longevity* Highly Crosslinked Polyethylene Liners

Solution 2
Trabecular Metal Revision Shell and *Longevity* Highly Crosslinked Polyethylene Liner

- Prevents backside micromotion
- Cement secures screws
- Isoelastic loading of bone
- Cemented *Longevity* Highly Crosslinked Polyethylene Liners with large-diameter heads, up to 40mm, for additional joint stability and range of motion

Type IIIA—Cavitary

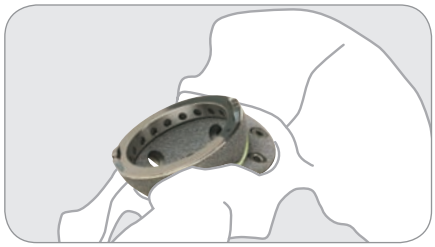
Radiograph of Defect



Defect

Algorithmic Repair

Type IIIA Cavitary Defect
Kohler's Line: Intact
Tear Drop: Minimal lysis
Ischial Lysis: Minimal
Vertical Migration: >3cm



Solution
Trabecular Metal Augment in oblong cup position[10]

- Uses the *Trabecular Metal* Augment to fill the superior bone void and restore head center to natural anatomic position
- Cementing the shell to the augment creates a monolithic construct

Clinical applications

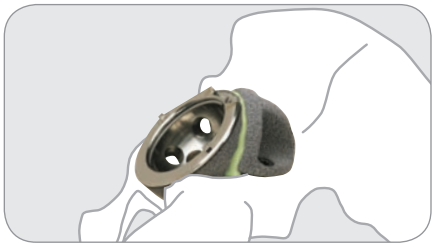
Type IIIA—Segmental defect

Radiograph of Defect

Defect

Algorithmic Repair

Type IIIA Segmental Defect
Kohler's Line: Moderately violated but intact
Tear Drop: Minimal lysis
Ischial Lysis: Mild
Vertical Migration: >3cm



Solution
Trabecular Metal Augment in flying buttress position[10]

- Uses the *Trabecular Metal* Augment, inverted, as a load-bearing structural support to replace the missing acetabular rim
- Cementing the shell to the augment creates a monolithic construct

Type IIIA—Extensive segmental defect

Radiograph of Defect

Defect

Algorithmic Repair

Type IIIA Extensive Segmental Defect
Kohler's Line: Intact
Tear Drop: Minimal lysis
Ischial Lysis: Mild
Vertical Migration: >3cm

Solution
Trabecular Metal Buttress Augment

- *Trabecular Metal* Buttress Augment provides a superior step for placement against the ilium and is an alternative to allografts, which are expensive and tend to resorb
- *Trabecular Metal* Shim Augments are available to supplement the fit of the superior flange of the buttresses onto the ilium
- Cementing the shell to the augment creates a monolithic construct

Clinical applications

Type IIIB—Contained medial defect

Radiograph of Defect

Defect

Algorithmic Repair Step 1

Type IIIB Medial Defect
Kohler's Line: Violated
Tear Drop: Violated, significant lysis
Ischial Lysis: Severe
Vertical Migration: >3cm

Solution
Trabecular Metal Augments in footings position[10]

- *Trabecular Metal* Augments sized to fit defect, providing a foundation for the shell and filling voids from medial and/or superior defects
- Cementing the shell to the augments creates a monolithic construct

Algorithmic Repair Step 2

Pelvic Discontinuity

Radiograph of Defect

Defect

Algorithmic Repair

Pelvic Discontinuity

- Superior aspect of pelvis is separated from the inferior aspect as a result of bone loss or an acetabular fracture

Solution

Cup/Cage Construct

- Used in situations where the *Trabecular Metal* Revision Shell alone does not provide adequate stability
- The *Trabecular Metal* Revision Shell provides potential for bone ingrowth and long-term fixation
- The Cage spans the acetabular defect and provides mechanical stability until biological ingrowth occurs within the *Trabecular Metal* Revision Shell
- Three components—shell, cage, and liner—cemented together create a monolithic construct

NOTES:

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