

PANTHEON[®]

One Hip - Complete Freedom



Surgical Technique
PFR - Proximal Femoral Replacement

ADLER[®]
ORTHO

PANTHEON[®]

A total modular limb salvage platform, allowing complete freedom to address bone loss in oncology, trauma, infection and failed joint replacements.





PANTHEON®

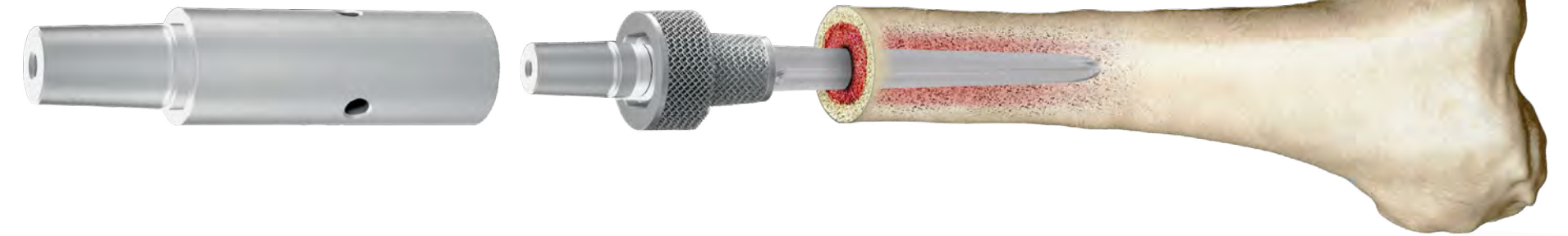
Fixation / Function / Freedom

System Features:



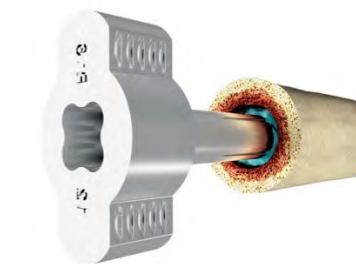
Bridging Collars:

First in-class collar & sleeve system, that gives immediate primary press-fit & rotational stability due to the endosteal sleeve portion of the collar. The endosteal sleeve is designed to create a joint space sealing and mechanical centering effect in the medullary canal.



3D-Por® fixation heritage:

The Pantheon 3D-Por® bridging collar & iCaS components have a three-dimensional, interconnected monolithic surface. With over 75% of porosity, the surface contributes to an increased mechanical quality of the bone produced for secondary stability obtained with bone integration. (Adler data on file, 2020)



Unique cementing system:

First in-class endo-prosthetic cementing system to protect the endosteal sleeve from cement ingress, to ensure biological fixation to sleeve.

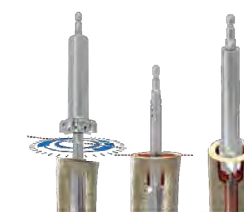


Rotational freedom & comprehensive choice:

Both flat porous and smooth bodies allow for full 360° of rotational freedom to fine-tune component positioning.

Designed to last:

First in class fully printed bodies stressed & tested under load for 10 million cycles to determine fatigue strength. The results showed that the implants did not fail as a result of the cyclical movement. (Adler data on file 2020)



Simple, reproducible instrumentation:

Size specific stem & collar preparation.



Designed for minimal bone cuts:

Class leading minimal resection length of 70mm. Incremental resection options of 5mm and 10mm

Novel body shape & central locking screw:

Lateral proximal body flare to resist vertical shear forces and a central locking screw to provides resistance to rotational forces.

Proven trunnion technology:

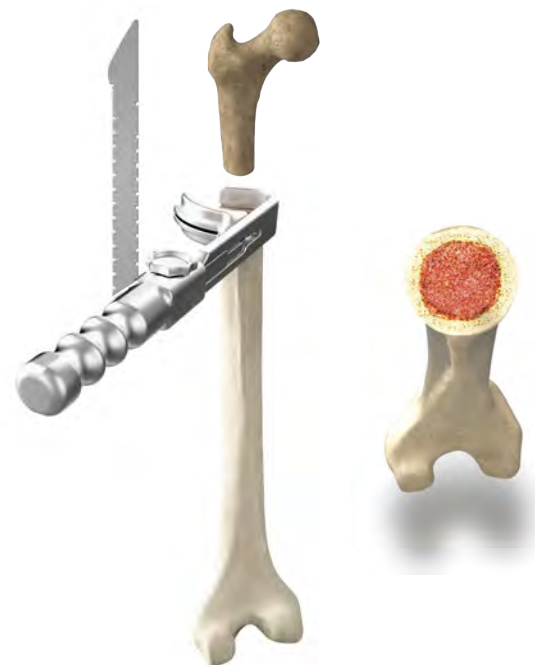
Same hip trunnion & tapers used for over 15years, utilising roller hardening techniques to ensure superior taper connections.

Taper stability at every junction:

Flat sided anti-rotational morse taper connection on all shafts / stems and collars.

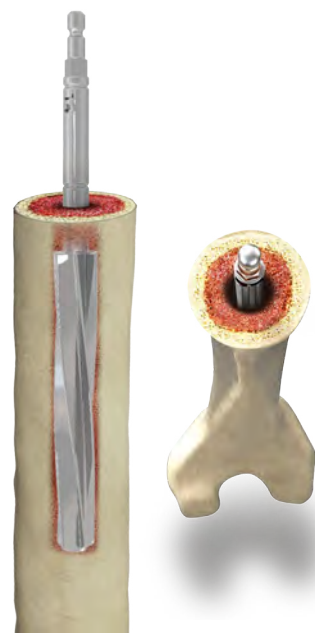
PANTHEON[®] Summary of operative flow

1



Measure/Resect

2



Stem Canal Preparation

3a



Bridging Collar Preparation
'Facing Ream'

3b



Bridging Collar Preparation
'Endosteal Ream'

4



Trial Reduction

5



Implant Assembly

6



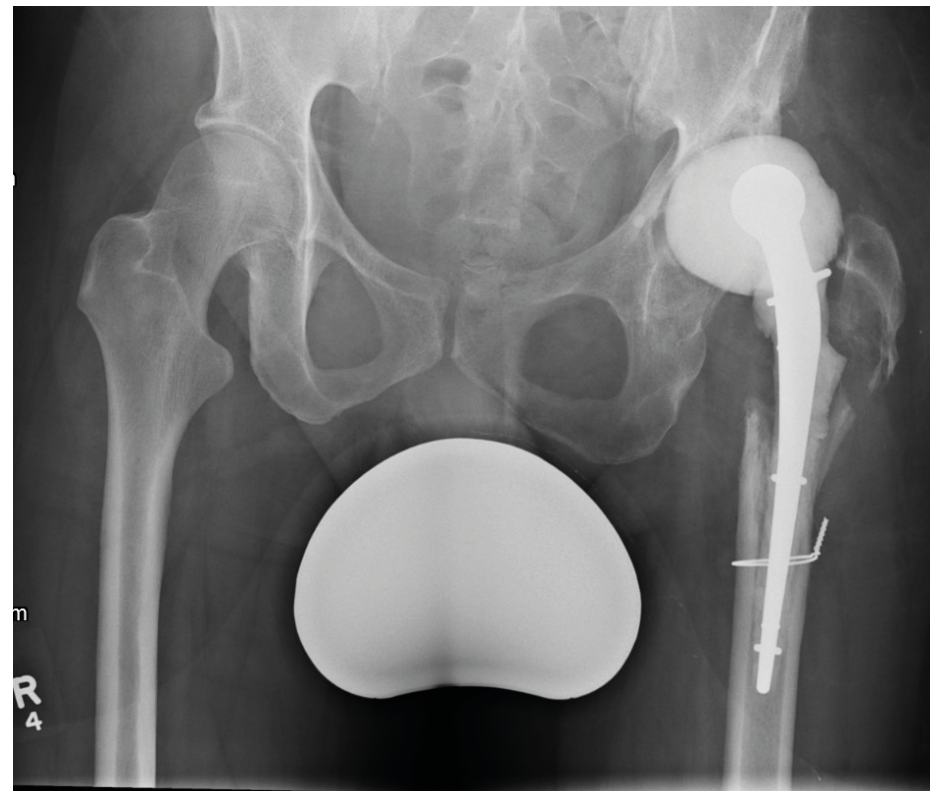
Cementing Technique

7

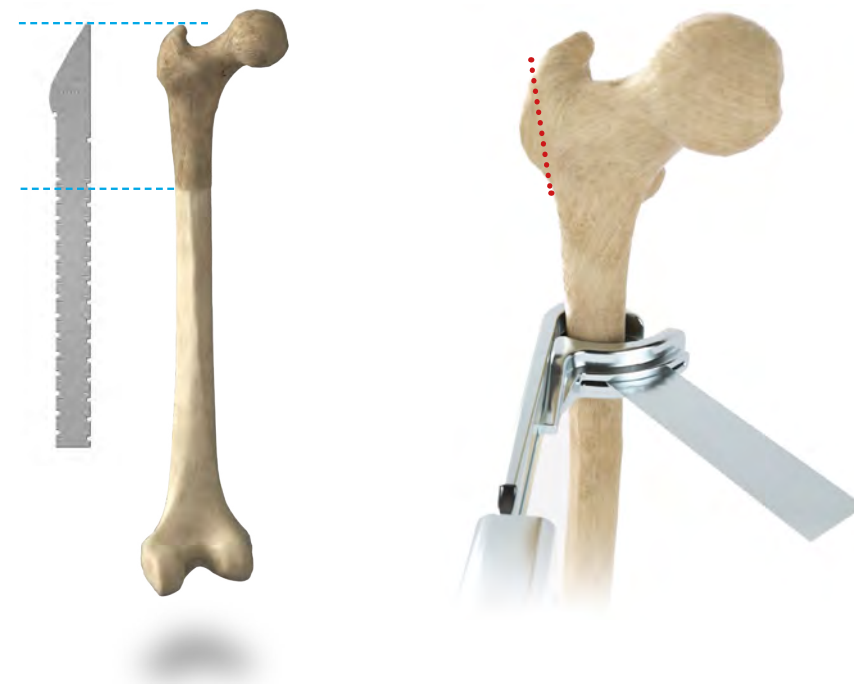


Implant Insertion

Step 1 - Templating & Resection

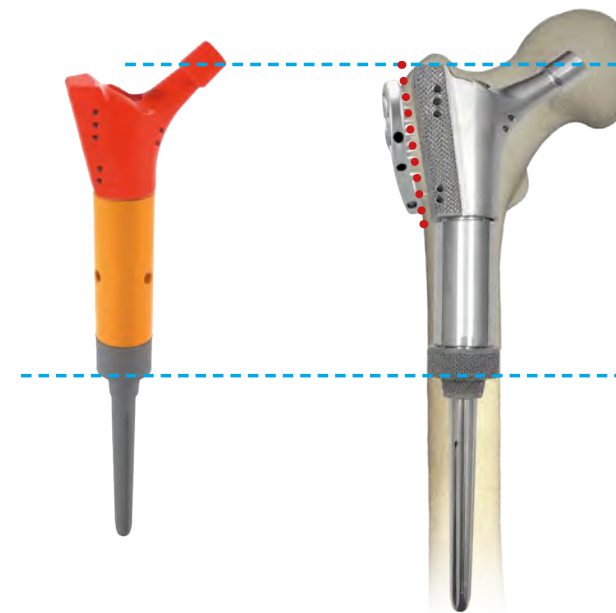


After achieving proximal femur exposure, the proximal femoral bone is resected at the pre-planned resection level. If the Pantheon system is being used in the oncological setting, excise the tumour and affected soft tissue at the pre-determined level prior to any bony resection, except in the case of an extraarticular resection. Using the femoral resection ruler provided, mark the proposed proximal femoral resection level with a horizontal line, which ensures a safe margin away from the original tumour or which allows for optimal bone contact for implantation.



When positioning the resection ruler, note the reference point is the tip of the greater trochanter. The resection ruler corresponds with the Pantheon system universal shafts available in 5 & 10mm increments.

Note: The minimum Pantheon resection height is 70mm. Please refer to page 20-21 for resection options.



Using the Adler Ortho bone clamp, perform the required resection. At this stage a trial implant can be made to match the resected bone if required.

Note: The bone clamp facilitates a perpendicular resection to the long axis of the femur. A face planer is also provided to clean up the resection if required.



- 2 x Body types (Porous & Smooth)
- 2 x Body heights - 50mm & 70mm
- 3 x Offsets - 32/38 & 45mm
- CCD 132 degrees
- Direct lateralisation
- Head options 22/28/32/36 & 40mm (S, M, L, X-long)



- Universal soft tissue attachment plate
- 2 x Plate heights - 50mm & 70mm
- Short / Medium and Long compression screws



- 9 x Universal shafts:
 - 35/50/65/80/95mm
 - 110/125-140/120mm ext
- Min resection 70mm - Unlimited resection

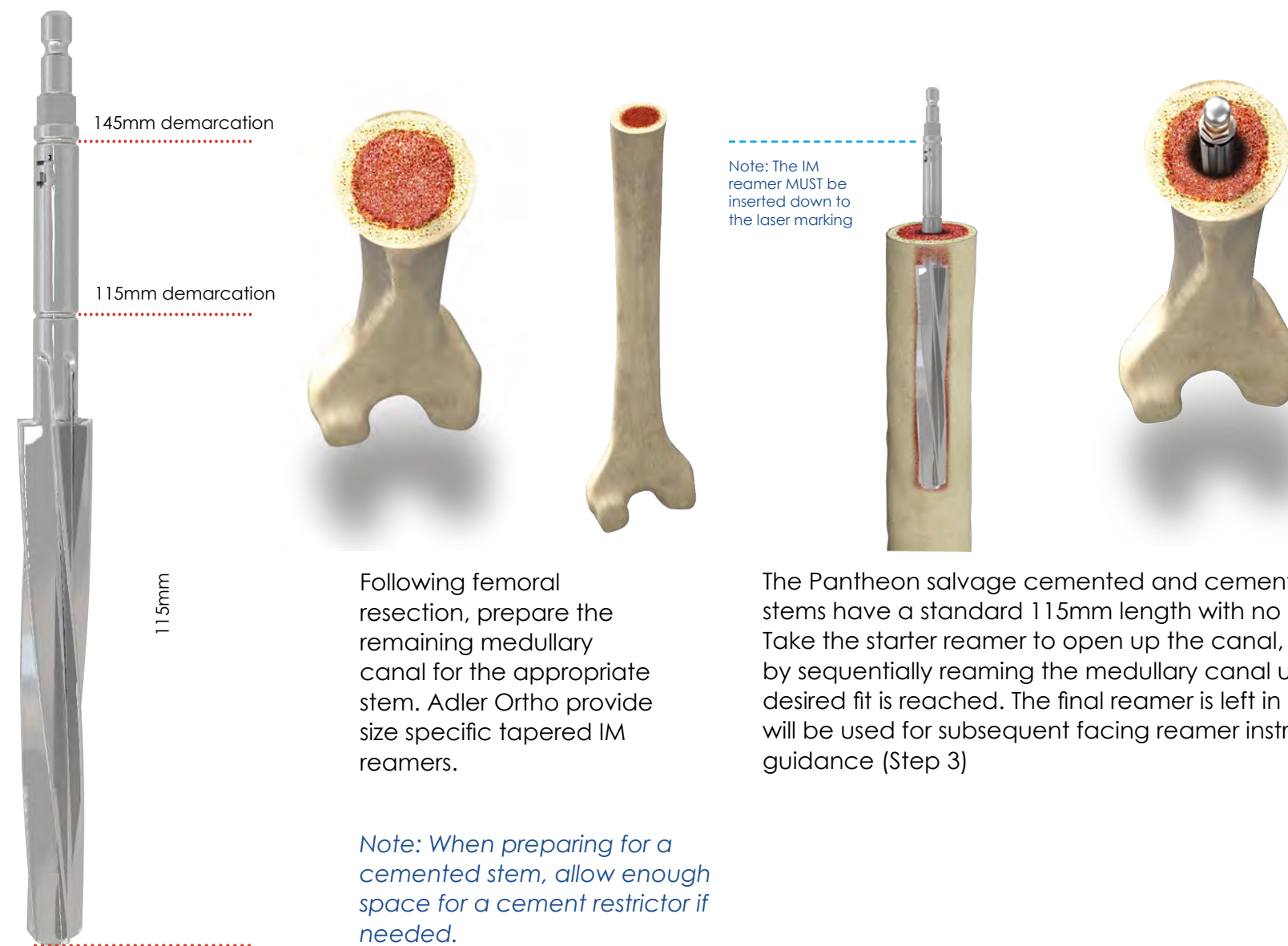


- Bridging collars (stem specific):
 - 26/30/36mm (outer dia.)
- 1 x fixed sleeve length - 15mm
- 1 x fixed collar height - 20mm



- 5 x Cemented stems (115mm in length):
 - 10/11/12/14 and 16mm
- 22 x Cementless stems (115 & 145mm in length):
 - 11/12/13/14/15/16mm
 - 17/18/20/22/24mm

Step 2 - Medullary Canal Preparation



Following femoral resection, prepare the remaining medullary canal for the appropriate stem. Adler Ortho provide size specific tapered IM reamers.

Note: When preparing for a cemented stem, allow enough space for a cement restrictor if needed.

The Pantheon salvage cemented and cementless stems have a standard 115mm length with no bow. Take the starter reamer to open up the canal, followed by sequentially reaming the medullary canal until the desired fit is reached. The final reamer is left in situ and will be used for subsequent facing reamer instrument guidance (Step 3)

Cemented Stem



When using the cemented stem option, an additional 2mm extra reaming is needed to allow for a circumferential cement mantle of 1mm either side of the stem. For example, a 16 mm stem will need an 18mm reamer.

PANTHEON BRIDGING COLLAR (Ti-6Al-4V)

Stem Type Cemented

Collar Diameter	Compatible with Stem Diameters					
Small	26mm	10mm	11mm	12mm	14mm	16mm
Medium	30mm		11mm	12mm	14mm	16mm
Large	36mm		11mm	12mm	14mm	16mm

Cementless Stem



When using a cementless stem, the reaming technique utilised will depend on a number of factors such as the patient age, bone quality, curvature of the remaining femur, etc. The final reamer size corresponds to the same size as the definitive stem. Each cementless stem has an additional 0.2mm of circumferential press-fit.

PANTHEON BRIDGING COLLAR (Ti-6Al-4V)

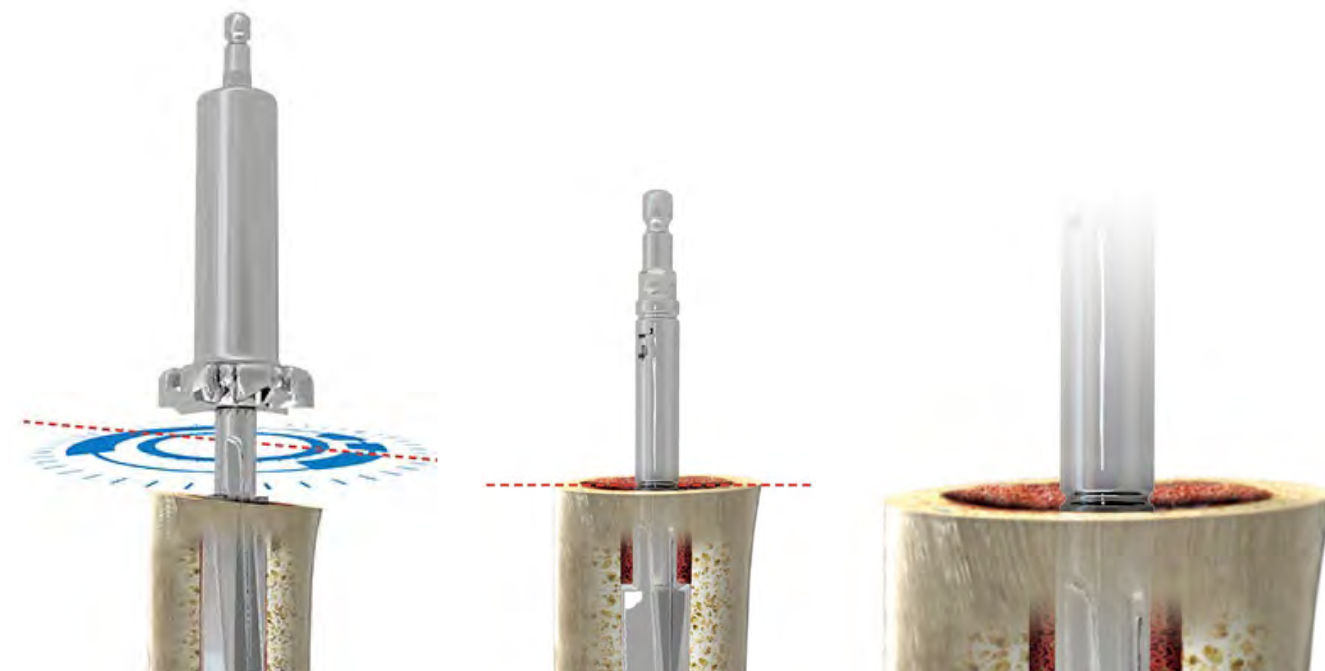
Stem Type Cementless

Collar Diameter	Compatible with stem diameters											
Small	26mm	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm	20mm		
Medium	30mm	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm	20mm	22mm	24mm
Large	36mm	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm	20mm	22mm	24mm

* Cementless 145mm straight tapered stems available on request.



Step 3a - Bridging Collar Preparation 'Facing Ream'



Once stem reaming is completed this provides stability for a perpendicular cut surface using the facing reamer. This allows the bridging collar to accurately seat.

The bridging collar is available in 3 sizes (26mm / 30mm / 36mm) to match the chosen stem.
For example Size 11mm stem = Size 11 Collar.

Note: The bridging collar reamer prepares the endosteal sleeve portion. The dimension of endosteal sleeve = The stem size, +2.4mm at bottom of sleeve and then the stem size +4.8mm at the widest point of sleeve. For example 16mm stem = 18.4mm at bottom of sleeve in dia. and 20.8mm at the top of the sleeve in dia.



Step 3b - Bridging Collar Preparation 'Endosteal Ream'

Collar 'Tips & Tricks'

Endosteal collar press-fit

- Too small**
 - Up size stem to be able to use larger collar
 - Consider wall cortical thickness can take larger stem
 - Consider lowering resection level
- Too large**
 - Down size stem to use smaller collar and cemented stem only
 - Consider lowering resection level
 - Consider Epitital collar (no endosteal sleeve)
- Good fit**
 - Good stem canal fit
 - Good endosteal press-fit on collar

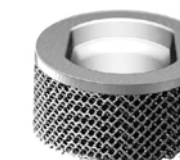
Effect of up-sizing collar on cortical bone

Collar/ Stem	Bone cortical wall thickness		
	d1	d2	d3
12mm	3mm	4.2mm	5.2mm
14mm	2mm	3.2mm	4.2mm
16mm	1mm	2.2mm	3.2mm

Once the appropriate sized facing reamer has been used, progressively ream the endosteal bone with sequential collar reamers until the appropriate stem/collar size is reached. Each bridging collar reamer corresponds to the intended stem that is to be implanted. Note: When using a cemented stem the collar preparation matches the stem and the reamer is two sizes above for a 1mm cement mantel.

Ensure the endosteal reamer is flush with the osteotomy to allow accurate seating of the definitive collar. A further check can be made using the available trials. If the trial collar sits more than 2mm proud of the resection line, then ream again with the last endosteal reamer.

Tip: In extreme osteopenic bone with thin cortical walls under 3mm, a prophylactic wire can be used to reduce the risk of bone fracture. Adler also provide the option to use a cylindrical collar with no internal endosteal sleeve portion.



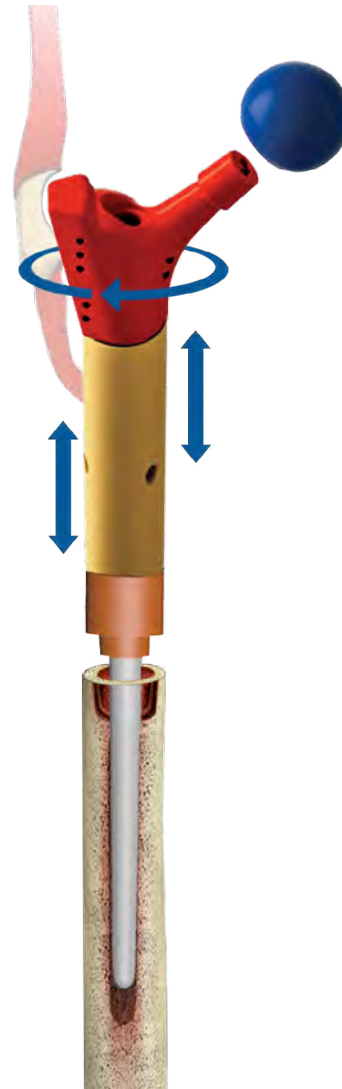
Step 4 - Trial Reduction

After the bridging collar preparation has been completed, the appropriate sized universal shaft and templated proximal trochanteric body are combined. These options should best restore the desired length and offset. Once the trial segments yield a satisfactory result, assemble the appropriate implant components.

Note: Femoral version is set when the hip is guided through a full range of motion. The laser markings/orientation on the femur is noted down for later.

Note: Distraction of the hip joint is assessed to confirm if a larger or smaller shaft segments are needed.

Note: Ensure the GT bone block is sitting as close to the proximal body as possible for favourable joint kinematics.



Note: For uncemented stems, the IM stem reamer remains in situ to form the trial ready for the appropriate universal shaft and templated proximal body.

Step 5 - Implant Assembly



1
Stem trunnion fits in lower recess of base plate. Impact collar on stem with tube.

2
Impact stem on shaft with impactor.

3
Impact body on shaft with impactor.

4
Once the proximal body construct has its desired version set, proceed to screw the locking bolt into shoulder of the prosthesis.

Note: The implant components use a morse-taper design for locking parts together. You would expect to see a 1mm gap between tapers.

Step 6/7 - Cementing Preparation and Implantation



Prepare the canal for cementing the stem. Place a cement restrictor 10mm distal to the length of the trial stem. A size specific canal pressuriser is supplied with each cemented stem. Fully insert pressuriser into the femoral canal ready for cementing through the channel.

Using a cement of choice, fill the canal whilst maintaining femoral canal pressure.

Remove pressuriser during the working phase of the cement curing, check surfaces and then place definitive implant in situ using hand pressure only.

As the stem starts to fully seat into the canal, before engagement of the bridging collar, ensure any excess cement that may extrude is cleared away and the appropriate rotation of prosthesis is set.



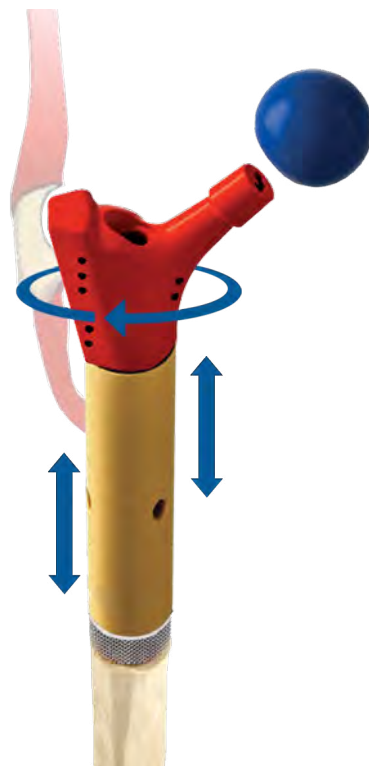
When Bridging Collar is 3mm / 4mm proud of the resection level, impact to fully seat.



Step 6/7 - Cementless Preparation and Implantation



Once the stem and collar are assembled, impact into the prepared medullary canal.



With collar and stem in place, a further trial reduction can be performed to evaluate version. Distraction of the hip joint will assess if a longer head is required or a change in shaft segment length.



Take the desired universal shaft and rotate and key the shaft onto the top of the stem. Once it seats, impact the tapers together.



Place the chosen proximal body onto the shaft and set the patient specific version.



Once the version is set, impact the tapers together. Proceed to then thread the correct L-50mm or L-70mm locking bolt into the shoulder of the proximal body and apply torque wrench.



PANTHEON[®]

Body Height (L)	Offset	
50mm		S-32mm
		M-38mm
		L-45mm

70mm		S-32mm
		M-38mm
		L-45mm



- Fixed collar height - 20mm
- Fixed sleeve length - 15mm

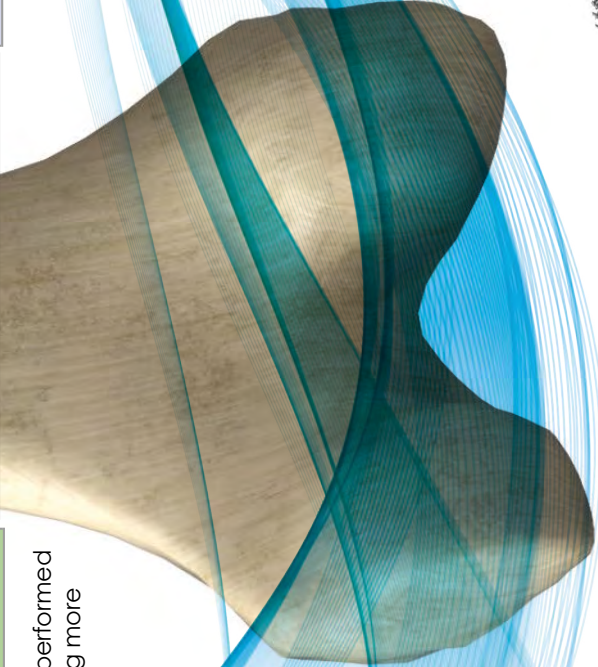
Resection inc 20mm Collar Height
70mm
90mm
105mm
120mm
125mm
135mm
140mm
150mm
155mm
165mm
170mm
180mm
185mm
195mm
200mm

Body Height	Shaft Combinations
50mm	0mm
70mm	0mm
50mm	35mm
50mm	50mm
70mm	35mm
50mm	65mm
70mm	50mm
50mm	80mm
70mm	65mm
50mm	95mm
70mm	80mm
50mm	110mm
70mm	95mm
50mm	125mm
70mm	110mm

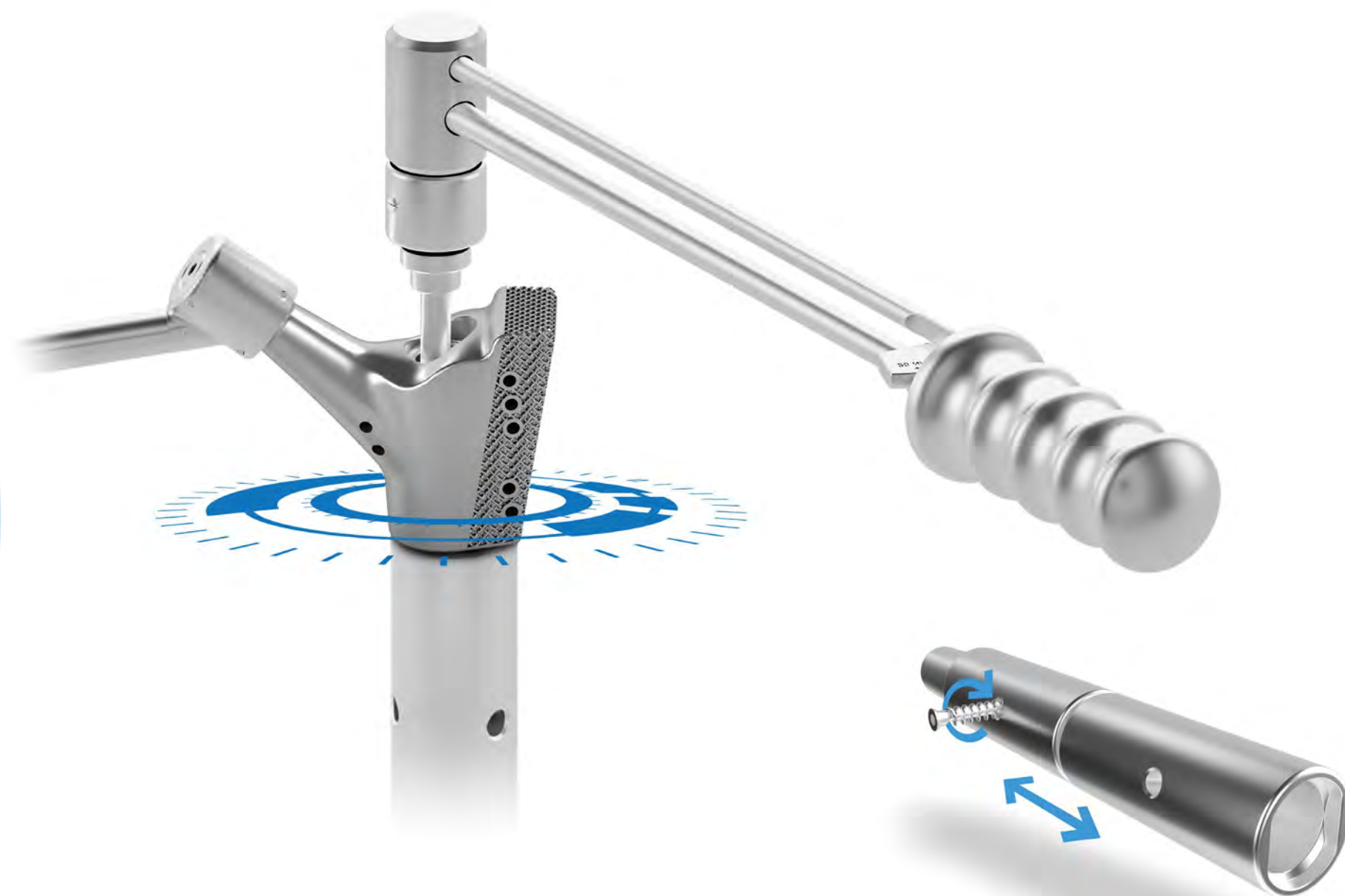
210mm
215mm
225mm
230mm
240mm
245mm
255mm
260mm
270mm
275mm
285mm
290mm
300mm
305mm
310mm
320mm
335mm

Further resections can be performed if needed by simply adding more shaft options together

50mm	140mm
70mm	125mm
50mm	120 + 35mm
70mm	140mm
50mm	120 + 50mm
70mm	120 + 35mm
50mm	120 + 65mm
70mm	120 + 50mm
50mm	120 + 80mm
70mm	120 + 65mm
50mm	120 + 95mm
70mm	120 + 80mm
50mm	120 + 110mm
70mm	120 + 95mm
50mm	120 + 120mm
70mm	120 + 110mm
70mm	120 + 125mm



Appendix I - Extraction



After the femoral head is impacted on to the proximal body, it is still possible to correct the femoral version if needed. To change the version when the stem is already implanted:

1. Thread the appropriate proximal body extraction screw (L-50mm height or L-70mm height) into the shoulder of prosthesis and apply torque to break tapers apart. The 5mm hex key should be used at this point
2. Correct the femoral version and re-impact body
3. Thread the correct L-50mm or L-70mm locking bolt into the shoulder of the proximal body and apply a torque wrench.

Note: Care should be taken to ensure no rotational force is transmitted to collar / bone junction during repositioning proximal body by using the neck trunnion holder.

If the shaft needs to be disassembled at any point, then use the 5mm hex worm screw at the shaft junction to force the two opposing tapers apart in a controlled manner.



THE MECHANISM OF INFECTION THE RACE TO THE SURFACE

In case of contamination of the implant surface, colonisation by pathogens results in the formation of a barrier called **Biofilm**.
Biofilm is an impervious polymeric matrix, able to make the bacterial colony resistant to antibiotic treatment and the patients immune system.

THE INFECTION MECHANISM FOLLOWS THREE STAGES IN QUICK SUCCESSION

Immediately after surgery	Few minutes after surgery	Few hours after surgery
Pathogens begin to adhere to the prosthetic surface	Pathogens start to multiply and irreversibly fix themselves to the implant	In the absence of a reaction to the organism, the bacterial colony starts biofilm production



DAC[®] HYDROGEL: THE BARRIER EFFECT

The application of **DAC[®]** disrupts the ability of pathogens to bind to the implant surface, inhibiting the initial stages of bacterial colonisation that would then result in Biofilm formation.

DAC[®] forms a hydrogel that acts as a temporary barrier providing an effective mechanism for prevention of bacterial infection.

THE DAC[®] HYDROGEL DEFENSIVE MECHANISM CAN BE ILLUSTRATED IN THREE STAGES:

Immediately before surgery	Immediately after surgery	Few days after surgery
The implant surface is evenly coated with DAC[®] hydrogel	Bacterial adhesion and colonisation of the implant surface is interrupted by the DAC[®] hydrogel layer and by the hydrophilic properties	Bacteria left on the implant surface or on the hydrogel are identified and attacked by the immune system

Implant Listing

PANTHEON PROXIMAL BODY - FLAT - L50mm		
REF	Description	Offset
0200210	SHORT	32mm
0200220	MEDIUM	38mm
0200230	LONG	45mm

PANTHEON PROXIMAL BODY - SMOOTH - L50mm		
REF	Description	Offset
0200310	SHORT	32mm
0200320	MEDIUM	38mm
0200330	LONG	45mm

PANTHEON PROXIMAL BODY - FLAT - L70mm		
REF	Description	Offset
0200215	SHORT	32mm
0200225	MEDIUM	38mm
0200235	LONG	45mm

PANTHEON PROXIMAL BODY - SMOOTH - L70mm		
REF	Description	Offset
0200315	SHORT	32mm
0200325	MEDIUM	38mm
0200335	LONG	45mm



PANTHEON SALVAGE PLATE WITH SPIKES - COMPRESSION SCREWS	
REF	Description
0200750	SHORT
0200760	MEDIUM
0200770	LONG

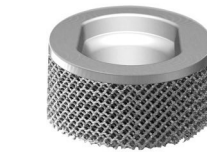
PANTHEON PROXIMAL BODY LOCKING SCREW	
REF	Description
0200090	PANTHEON PROXIMAL BODY LOCKING SCREW - L50
0200095	PANTHEON PROXIMAL BODY LOCKING SCREW - L70

PANTHEON SALVAGE PLATE WITH SPIKES	
REF	Description
0200710	PANTHEON SALVAGE PLATE WITH SPIKES - L50
0200715	PANTHEON SALVAGE PLATE WITH SPIKES - L70



PANTHEON BRIDGING COLLAR		
REF	Description	Size
0201000	Ø 26 FOR STEM Ø 10	26mm
0201010	Ø 26 FOR STEM Ø 11	26mm
0201110	Ø 30 FOR STEM Ø 11	30mm
0201210	Ø 36 FOR STEM Ø 11	36mm
0201020	Ø 26 FOR STEM Ø 12	26mm
0201120	Ø 30 FOR STEM Ø 12	30mm
0201220	Ø 36 FOR STEM Ø 12	36mm
0201030	Ø 26 FOR STEM Ø 13	26mm
0201130	Ø 30 FOR STEM Ø 13	30mm
0201230	Ø 36 FOR STEM Ø 13	36mm
0201040	Ø 26 FOR STEM Ø 14	26mm
0201140	Ø 30 FOR STEM Ø 14	30mm
0201240	Ø 36 FOR STEM Ø 14	36mm
0201050	Ø 26 FOR STEM Ø 15	26mm
0201150	Ø 30 FOR STEM Ø 15	30mm
0201250	Ø 36 FOR STEM Ø 15	36mm
0201060	Ø 26 FOR STEM Ø 16	26mm
0201160	Ø 30 FOR STEM Ø 16	30mm
0201260	Ø 36 FOR STEM Ø 16	36mm

PANTHEON BRIDGING COLLAR		
REF	Description	Size
0201070	Ø 26 FOR STEM Ø 17	26mm
0201170	Ø 30 FOR STEM Ø 17	30mm
0201270	Ø 36 FOR STEM Ø 17	36mm
0201080	Ø 26 FOR STEM Ø 18	26mm
0201180	Ø 30 FOR STEM Ø 18	30mm
0201280	Ø 36 FOR STEM Ø 18	36mm
0201090	Ø 26 FOR STEM Ø 20	26mm
0201190	Ø 30 FOR STEM Ø 20	30mm
0201290	Ø 36 FOR STEM Ø 20	36mm
0201193	Ø 30 FOR STEM Ø 22	30mm
0201293	Ø 36 FOR STEM Ø 22	36mm
0201196	Ø 30 FOR STEM Ø 24	30mm
0201296	Ø 36 FOR STEM Ø 24	36mm



PANTHEON CYLINDRICAL BRIDGING COLLAR		
REF	Description	Size
0205000	Ø 26 FOR STEMS Ø 10-11	26mm
0205100	Ø 30 FOR STEMS Ø 10-11	30mm
0205200	Ø 36 FOR STEMS Ø 10-11	36mm
0205010	Ø 26 FOR STEMS Ø 12-13-14-15-16	26mm
0205110	Ø 30 FOR STEMS Ø 12-13-14-15-16	30mm
0205210	Ø 36 FOR STEMS Ø 12-13-14-15-16	36mm
0205020	Ø 26 FOR STEMS Ø 17-18-19-20	26mm
0205120	Ø 30 FOR STEMS Ø 17-18-19-20	30mm
0205220	Ø 36 FOR STEMS Ø 17-18-19-20	36mm
0205130	Ø 30 FOR STEMS Ø 22-24	30mm
0205230	Ø 36 FOR STEMS Ø 22-24	36mm

*PANTHEON CYLINDRICAL BRIDGING COLLAR HA COATED
AVAILABLE ON REQUEST

*PANTHEON BRIDGING COLLAR HA COATED
AVAILABLE ON REQUEST

Implant Listing



PANTHEON SHAFT		
REF	Description	Size
0200910	L35	35mm
0200920	L50	50mm
0200930	L65	65mm
0200940	L80	80mm
0200950	L95	95mm
0200960	L110	110mm
0200965	PANTHEON EXTENSION SHAFT L120	120mm
0200970	L125	125mm
0200980	L140	140mm



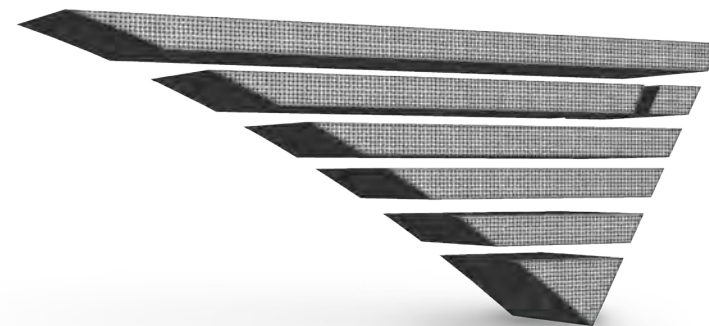
PANTHEON SALVAGE CEMENTED STEM - L115		
REF	Description	Size
0280510	L115 Ø 10	10mm
0280511	L115 Ø 11	11mm
0280512	L115 Ø 12	12mm
0280514	L115 Ø 14	14mm
0280516	L115 Ø 16	16mm



PANTHEON SALVAGE CEMENTLESS STEM - L115		
REF	Description	Size
0200511	L115 Ø 11	11mm
0200512	L115 Ø 12	12mm
0200513	L115 Ø 13	13mm
0200514	L115 Ø 14	14mm
0200515	L115 Ø 15	15mm
0200516	L115 Ø 16	16mm
0200517	L115 Ø 17	17mm
0200518	L115 Ø 18	18mm
0200520	L115 Ø 20	20mm
0200522	L115 Ø 22	22mm
0200524	L115 Ø 24	24mm

PANTHEON SALVAGE CEMENTLESS STEM - L145		
REF	Description	Size
0201511	L145 Ø 11	11mm
0201512	L145 Ø 12	12mm
0201513	L145 Ø 13	13mm
0201514	L145 Ø 14	14mm
0201515	L145 Ø 15	15mm
0201516	L145 Ø 16	16mm
0201517	L145 Ø 17	17mm
0201518	L145 Ø 18	18mm
0201520	L145 Ø 20	20mm
0201522	L145 Ø 22	22mm
0201524	L145 Ø 24	24mm

*PANTHEON SALVAGE CEMENTLESS STEM HA COATED
AVAILABLE ON REQUEST



Powder Manufacturing Leader



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