LINK®

TrabecuLink Augments

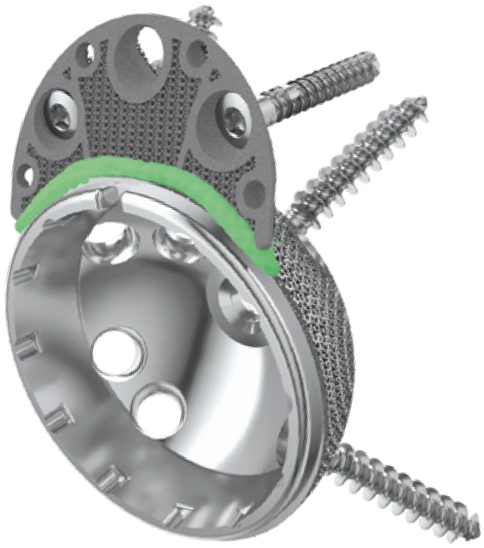
for segmental acetabular defects

Product Rationale

The latest material and fixation technologies have been taken into account and used in the design of the TrabecuLink Augments

TrabecuLink Augments

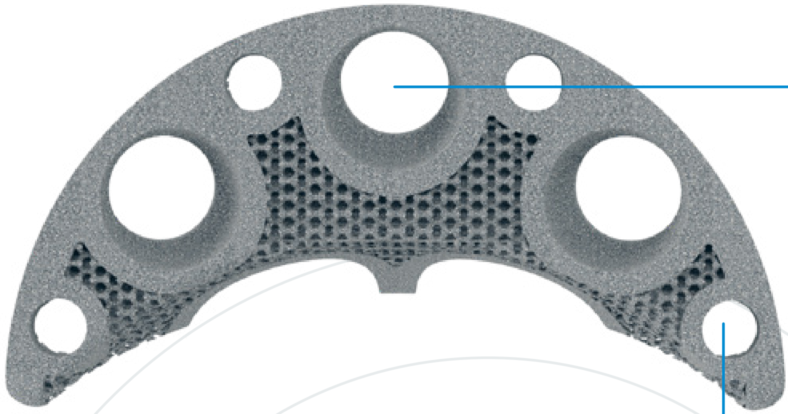
- The TrabecuLink Augments offer an attractive solution in cases of segmental acetabular defects as a prosthetic alternative to structural allograft
- The biocompatible material Tilastan-E[1,2] and the TrabecuLink structure offer an excellent prerequisite for a stable and permanent treatment of bone defects.
- Furthermore, the 3-dimensional TrabecuLink structure, with its pore size, porosity and structure depth, also provides an excellent basis for promoting osteoconduction and microvascularization, taking into account the requirements for the structure-covering protein layer (fibronectin - vitronectin - fibrinogen)[3,4].
- The Augments can be combined with all LINK cups, in particular with the MobileLink cup, which has variable options for placing bone screws, as the Augment design allows flexibility to put bone screws through shell and Augment.
- In case of acetabular defects the combination of LINK shell with TrabecuLink Augments can be the solution to help conserve the physiological patient anatomic and kinematics.
- The Augment size range allows good fit for different anatomies and defects[5].



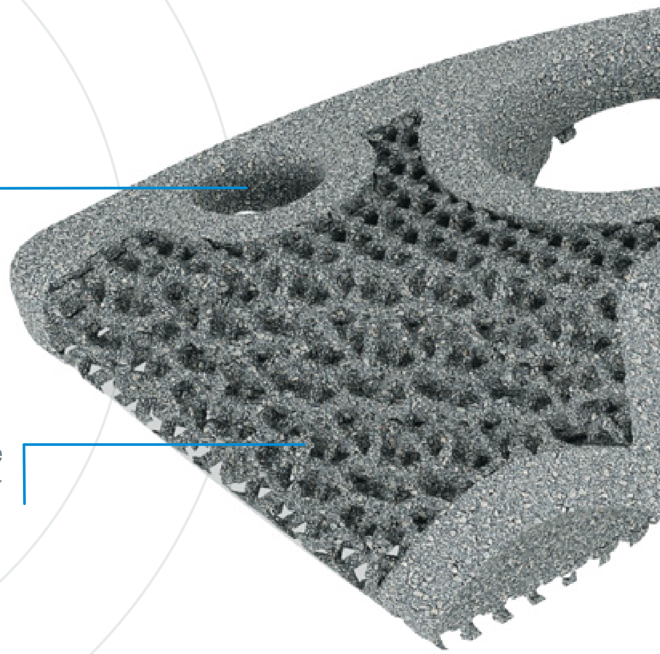
Great connection between shell and Augment by application of cement mantle (according to surgical technique)[5,6]

Augment sizes

Outer Ø of Augment width (mm)	For shell sizes (mm)	Augment depth (mm) 10	15	20	30
44	42-46	X	X		
46	44-48	X	X	X	
50	48-52	X	X	X	X
54	52-56	X	X	X	X
58	56-60	X	X	X	X
62	60-64	X	X	X	X
68	66-70	X	X	X	
74	72-76	X	X		

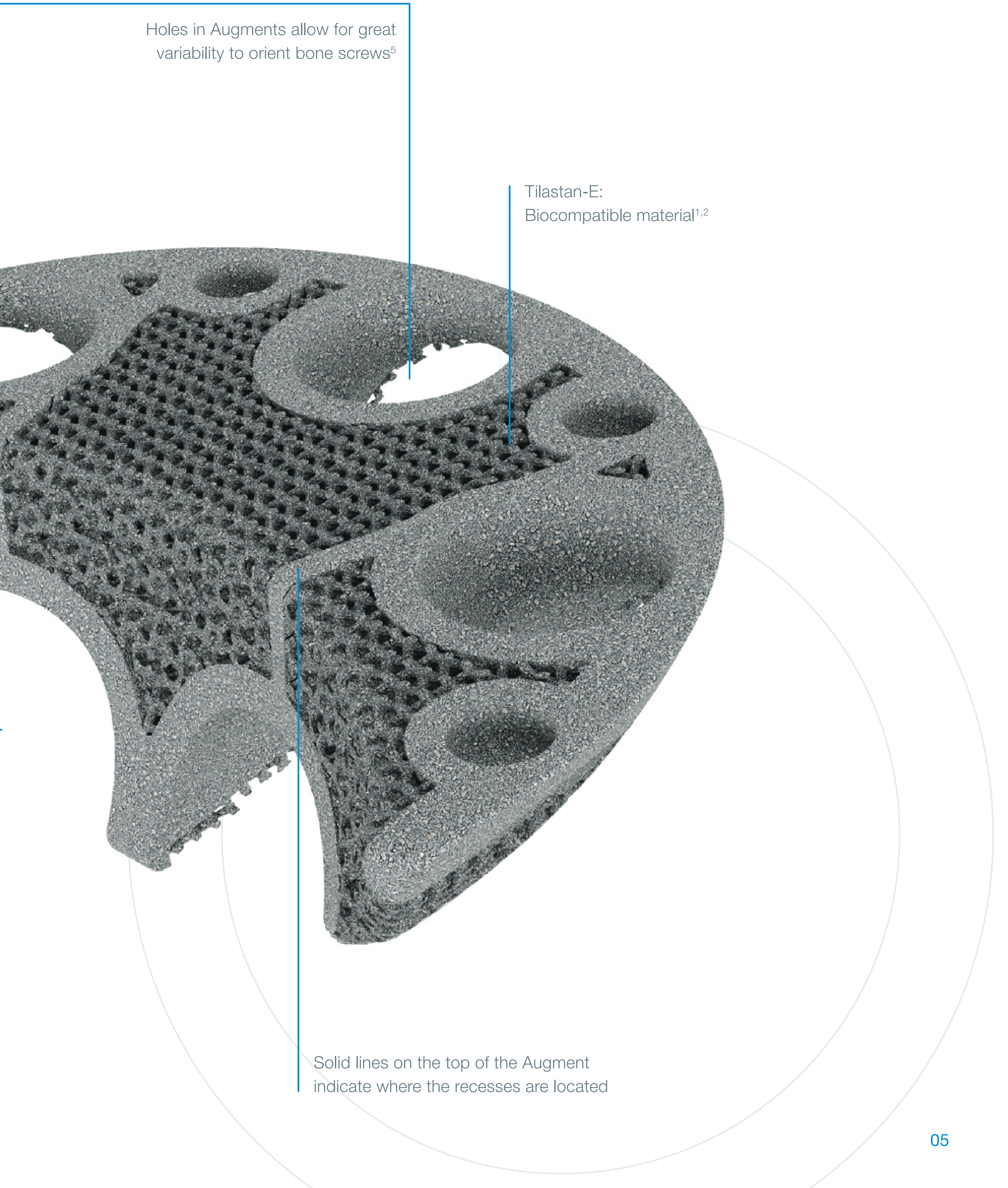


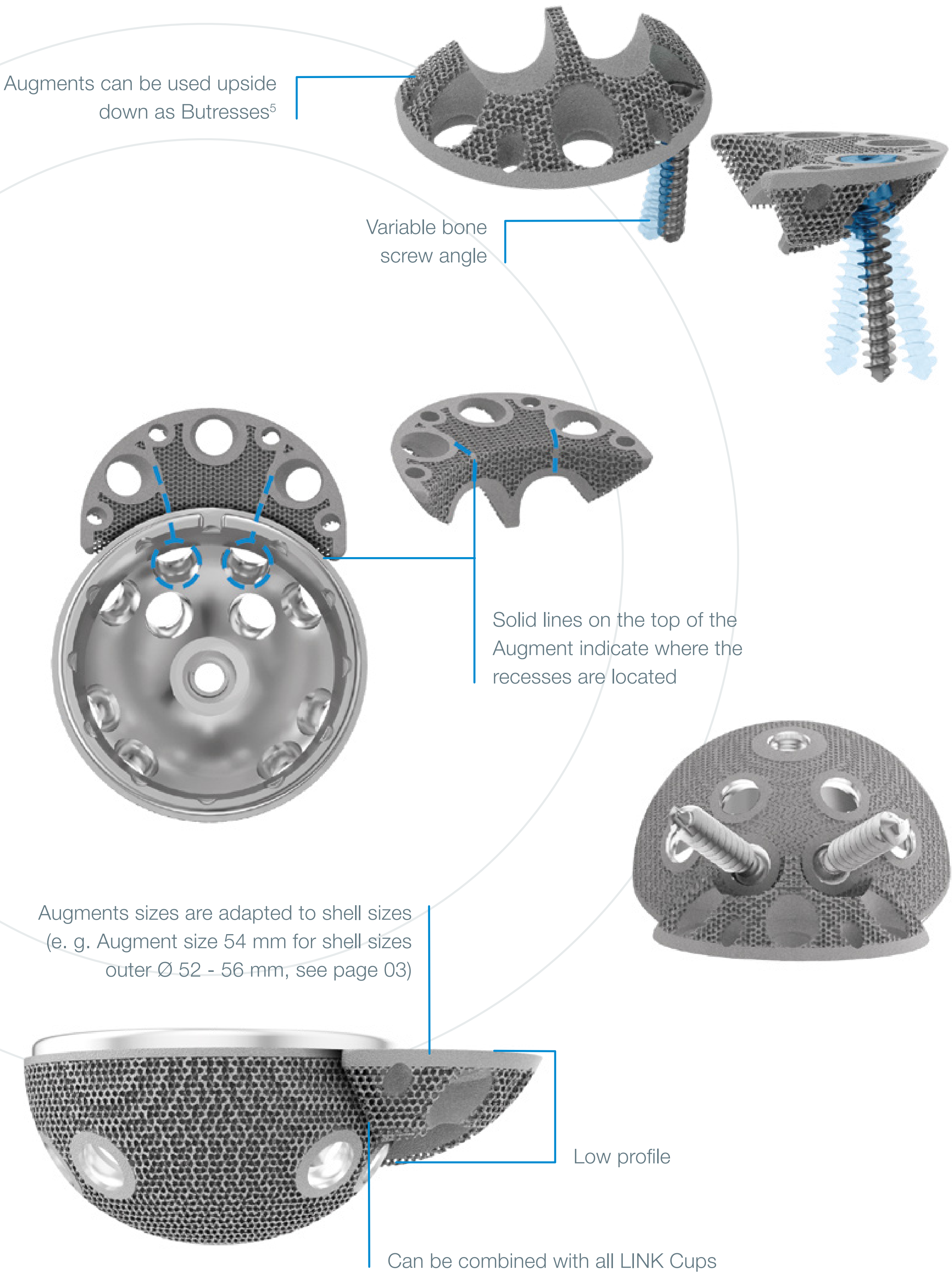
Temporary fixation of trial Augment and final Augment by drill pins through pin holes



Pore geometry of the TrabecuLink structure for effective cell ongrowth[3,4,7]

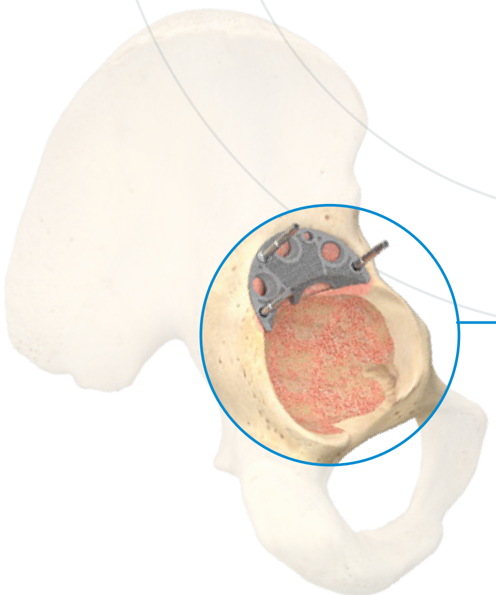
The Augment design allows flexibility to put bone screws through shell and Augment – big recesses allow for great variability in positing the Augment[5]

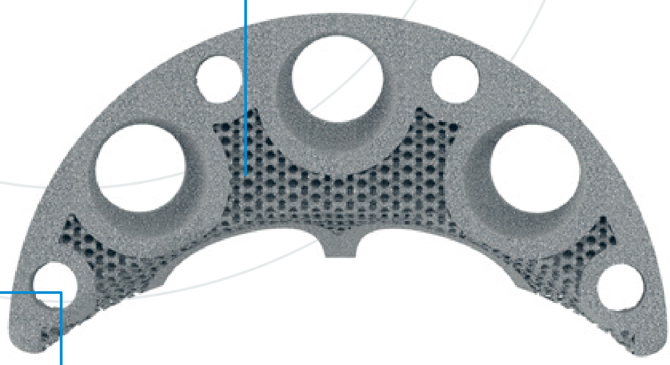

Holes in Augments allow for great variability to orient bone screws[5]
Tilastan-E:
Biocompatible material[1,2]
Solid lines on the top of the Augment indicate where the recesses are located


Augments can be used upside down as Butresses[5]
Variable bone screw angle
Solid lines on the top of the Augment indicate where the recesses are located
Augments sizes are adapted to shell sizes (e. g. Augment size 54 mm for shell sizes outer Ø 52 - 56 mm, see page 03)
Low profile
Can be combined with all LINK Cups

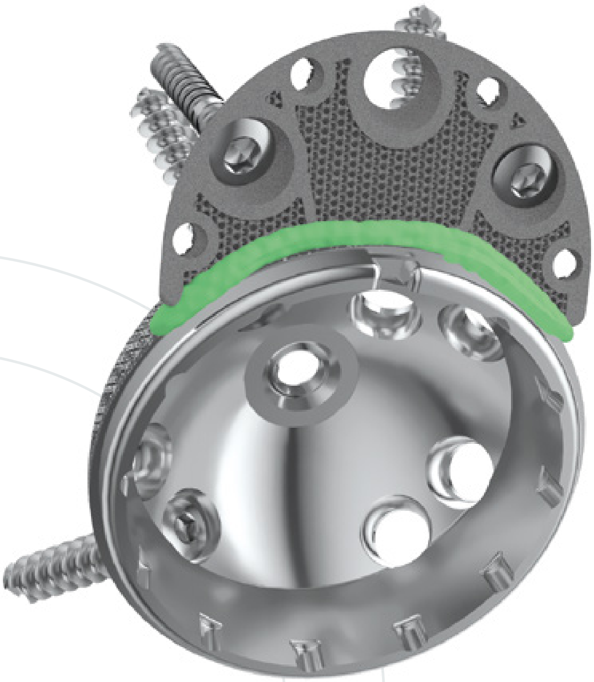
Great connection between shell and Augment by application of cement mantle[5,6]

Pore geometry highly porous 3-dimensional TrabecuLink structure for effective cell ongrowth[3,4,7]





Temporary fixation of trial Augment and final Augment by drill pins through pin holes. Pins which hold trial Augments in place help to position final implant[5]



Versatility

- The Augment size range allows good fit for different anatomies and defects[5]
- Variable bone screw angulation/options
- The Augment design allows flexibility to put bone screws through shell and Augment – Big recesses allow for great variability in positing the Augment[5]
- Low Augment profile
- Augments can be used upside down as Butresses[5]

Reproducible surgical technique

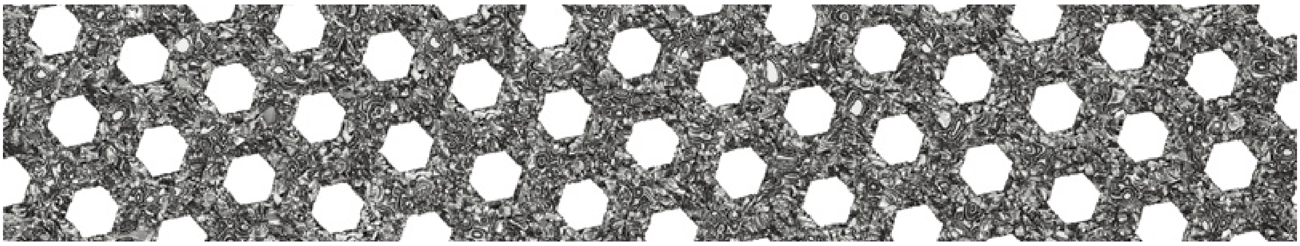
- The Augment forceps helps to place the Augment[5]
- Temporary fixation of trial Augment and final Augment by drill pins through pin holes
- Pins which hold trial Augments in place help to position final implant[5]
- Small inventory

Effective fixation

- Sufficient grip of Augments. Augments have a great primary stability[5]
- Pore geometry of the TrabecuLink structure for effective cell ongrowth[3,4,7]
- Great connection between shell and Augment by application of cement mantle (according to surgical technique)[5,6]

TrabecuLink
3-dimensional structure for effective cell ongrowth

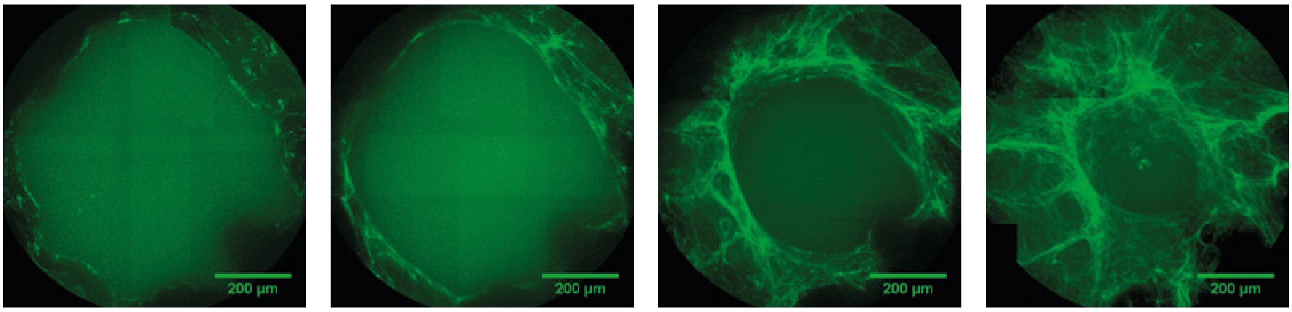
- The pore geometry (porosity: 70%, pore size: 610-820 µm, structure depth: up to 1 mm) ensures excellent cell ongrowth.[3,4,7]



TrabecuLink pore filling

The sequence of images shows a pore of the TrabecuLink structure being filled with tissue under in-vitro cell culture conditions. The fibronectin laid down by human fibroblasts and continually reorganized over a period of eight days is visible as green fibers.

Fibronectin is a component of the extracellular matrix that is formed at an early stage of the healing process. It forms a basis for the embedding of collagen, which is essential for mineralization of the tissue and ingrowth of bone into the structure. Apart from the accumulation of fibronectin, which increases over time, a clear contraction of the matrix towards the center of the pore can be observed. This contraction mechanism, which is attributable to the cellular forces acting in the tissue, accelerates the rate at which the pore is filled with tissue, compared to a layer-by-layer tissue growth.



(Reference: Joly P et al., PLOS One 2013; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0073545). Julius Wolff Institute, Charité - Universitätsmedizin Berlin

Sufficient mechanical stability

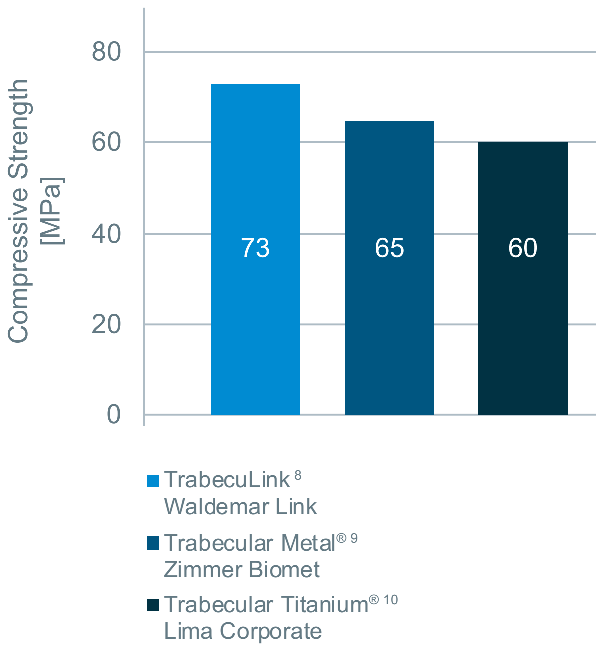
Mechanical properties, such as compressive strength and elastic modulus, of the tested cellular Ti6Al4V structures are similar to those of human bone. Thus, stress-shielding effects after implantation might be avoided due to a reduced stiffness mismatch between implant and bone.

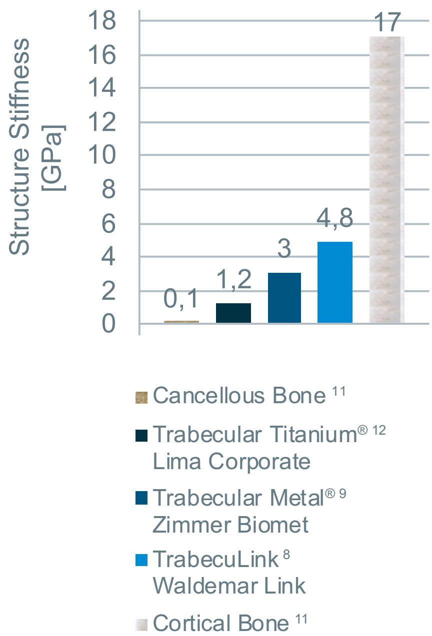
Compressive strength

The TrabecuLink structure offers the highest compressive strength among Trabecular Metal® and Trabecular Titanium®, reducing the risk of material failure of the orthopaedic implant.

Stiffness

TrabecuLink structure offers the highest structure stiffness among Trabecular Metal® and Trabecular Titanium® but lower than the cortical bone for more physiological loading.





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4. Pascal Joly, Georg N. Duda, Martin Schöne, Petra B. Welzel, Uwe Freudenberg, Carsten Werner, Ansgar Petersen et al. (2013) Geometry-Driven Cell Organization Determines Tissue Growths in Scaffold Pores: Consequences for Fibronectin Organization. PLoS ONE 8(9): e73545. https://doi.org/10.1371/journal.pone.0073545

5. Internal Document, Waldemar Link.

6. Beckmann, N. A., et al. "Comparison of the stability of three fixation techniques between porous metal acetabular components and Augments." Bone & Joint Research 7.4 (2018): 282-288.

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