TaperFit™

Cemented Total Hip Replacement

Surgical technique

Corin

TaperFit™

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Cemented total hip replacement

TaperFit™

Product overview

TaperFit is a double-tapered, polished, collarless stem, based on biomechanical principles proven over 20 years of clinical use[1].

The design takes advantage of the 'cement creep' phenomenon. The implant is decoupled from the cement and becomes progressively more stable and secure, wedging within the cement mantle as the stem subsides. Thus the cement-bone interface is protected.

One of the most important factors in successful total hip replacement is ensuring the central placement of the stem within the cement mantle. Misalignment of the prosthesis in the cement mantle has been shown to correlate with early loosening and failure of the prosthesis[2].

The TaperFit femoral prosthesis has been designed with an extended lateral shoulder and superior location recesses, which accommodate the smooth bollards of the dedicated introducer. This introducer allows force to be applied directly down the axis of the stem during insertion, giving precise rotational control.

The lateral shoulder of the TaperFit stem is specifically designed to improve rotational stability and increase proximal fill. The square shoulder is also designed to enhance the cement pressurisation in the trochanteric region of the upper femur. The broad proximal section is double-tapered to a slim distal tip. This design enables two offsets to be achieved within a given range of stem sizes. The sizing of the TaperFit implant is designed to match differing patient anatomies with a concise product range.

The risk of metallic abrasion at the cement interface (which can result from micromotion) has been drastically reduced[3], as the TaperFit stem has a highly polished surface. Implant stability is greatly enhanced by the effect of the double taper which permits controlled distal migration. The forces in the proximal femur are therefore at equilibrium, transmitting the physiological loads through radial pressurisation. The stem centraliser is manufactured from polymethyl-methacrylate (PMMA). This device centralises the distal tip of the stem and re-polymerises with the cement mantle during insertion.

The TaperFit stem is manufactured from high strength, high nitrogen stainless steel and is available in four sizes with two offset configurations: 38mm and 45mm. There is also a CDH stem available with 36mm offset.

Each implant has a dedicated over-sized broach which produces an optimum cement mantle. A trial reduction can be performed with the broach *in situ*. Implant depth may be accurately measured by assessing the position of one of three holes in relation to the resected femoral neck. Corresponding marks on the stem ensure the position is accurately replicated once the definitive femoral component is introduced.

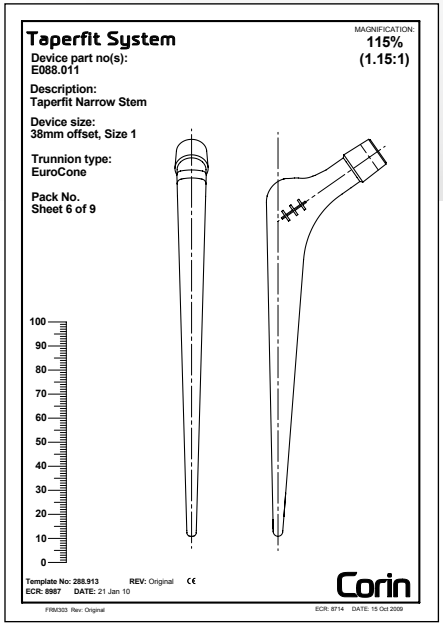
The TaperFit modular trunnion is compatible with a comprehensive range of Corin modular heads in cobalt chrome and BIOLOX *delta* ceramic.

Fracture management solutions are available with the use of Bipolar and/or hemiarthroplasty heads.

TaperFit also offers compatibility with a wide range of acetabular options, including Cormet cup, Trinity advanced acetabular bearing system and Cenator cemented polyethylene cup.

TaperFit™

Operative technique



Pre-operative templating

Pre-operative templating using the Corin X-ray templates provided allow the surgeon to identify the implant sizes appropriate for the patient, and also to plan the position in which the components will be placed. Whilst templating, allowance must be made for a complete cement mantle for the chosen component.

Surgical exposure

Full exposure of both the acetabulum and proximal femur are required to permit effective preparation and implantation.

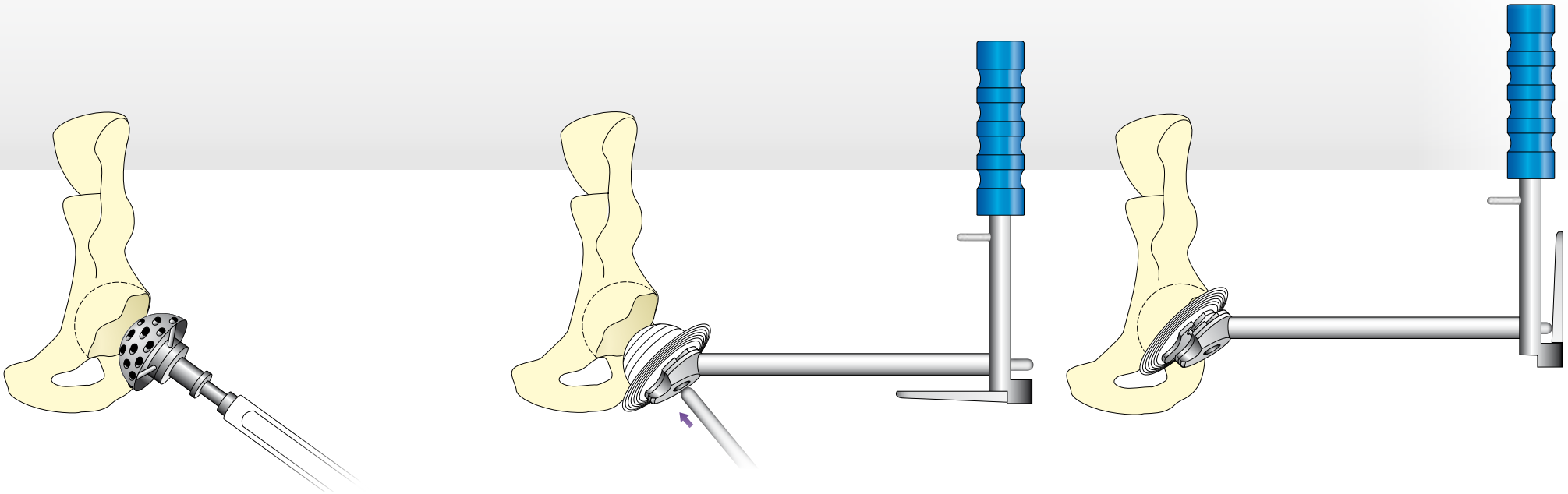
Femoral neck resection

The osteotomy line for neck resection usually runs from the superior surface of the base of the neck to a point midway between the upper margin of the lesser trochanter and the inferior aspect of the head. However, since the TaperFit stem is a collarless device, the level and orientation of neck resection is not critical to this procedure.

Acetabular preparation

The acetabulum is prepared as instructed for the chosen acetabular cup system. The TaperFit stem can be used in combination with the large diameter Optimom head and Cormet cup, the Trinity acetabular cup system or the Cenator cemented polyethylene cup – please refer to the respective surgical technique (see facing page for Cenator).

Cenator cup acetabular preparation



Step 1. Reaming the acetabulum

The acetabular rim is identified and any osteophytes and capsular remnants are removed.

The acetabulum is reamed up to the appropriate size, using sequentially larger reamers, until bleeding sub-chondral bone is exposed and the acetabulum is hemi-spherical.

In order to ensure an adequate cement mantle, the final size of reamer used should be 4mm larger than the cup to be implanted, e.g. to accept a 44mm cup the acetabulum must be reamed to 48mm.

Step 2. Insertion of the acetabular cup

Trial cups may be used to confirm the size selection made at pre-operative templating.

The acetabulum is then prepared to accept bone cement which is applied according to usual practice.

Flanged Cenator cups have a 0.75mm thick flange which is marked with concentric rings 2mm apart. The flange should be trimmed to the contours of the acetabulum prior to cementing in place.

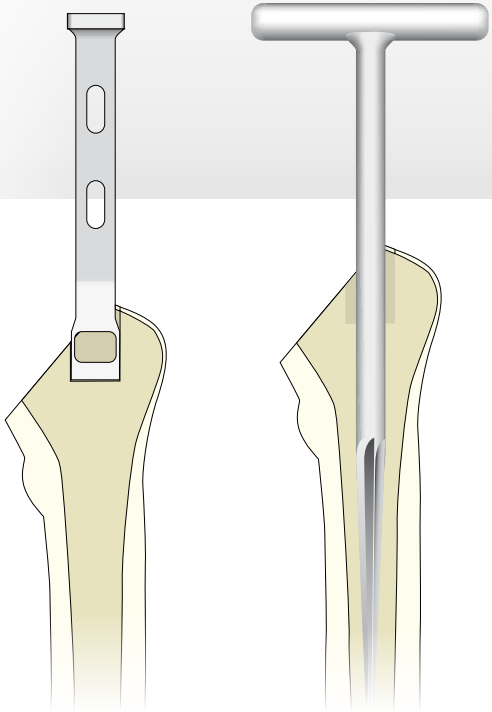
The chosen acetabular component is then mounted on the acetabular cup holder and inserted into the bone cement. The cup holder permits orientation of the cup as follows: with the handle parallel to the long axis of the body, and the metal shaft at 90° to the long axis, the cup will be placed at 45° of abduction, in neutral, so anteversion may then be applied by appropriate rotation of the handle.

Pressure is applied to the back of the cup holder with the pusher and excess bone cement removed.

The cup introducer is removed by squeezing the ‘trigger’. The plastic-headed cup pusher is inserted into the cup and firm pressure is maintained until the bone cement has fully polymerised.

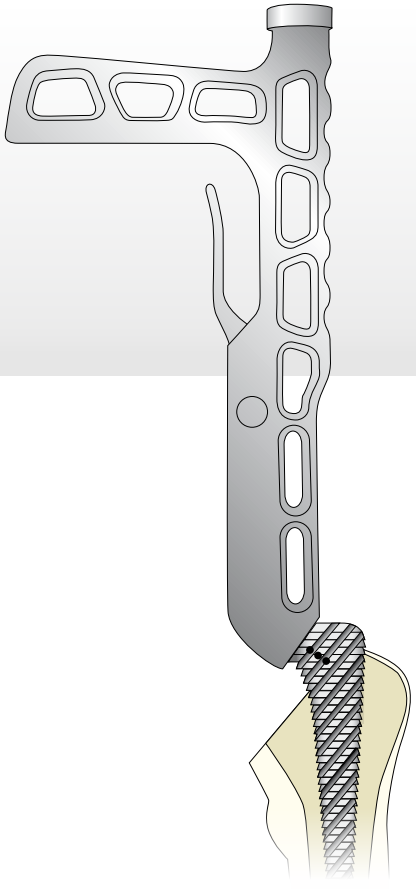
TaperFit™

Femoral preparation



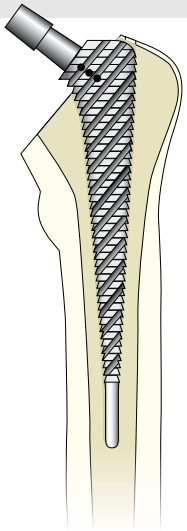
Step 3. Opening the femur
The proximal femur is opened using the box osteotome ensuring that this is positioned laterally into the greater trochanter and with the appropriate anteversion.

Step 4. Reaming the medullary canal
The medullary canal is identified and opened using the tapered reamer.



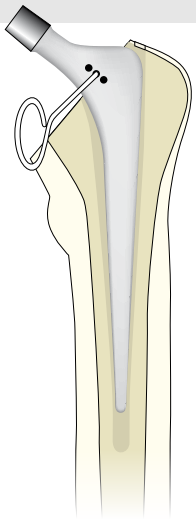
Step 5. Rasping the medullary canal
The medullary canal is then rasped sequentially starting with the smallest rasp, of appropriate offset, until the rasp equivalent to the prosthesis chosen at templating is seated within the femur.

The rasp handle may be impacted directly using a mallet, or the slap hammer may be used to both impact and loosen the rasp.



Step 6. Trial using rasp
Stability and fit are assessed, and if satisfactory, the rasp handle is removed. A trial neck is placed on the spigot, a standard trial modular head of appropriate diameter placed on the trial neck and a trial reduction carried out.

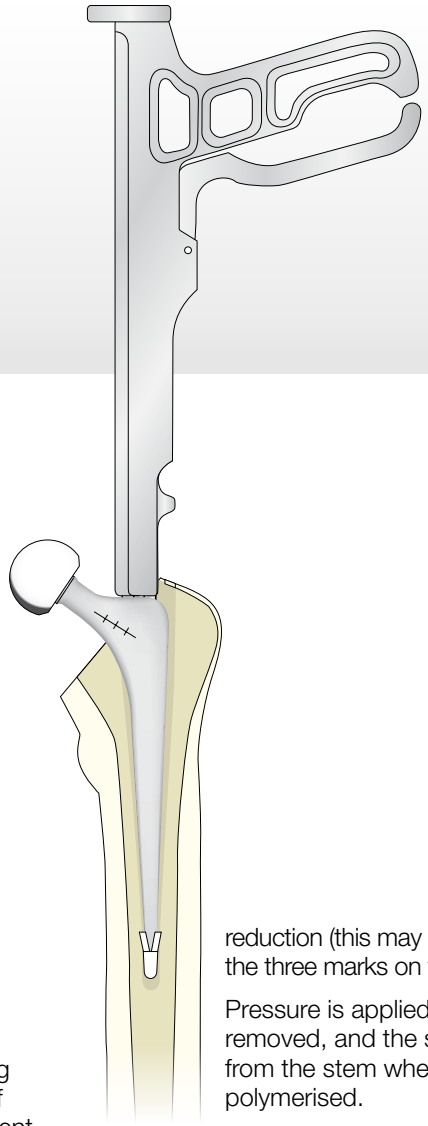
Long or short trial heads may be used if adjustment is necessary.



Step 7. Trial using trial stem

If the surgeon prefers to use a trial stem rather than the rasp, the rasp is removed and a trial stem matching the rasp is placed into the femoral canal. The pin is placed through the central hole on the trial stem, a standard trial modular head placed on the trunnion and a trial reduction carried out.

Long or short trial heads may be used if adjustment is necessary.



Step 8. Insertion of definitive femoral implant

The rasp is removed, using the rasp handle and slap hammer and the medullary canal prepared to accept bone cement according to the surgeon's preference.

A Corin Hardinge canal occluder or similar is inserted into the medullary canal to the correct depth, ensuring it is placed at least 2cms below where the distal tip of the implant will be. Bone cement is applied via a cement gun, in a retrograde fashion.

The definitive implant is mounted onto the stem introducer and the stem centraliser placed on the distal tip. The stem is then pushed firmly into the bone cement until it reaches the level at which the rasp or trial stem sat during the trial reduction (this may be checked by reference to the three marks on the implant).

Pressure is applied, excess bone cement is removed, and the stem introducer detached from the stem when the cement has fully polymerised.

A further trial reduction may be carried out using a trial head, or a definitive modular head (matching the trial head used) is secured in place onto the trunnion. The wound is then closed according to the surgeon's usual practice.

TaperFit™

Ordering information

TaperFit femoral stems

Corin (11/13) options

188.000	36mm Offset CDH
188.001	45mm Offset size 1
188.002	45mm Offset size 2
188.003	45mm Offset size 3
188.004	45mm Offset size 4
188.011	38mm Offset size 1
188.012	38mm Offset size 2
188.013	38mm Offset size 3
188.014	38mm Offset size 4

Eurocone (12/14) options

E088.000	36mm Offset CDH
E088.001	45mm Offset size 1
E088.002	45mm Offset size 2
E088.003	45mm Offset size 3
E088.004	45mm Offset size 4
E088.011	38mm Offset size 1
E088.012	38mm Offset size 2
E088.013	38mm Offset size 3
E088.014	38mm Offset size 4

TaperFit femoral stems are manufactured from high-strength stainless steel, to BS7252-9/1993 ISO 5832-9:1992. This material is fully compatible with cobalt chrome modular heads, as detailed in EN12010, European Standard for non-active surgical implants - joint replacement implants - Particular requirements, approved on 1 January 1998

CoCr modular heads for use with Cenator cup

CoCr modular heads, Corin (11/13) options

116.022	22mm short
116.122	22mm medium
116.222	22mm long
116.026	26mm short
116.126	26mm medium
116.226	26mm long
116.028	28mm short
116.128	28mm medium
116.228	28mm long

CoCr modular heads, Eurocone (12/14) options

E100.022	22mm short
E100.122	22mm medium
E100.222	22mm long
E100.026	26mm short
E100.126	26mm medium
E100.226	26mm long
E100.028	28mm short
E100.128	28mm medium
E100.228	28mm long

CoCr and BIOLOX *delta* modular heads for use with the Trinity acetabular cup

CoCr modular heads Eurocone (12/14)

E321.028	Small	-3.5mm	28mm
E321.032	Small	-4.0mm	32mm
E321.036	Small	-4.0mm	36mm
E321.040	Small	-4.0mm	40mm
E321.128	Medium	-0.0mm	28mm
E321.132	Medium	-0.0mm	32mm
E321.136	Medium	-0.0mm	36mm
E321.140	Medium	-0.0mm	40mm
E321.228	Long	+3.5mm	28mm
E321.232	Long	+4.0mm	32mm
E321.236	Long	+4.0mm	36mm
E321.240	Long	+4.0mm	40mm
E321.332	Extra long	+7.0mm	32mm
E321.336	Extra long	+8.0mm	36mm
E321.240	Extra long	+8.0mm	40mm

BIOLOX *delta* ceramic modular heads Eurocone (12/14)

104.2800	Small	-3.5mm	28mm
104.3200	Small	-4.0mm	32mm
104.3600	Small	-4.0mm	36mm
104.4000	Small	-4.0mm	40mm
104.2805	Medium	-0.0mm	28mm
104.3205	Medium	-0.0mm	32mm
104.3605	Medium	-0.0mm	36mm
104.4005	Medium	-0.0mm	40mm
104.2810	Long	+3.5mm	28mm
104.3210	Long	+4.0mm	32mm
104.3610	Long	+4.0mm	36mm
104.4010	Long	+4.0mm	40mm
104.3215	Extra long	+7.0mm	32mm
104.3615	Extra long	+8.0mm	36mm
104.4015	Extra long	+8.0mm	40mm

Cenator cemented polyethylene acetabular cups

Standard cups with EPW

175.140	40mm OD 22mm ID
175.144	44mm OD 22mm ID
175.148	48mm OD 22mm ID
175.152	52mm OD 22mm ID
175.344	44mm OD 28mm ID
175.348	48mm OD 28mm ID

Flanged cups with EPW

175.640	40mm OD 22mm ID
175.644	44mm OD 22mm ID
175.648	48mm OD 22mm ID
175.652	52mm OD 22mm ID
175.740	40mm OD 26mm ID
175.744	44mm OD 26mm ID
175.748	48mm OD 26mm ID
175.752	52mm OD 26mm ID
175.844	44mm OD 28mm ID
175.848	48mm OD 28mm ID
175.852	52mm OD 28mm ID

Standard cups without EPW

176.140	40mm OD 22mm ID
176.144	44mm OD 22mm ID
176.148	48mm OD 22mm ID
176.152	52mm OD 22mm ID
176.344	44mm OD 28mm ID
176.348	48mm OD 28mm ID
176.352	52mm OD 28 mm ID

Flanged cups without EPW

176.640	40mm OD 22mm ID
176.644	44mm OD 22mm ID
176.648	48mm OD 22mm ID
176.652	52mm OD 22mm ID
176.740	40mm OD 26mm ID
176.744	44mm OD 26mm ID
176.748	48mm OD 26mm ID
176.752	52mm OD 26mm ID
176.844	44mm OD 28mm ID
176.848	48mm OD 28mm ID
176.852	52mm OD 28mm ID

Centralisers and impaction grafting

188.555	TaperFit PMMA centraliser, pack 5
181.901	Impaction grafting canal occluder size 1
181.902	Impaction grafting canal occluder size 2
181.903	Impaction grafting canal occluder size 3

Instrumentation

288.999	TaperFit instrument set
288.993	TaperFit impaction grafting instrument set
281.999	Standard impaction grafting instrument set
275.000	Cenator instrument set

Complementary products

174.600	Hardinge femoral canal occluder, box 10
279.000	Canal occluder introducer

TaperFit X-ray templates

288.911	100%
288.912	110%
288.913	115%
288.914	120%

References:

1. Fowler JL, Gie GA, Lee AJC, Ling RSM. Experiences with the Exeter total hip replacement since 1970. *Orthop Clin North Am* 1988:19; 477-489

2. Ramos JL, Pandit HG, Edwards S, Grover ML. Lateral approach to the hip joint; does it predispose to malalignment of the femoral component in total hip arthroplasty? British Orthopaedic Association, Annual Congress 1999, Glasgow, Free Paper Session 16.

3. Malchau H, Herberts P. Prognosis of total hip replacement: Revision and re-revision rate in THR: A revision-risk study of 148,359 primary operations. Scientific Exhibition presented at the 65th Annual Meeting of the American Academy of Orthopaedic Surgeons, March 1998, New Orleans.

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