jri
ORTHOPAEDICS

Furlong® H-A.C.

Primary & Revision Stem

OPERATIVE TECHNIQUE

MADE IN BRITAIN[1]

Contents

Pre-Operative Planning

Pre-operative planning for the Furlong® H-A.C. stem is available on all commonly used 2D software and in acetate.

Note: Insufficient bone stock or bone quality to support the prosthesis or to provide adequate fixation is a contraindication.

To ensure accurate templating, Anterior / Posterior and Lateral radiographs will be required with neutral leg alignment and stable pelvic tilt to help determine the implant size and positioning required to restore the patient's natural anatomy and hip biomechanics.

Be sure that the cup is well centred within the acetabulum and at an abduction angle of approximately 45°, taking into account the subchondral bone and selecting a size that is located between the superior rim and the tear drop. After templating the acetabulum for size, mark the centre of rotation. Care should also be taken intra-operatively to restore anteversion, taking into consideration alignment with the tranverse ligament[2].

The Furlong® H-A.C. stem is only indicated for use with JRI Orthopaedics Ltd. femoral heads and acetabular cup systems. These include:

- Furlong® CSF Acetabular Cup with UHMWPE liner
- Furlong® CSF Plus Acetabular Cup with XLPE liner
- Furlong® CSF Plus Acetabular Cup with BIOLOX®delta ceramic liner
- Furlong® CSF Plus Multi-hole Revision Cup
- ACE® Acetabular Cup System
- BIOLOX® *delta* Ceramic Femoral Head
- JRI CoCr Femoral Heads
- Revision Femoral Head Delta Ceramic

Femoral Neck Osteotomy

Figure 1

After dislocation, resect the femoral neck. The femoral neck resection guide can be used to aid alignment and inclination of the cut (Figure 1). The level of the femoral neck cut should be performed in conjunction with the pre-operative planning. The line of the femoral resection represents 40° from the long axis of the femur.

Two neck shaft angles stems are available, 140° and 133°. Align the resection guide with the femoral axis and determine which neck shaft angle matches the patient's anatomy.

Femoral Canal Preparation

Figure 2

Figure 3

The box chisel is placed as laterally and slightly posterior as possible on the medial wall of the greater trochanter (Figure 2). An initial wedge of cancellous bone is resected using the box chisel while keeping it in line with the femur.

The 4mm - 8mm intramedullary reamer is used to determine the line of the medullary canal (Figure 3).

Opening up the canal with a blunt reamer is a safer option.

Broaching the Femur

Figure 4

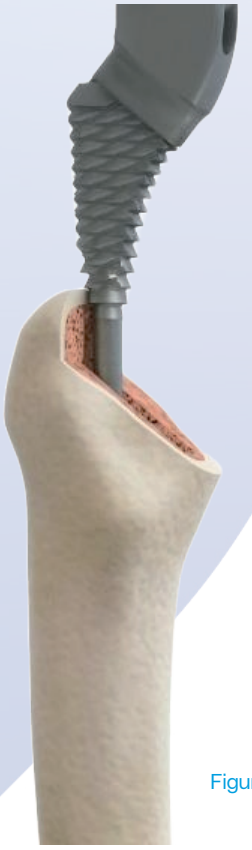


Figure 5

The femoral canal is alternatively reamed and rasped, moving up through the available sizes until the desired implant size is reached (Figure 4). To reduce the risk of damage to the calcar, care should be taken to cautiously hammer the rasp in and out. To facilitate proper implant sizing, it is important to keep the rasp handle in as laterally as possible within the greater trochanter (Figure 5).

The handle of the rasp can be used as a 'torque wrench' to ensure rasp stabilty at the final size. Move the handle anteriorly and posteriorly to check anterior/posterior stability. When movement only occurs between the handle and the rasp, not between the rasp and bone, the rasp is correctly sized.

The proximal etched line indicates the 'stop' point of the rasp. This line should be visible above the resection line medially. NB. if pre-operative planning indicates an acute neck resection angle, it is possible the entire line might not be visible.

It is a good idea to remove the rasp slightly medially to reduce any risk of damage to the trochanter.

Calcar Reaming and Lateral Fin Cutting

Figure 6

Figure 7

Figure 8

When the fit of the rasp/trial is considered satisfactory, the handle is removed leaving the rasp/trial in the femur, as illustrated (Figure 6).

The calcar cutter is fitted to the T-handle and used to trim the calcar at the femoral neck osteotomy (Figure 7).

The fin cutter is orientated with the teeth facing the greater trochanter and is tapped home into the slot on the supero-lateral aspect of the rasp/trial (Figure 8).

Femoral Head Trialling

Figure 9

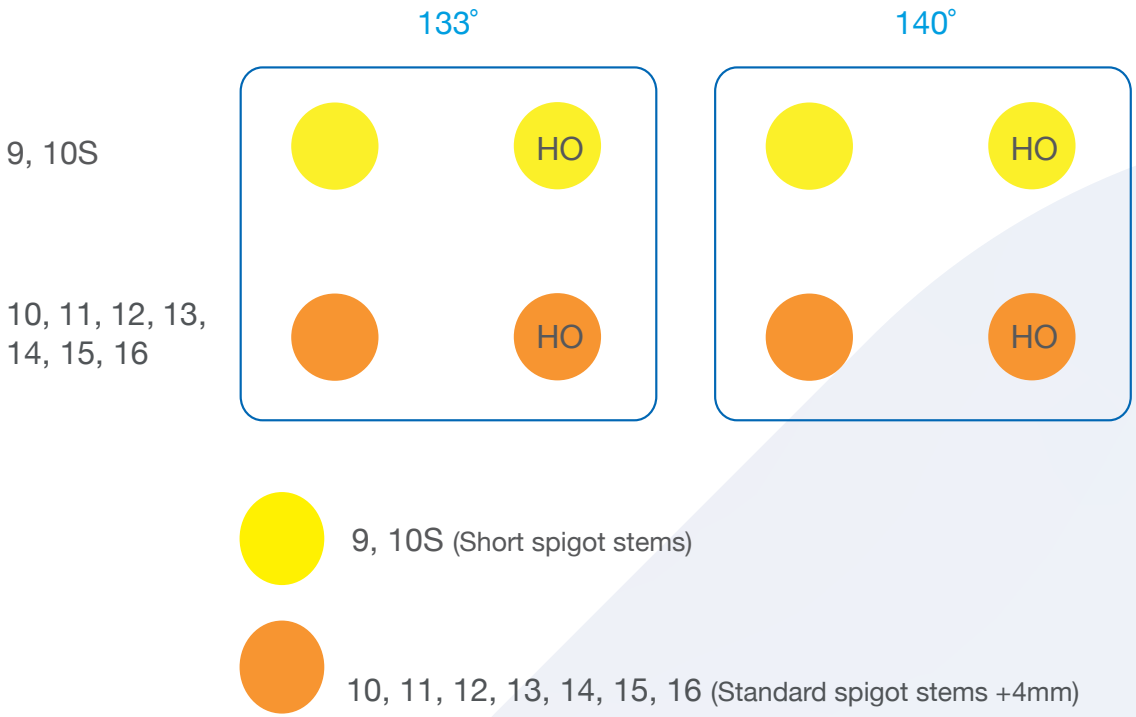
Attach a trial neck to the broach and the appropriate trial head as templated during pre-operative planning (Figure 9). A choice of four neck lengths are available: short (-4mm), medium (0mm), long (+4mm) and X-long (+8mm). It is vital to select the head diameter size that matches the chosen acetabular cup/liner I.D. size. Reduce the hip and check for stability and range of motion.

Important: The size 9 stem has a shorter spigot than the size 10 and above stems (4mm less), therefore there are two sets of trial neck adaptors.

Yellow adaptors are for short spigot stems, stem size 9 in both 133 and 140 and 10S in 140.
Orange adaptors are for the long spigot stems, size 10 and above.

Trial necks are available in clearly labelled options overleaf (Figure 10):

- 133° standard offset
- 133° high offset
- 140° standard offset
- 140° high offset



HO = High offset (lateral offset +5mm)

Furlong® H-A.C 9, and 10S stems have a short spigot

Furlong® H-A.C 10 to 16 stems have a spigot +4mm longer

Figure 10

Femoral Stem Insertion

Figure 11

Figure 12

The trial implants are removed, and the femoral canal is reamed 1mm or 2mm larger than the definitive stem (Figure 11). This is to create circumferential clearance around the distal stem. The femoral canal is cleared of any loose debris. The definitive femoral stem is implanted using the stem impactor, which locates into the hexagonal slot on the prosthesis allowing control over the rotation of the stem during implantation (Figure 12). As the stem is impacted, a change of tone can be used as a guide to determine the final position of the stem. The collar might not rest flush on the calcar when the note changes to a harder tone. In this case, further impaction to attempt to seat the collar on the calcar is not necessary.

Due to the viscoelastic nature of particularly young male bone, it is good to 'rest' from impacting for a short period before final impaction.

Femoral Head Impaction

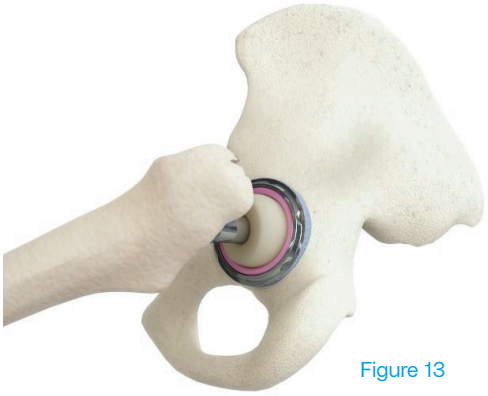


Figure 13

Figure 14

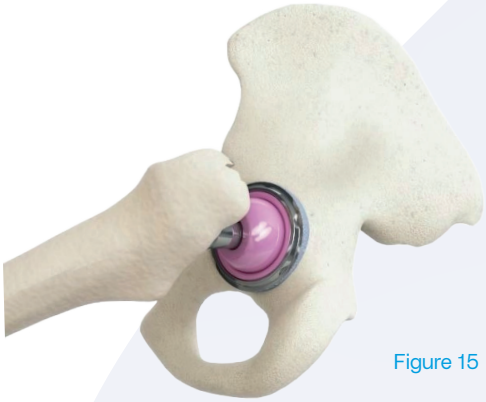


Figure 15

Once the stem is fully impacted, the spigot protector is removed. A final trial reduction is performed to confirm joint stability and range of motion (Figure 13).

The definitive femoral head with the desired neck length is placed carefully onto the clean spigot of the femoral stem using a twisting motion. Using a light tap, impact the definitive femoral head using the head impactor, ensuring the surface of the head is not scratched or damaged in any way (Figure 14).

The hip is reduced and range of motion, joint stability and leg length are re-checked prior to wound closure (Figure 15).

Revision Stems

Figure 16

Figure 17

Revision hip surgery presents the surgeon with a plethora of potential problems, therefore, thorough pre-operative planning is essential for ensuring a successful outcome. Identifying the type and sizes of the primary components from patient records facilitates the provision of matched replacement sizes, if leaving one of the components in-situ is required. Scrutiny of x-rays will be required by the surgeon to complement this, and we provide templates of primary and revision implants to gauge head sizes, femoral stem widths, and acetabular component diameters. Templating can then indicate the various sizes of revision implants that can be used.

During revision surgery or complex primary procedures, it may be necessary to use a longer stemmed prosthesis to bypass deficient bone.

Furlong® H-A.C. Femoral Revision stems retain the Furlong® shape in the proximal portion but the distal stem is available in 200mm and 250mm lengths (Figure 16 and 17).

IMPORTANT: Adjunctive proximal fixation/support is required. Where there is loss of proximal bone stock, or poor proximal bone quality, bone grafting or other adjunctive proximal fixation/support is advised for implant stability. It is important that the prosthesis is not distally fixed without proximal support.

Femoral Canal Preparation

Figure 18

Figure 19

Care should be taken to ensure all remnants of previous implants and bone cement are removed from the femoral canal (Figure 18). The pre-operative planning should indicate the necessary length of femoral prosthesis to be used, 200mm or 250mm.

The intramedullary reamers and the corresponding rasp/trials are used to prepare the femoral canal (Figure 19). Longer reamers are used to ream the femoral canal down past the depth of the femoral stem, either 200mm or 250mm. This measure is taken from the anticipated final position of the shoulder of the proximal body.

Using the straight femoral reamers, ream the femoral canal to a depth of approximately 5cm past the most distal femoral defect. Increase the diameter of the femoral reamers until cortical contact is achieved. Take a measure from the greater trochanter to determine whether the 200mm or 250mm length stem should be used.

Broaching the Femur

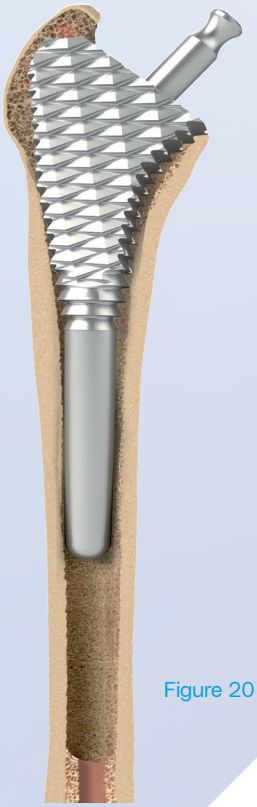


Figure 20

To reduce the risk of damage to the calcar, care should be taken to cautiously hammer the rasp in and out (Figure 20). To facilitate proper implant sizing, it is important to keep the rasp handle in a laterally position as possible within the greater trochanter.

When sizing the metaphasis, it is important to achieve proximal stability so as not to rely on distal loading. Continue rasping and reaming until secure proximal stability is achieved.

Femoral Trialling

Figure 21

Select the appropriate size trial stem and impact it into position (Figure 21).

The trial stem has the same dimensions as the definitive implant without the H-A.C. coating.

The trial stems have a parallel-sided spigot and therefore require parallel-sided trial heads. A choice of six neck lengths are available: S , M, L, XL, XL+4, and XL+8.

Perform a trial reduction and check for stability, range of movement, and leg length.

High offset options are available. If the offset needs to be increased, then the standard trial stem needs to be removed and replaced with the high offset trial stem.

Removal of the trial stem is facilitated by an extraction hole in the parallel-sided spigot.

Femoral Stem Insertion

Figure 22

The definitive femoral stem is implanted using the stem impactor, which locates into the hexagonal slot on the prosthesis allowing control over the rotation of the stem during implantation. Once the stem is fully impacted, the spigot protector is removed.

A further trial reduction is carried out using the brown implant trial head. The diameter of the implant trial head must be the same as the internal diameter of the acetabular liner. A choice of six neck lengths are available.

The definitive femoral head with the desired neck length is placed carefully onto the clean spigot of the femoral stem. The head is tapped gently onto the spigot, ensuring the surface of the head is not scratched or damaged in any way (Figure 22).

The hip is reduced. Drainage is established.

Furlong® H-A.C. Dimension Chart

133° Neck Shaft Angle Standard Offset — ***Lateral Offset***

Stem Size	Stem Length	S	M	L	XL
9	140	34	37	40	43
10, 11, 12 13 14 16	152 159 165 166	38	41	44	47

133° Neck Shaft Angle High Offset Neck (+5mm) — ***Lateral Offset***

Stem Size	Stem Length	S	M	L	XL
9	140	39	42	45	48
10, 11, 12 13 14 16	152 159 165 166	43	46	50	52

140° Neck Shaft Angle Standard Offset — ***Lateral Offset***

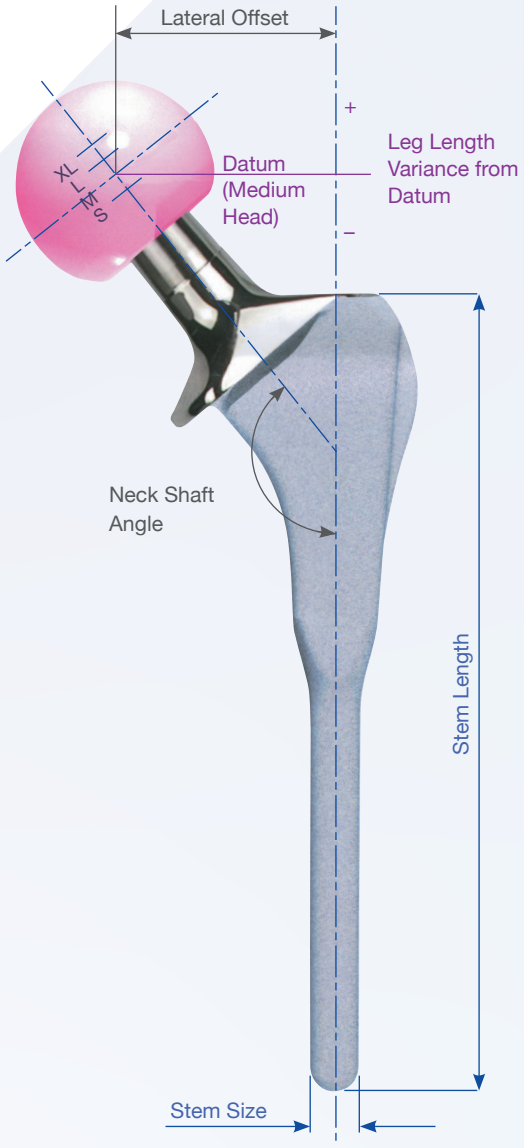
Stem Size	Stem Length	S	M	L	XL
9	140	30	32	35	37
10 Short Spigot	152	31	33	36	39
10, 11, 12 13 14 16	152 159 165 166	33	36	39	41

140° Neck Shaft Angle High Offset Neck (+5mm) — ***Lateral Offset***

Stem Size	Stem Length	S	M	L	XL
9	140	35	37	40	42
10 Short Spigot	152	36	38	41	44
10, 11, 12 13 14 16	152 159 165 166	38	41	44	46

Variance from Medium Head
Neck Length (in mm)
Leg Length (in mm)

Neck Shaft Angle	Short (-4)	Medium (0)	Long (+4)	XL (+8)	XL +4 (+12)	XL +8 (+16)
133°	-2.8	0	2.8	5.6	8.4	11.8
140°	-3.1	0	3.1	6.2	9.3	12.4



All dimensions are in mm.
All 12/14 taper heads available in the JRI Orthopaedics portfolio are compatible with this stem.

Furlong® H-A.C. Implant Range

Furlong® H-A.C. Supravit® Coated 133° Neck Angle Femoral Stem

133° Neck Angle Standard Stem
Titanium Alloy with Supravit® Coating

Description	Product no.
09mm	81-09-30
10mm	81-10-30
11mm	81-11-30
12mm	81-12-30
13mm	81-13-30
14mm	81-14-30
16mm	81-16-30

133°Neck Angle Standard Stem, High Offset (+5mm)
Titanium Alloy with Supravit® Coating

09mm	81-09-35
10mm	81-10-35
11mm	81-11-35
12mm	81-12-35
13mm	81-13-35
14mm	81-14-35
16mm	81-16-35

140° neck angle standard stem
Titanium Alloy with Supravit® Coating

Description	Product no.
09mm	81-09-08
10mm (Short Spigot)	81-10-08
10mm	81-10-12
11mm	81-11-12
12mm	81-12-12
13mm	81-13-12
14mm	81-14-12
16mm	81-16-12

140° NECK ANGLE STANDARD STEM, High Offset (+5mm)
Titanium Alloy with Supravit® Coating

09mm	81-09-05
10mm (Short Spigot)	81-10-05
10mm	81-10-15
11mm	81-11-15
12mm	81-12-15
13mm	81-13-15
14mm	81-14-15
16mm	81-16-15

Furlong® H-A.C. Supravit® Coated 140° Neck Angle Femoral Stem

Furlong® H-A.C.
Revision Stem Range

Part Number	Description
83-10-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 10mm x 200mm
83-10-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 10mm x 200mm
83-10-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 10mm x 250mm
83-10-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 10mm x 250mm
83-11-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 11mm x 200mm
83-11-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 11mm x 200mm
83-11-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 11mm x 250mm
83-11-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 11mm x 250mm
83-12-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 12mm x 200mm
83-12-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 12mm x 200mm
83-12-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 12mm x 250mm
83-12-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 12mm x 250mm
83-13-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 13mm x 200mm
83-13-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 13mm x 200mm
83-14-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 14mm x 200mm
83-14-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 14mm x 200mm
83-14-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 14mm x 250mm
83-14-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 14mm x 250mm
83-16-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 16mm x 200mm
83-16-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 16mm x 200mm
83-16-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 16mm x 250mm
83-16-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 16mm x 250mm
83-18-20	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 18mm x 200mm
83-18-21	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 18mm x 200mm
83-18-25	H-A.C. Femoral Stem - 140° CCD Angle - Revision, 18mm x 250mm
83-18-26	H-A.C. Femoral Stem - 140° CCD Angle - Revision Offset, 18mm x 250mm

JRI CoCr Femoral Heads 12/14 Taper

Head-neck length / Head size (mm)	28	32	36
Short -4	47-28-10	47-32-10	47-36-10
Medium 0	47-28-20	47-32-20	47-36-20
Long +4	47-28-30	47-32-30	47-36-30
X Long +8	47-28-40	47-32-40	47-36-40

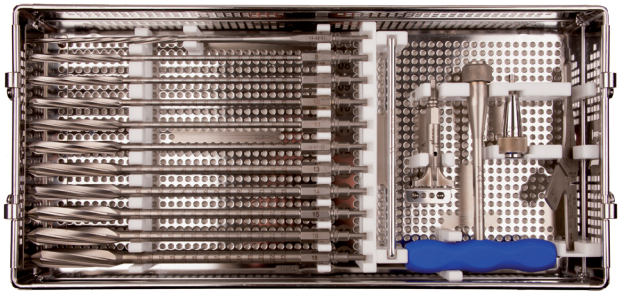
BIOLOX®*delta* Ceramic Femoral Heads 12/14 Taper

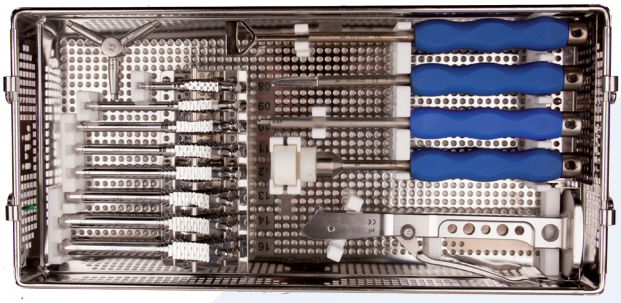
Head-neck length / Head size (mm)	28	32	36	40
Short -4	192-28-10c	192-32-10c	192-36-10c	192-40-10c
Medium 0	192-28-20c	192-32-20c	192-36-20c	192-40-20c
Long +4	192-28-30c	192-32-30c	192-36-30c	192-40-30c
X Long +8			192-36-40c	192-40-40c

Revision Femoral Head Delta Ceramic

Head-neck length / Head size (mm)	28	32	36	40
Short	120-28-10C	120-32-10C	120-36-10C	120-40-10C
Medium	120-28-20C	120-32-20C	120-36-20C	120-40-20C
Long	120-28-30C	120-32-30C	120-36-30C	120-40-30C
X Long	120-28-40C	120-32-40C	120-36-40C	120-40-40C

Furlong® H-A.C. Instrumentation





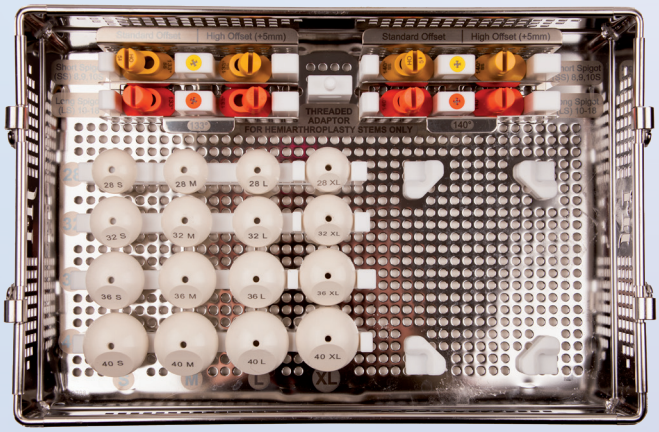
Instrumentation for Furlong® H-A.C Femoral Stem Tray One

Part Number	Description
700-00-16	Furlong® H-A.C. Femoral Stem Tray One
10-00-51	T-Handle - 12mm A/F Hex
10-00-64	Jacobs Adaptor - Cannulated
10-08-28	Tommy Bar - 8mm Dia X 200mm Long
14-48-61	Helical Femoral Reamer 12mm A/F Hex - 4-8mm
14-61-08	IM Femoral Reamer - 08mm Dia 60°
14-61-09	IM Femoral Reamer - 09mm Dia 60°
14-61-10	IM Femoral Reamer - 10mm Dia 60°
14-61-11	IM Femoral Reamer - 11mm Dia 60°
14-61-12	IM Femoral Reamer - 12mm Dia 60°
14-61-013	IM Femoral Reamer - 13mm Dia 60°
14-61-14	IM Femoral Reamer - 14mm Dia 60°
14-61-15	IM Femoral Reamer - 15mm Dia 60°
14-61-16	IM Femoral Reamer - 16mm Dia 60°
14-61-18	IM Femoral Reamer - 18mm Dia 60°
64-00-21	Head Resection Guide - Furlong H-A.C Stems,Short, 140°
81-00-46	H.A-C. Instrumentation Femoral Tray 1
90-00-23	Calcar Cutter - Bi-Directional

Instrumentation for Furlong® H-A.C Femoral Stem Tray Two

Part Number	Description
700-00-17	Furlong® H-A.C. Femoral Stem Tray Two
10-00-46	Head Impactor Cushion
10-99-38	Spare Impactor Heads
10-99-47	Femoral Head Impactor
200-02-88	Rasp Handle - Inline
50-04-08	Allen Multi-key - (Large) 3.5mm, 4mm & 6mm A/F Hex
50-99-34	Stem Impactor - 6mm A/F Hex
50-99-45	Box Chisel - Straight
70-11-08	Furlong HAC Rasp - 8mm
70-11-09	Furlong HAC Rasp - 9mm
70-11-10	Furlong HAC Rasp - 10mm
70-11-11	Furlong HAC Rasp - 11mm
70-11-12	Furlong HAC Rasp - 12mm
70-11-13	Furlong HAC Rasp - 13mm
70-11-14	Furlong HAC Rasp - 14mm
70-11-16	Furlong HAC Rasp - 16mm
81-00-47	H.A-C. Instrumentation Femoral Tray 2
90-99-02	Fin Cutter

Trial Head Instrument Tray



Instrumentation for Furlong® H-A.C. Trial Head

Part Number	Description
700-00-21	Furlong® Trial Head Tray Contents
70-00-00	Tray for Trial Head Instruments
70-10-01	Rasp Adaptor - Short Spigot 133° Std offset
70-10-02	Rasp Adaptor - Short Spigot 133° 5mm offset
70-10-03	Rasp Adaptor - Std Spigot 133° Std offset
70-10-04	Rasp Adaptor - Std Spigot 133° 5mm offset
70-10-05	Rasp Adaptor - Short Spigot 140° Std offset
70-10-06	Rasp Adaptor - Short Spigot 140° 5mm offset
70-10-07	Rasp Adaptor - Std Spigot 140° Std offset
70-10-08	Rasp Adaptor - Std Spigot 140° 5mm offset
70-28-10	Trial Head - 28mm Short Neck
70-28-20	Trial Head - 28mm Medium Neck
70-28-30	Trial Head - 28mm Long Neck
70-28-40	Trial Head - 28mm Extra Long Neck
70-32-10	Trial Head - 32mm Short Neck
70-32-20	Trial Head - 32mm Medium Neck
70-32-30	Trial Head - 32mm Long Neck
70-32-40	Trial Head - 32mm Extra Long Neck

Instrumentation for Furlong® H-A.C. Trial Head

Part Number	Description
70-36-10	Trial Head - 36mm Short Neck
70-36-20	Trial Head - 36mm Medium Neck
70-36-30	Trial Head - 36mm Long Neck
70-36-40	Trial Head - 36mm Extra Long Neck
70-40-10	Trial Head - 40mm Short Neck
70-40-20	Trial Head - 40mm Medium Neck
70-40-30	Trial Head - 40mm Long Neck
70-40-40	Trial Head - 40mm Extra Long Neck

References

[1]The Furlong® H-A.C. stem is made in Britain. Other components and services within this document which are not sourced in Britain are: BIOLOX®*delta* ceramic components.

[2]D. Beveland et al. The transverse acetabular ligament: an aid to orientation of the acetabular component during primary total hip replacement. J Bone J Surgery [Br] 2006; 88-B:883-6

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