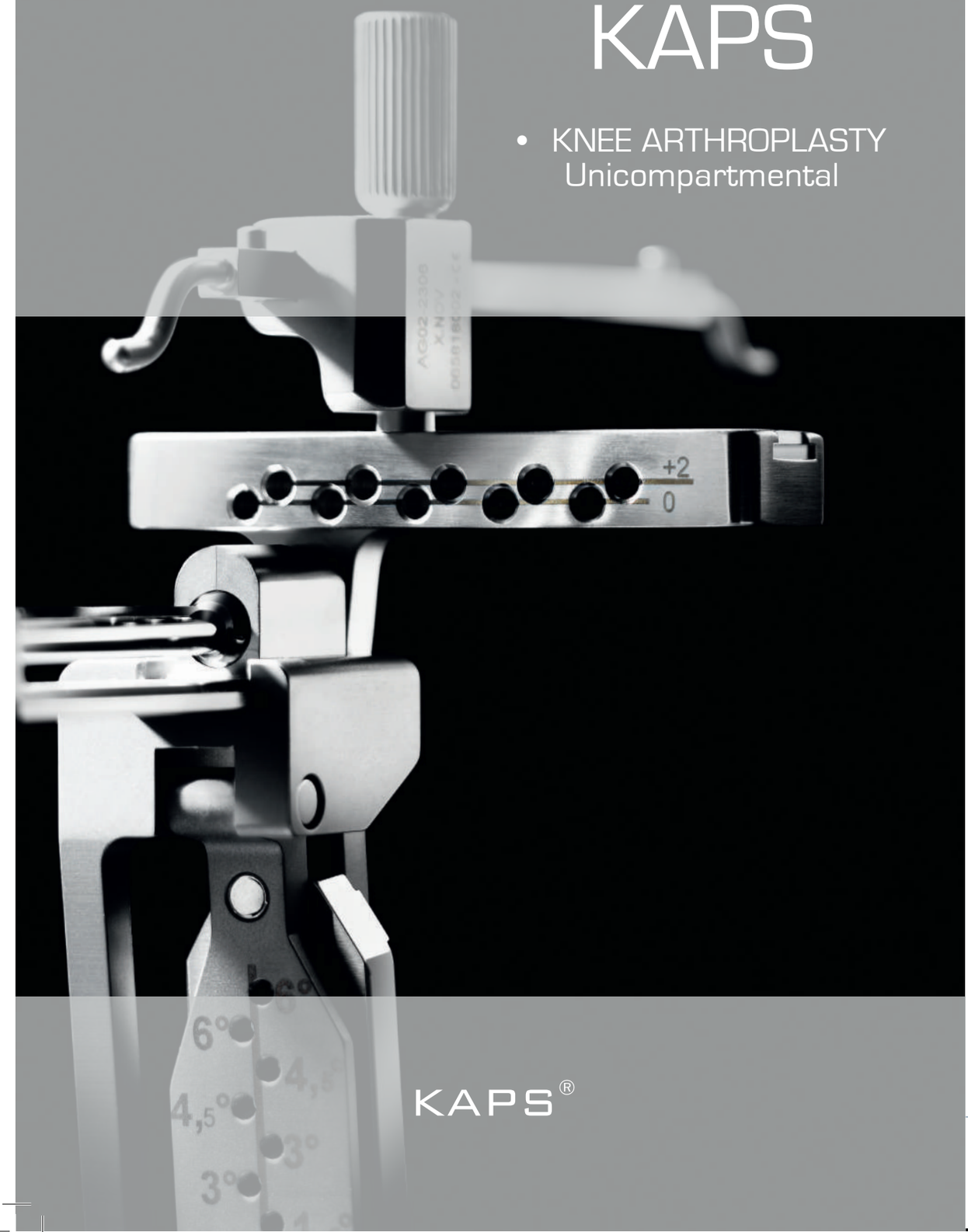
X·NOV
NEW ORTHOPEDIC VALUE

Surgical Technique

KAPS

- KNEE ARTHROPLASTY
  Unicompartmental



KAPS®

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KAPS SURGICAL TECHNIQUE

Unicompartmental knee arthroplasty

X·NOV

NEW ORTHOPEDIC VALUE

Summary

The concept of the KAPS unicompartmental prosthesis is the natural evolution of the original meniscal arthroplasty carried out by *Goodfellow* and *O'Connor* in 1976 and subsequently by Buechel and Pappas in 1979.
The KAPS prosthesis has been designed to restore knee mobility and stability. The choice of a reproducible surgical technique and specific instrumentation reduces technical errors and achieves knee stability and functionality provided that several criteria are met :

- Total implant stability must be obtained,
- Optimum laxity must be obtained in order to protect the opposite compartment,
- The anatomical curvature of the tibia must be respected, following the angle of the epiphyseal varus (CARTIER's angle) for the frontal tibial cut,
- The femoral implant must be centred on the tibial component, with 0° to 130° of flexion.

However, patient selection, surgical planning and the surgeon's experience are also vital criteria for the success of the unicompartmental procedure.


F2
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KAPS

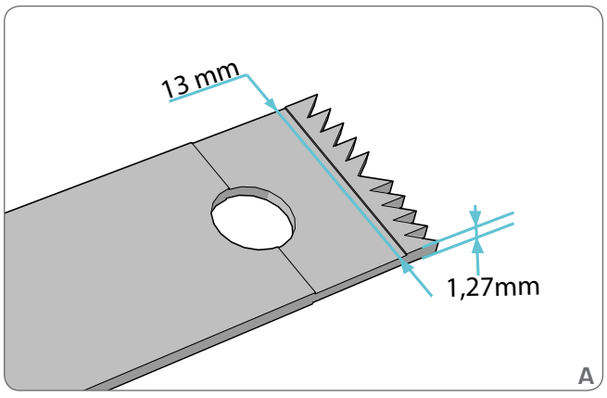
The Kaps prosthesis is designed to offer the surgeon a unicompartmental knee prosthesis with three types of tibial implant :

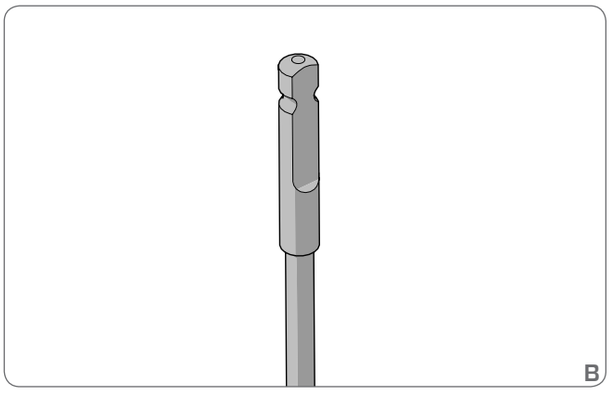
- A cemented mobile version ;
- A fixed metal-back version to be fitted with or without cement ;
- A cemented full-PE version.

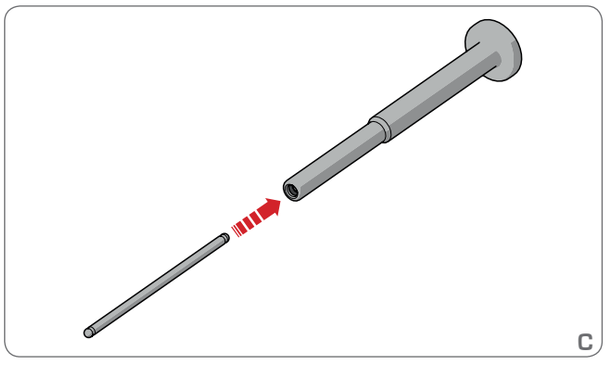
The three versions use the same condyle (cemented and cementless). The same surgical technique is used in both the fixed and mobile versions, and is suitable for the various approaches. However, the surgeon may select the tibial implant type at any stage of the operation.

But it is essential that strict criteria are respected when deciding which version to use :

- Mobile version on the medial side ;
- Fixed version on the medial or lateral side.


13 mm
1,27mm
A


B


C

Patient selection

Patient selection is a vital criterion for successful unicompartmental knee arthroplasty.

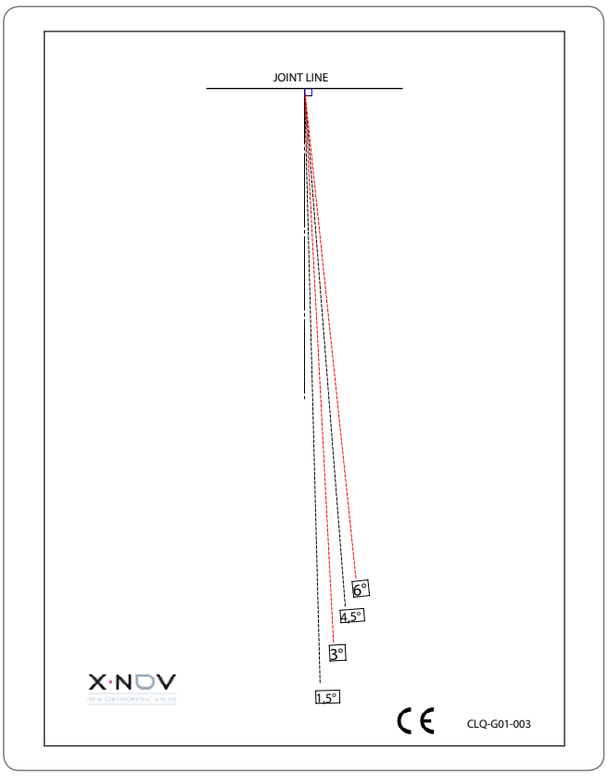
- The ligamentary structure of the knee must be intact and functional;
- The other compartments must be intact;
- Genu varum or valgum less than 10°;
- Flexum must be more than 15°;
- The patient must not be overweight, and must weigh less than 80 kg;

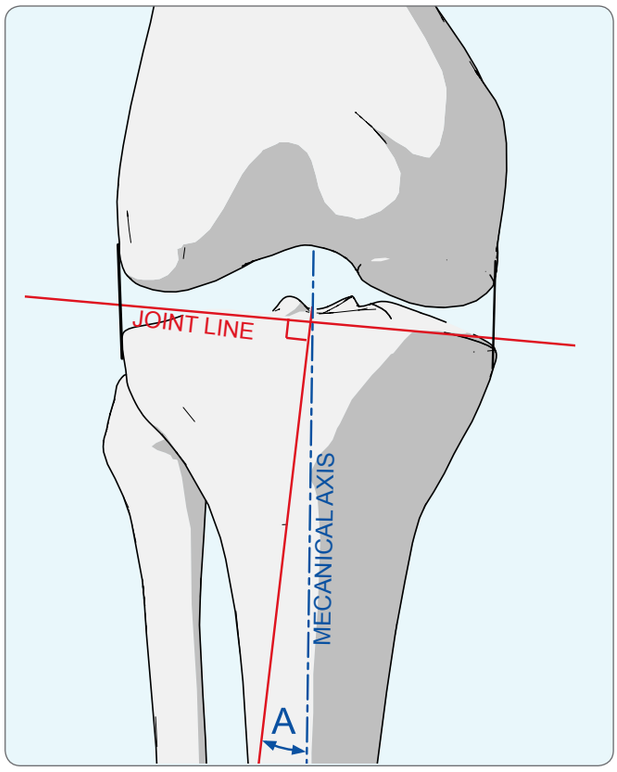
Learning curve

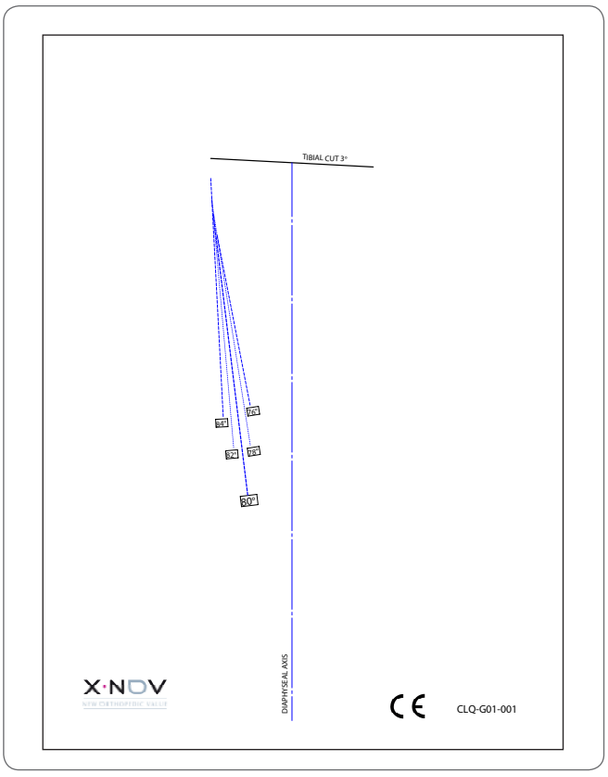
As with other surgical procedures, errors are more common when starting to use a new implant and new instrumentation. We advise practitioners to undergo training in the KAPS prosthesis before starting to operate. Reference centres allow practitioners to practice unicompartmental arthroplasty under the guidance of our experts.

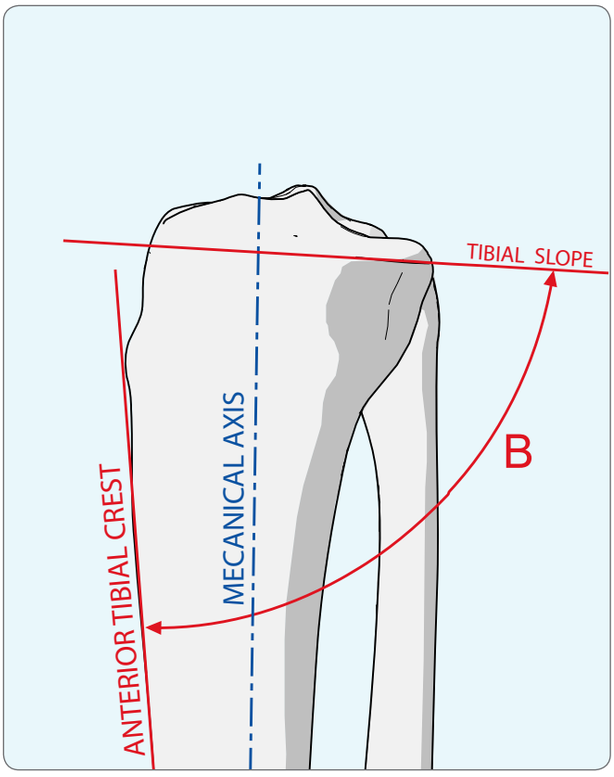
Important remarks

1. Use a saw 1.27 mm thick and 13 mm wide. **[Fig. A]**
2. Drill using a Ø 3.2 mm bit before inserting a smooth pin.
3. The axis of the pins is always perpendicular to the plane on which the hole is drilled.
4. Have a "small AO" adaptor to hand for all bits. **[Fig. B]**
5. Users are advised not to strike pins with a hammer, but to insert them using the specific impactor. **[Fig. C]**
6. During installation, take care not to leave any excess on the tibial bone markers (ankle and anterior tibial crest).


JOINT LINE
6°
4.5°
3°
1.5°
X·NOV
CLQ-G01-003


JOINT LINE
MECANICAL AXIS
A


TIBIAL CUT 3°
DIAPHYSEAL AXIS
X·NOV
CLQ-G01-001


TIBIAL SLOPE
MECANICAL AXIS
ANTERIOR TIBIAL CREST
B

Planning

Systematic planning of unicompartmental insertions is vital. Measuring tibial angles in the pre-operative phase ensures that the implants will be correctly positioned.

A pangonogram measures the overall axis defect, and in particular shows that there is no single diaphyseal or metaphyseal defect of more than 10° on a single limb segment.

Using X-rays and goniometric templates, measure the following angles :

- From the side : between the tibial slope at 3° (mobile) or 5° (fixed) and the anterior tibial crest
- From the front between the joint line and the diaphyseal axis

These measurements must be transferred to the tibial goniometer.

Use of goniometric templates

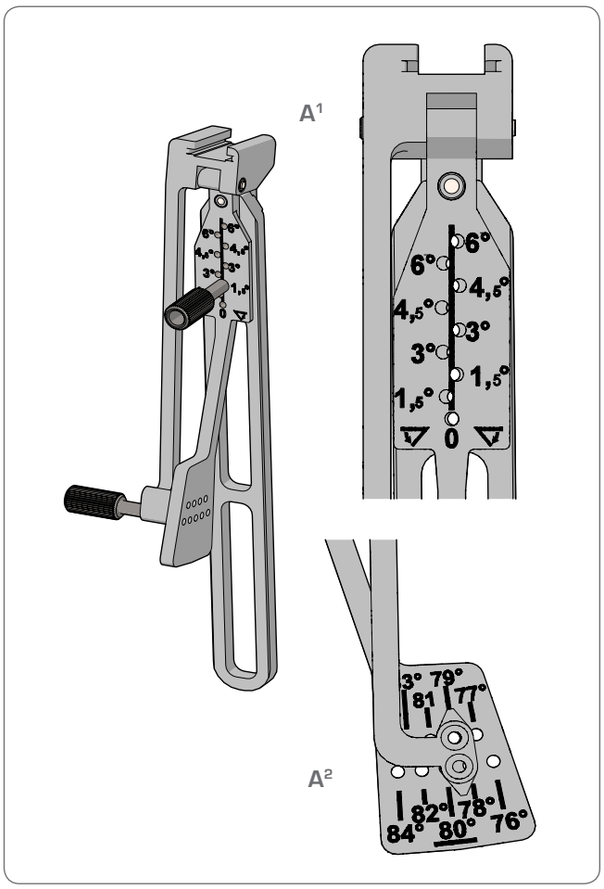
Measuring tibial varus
(0° varus for the outer side)

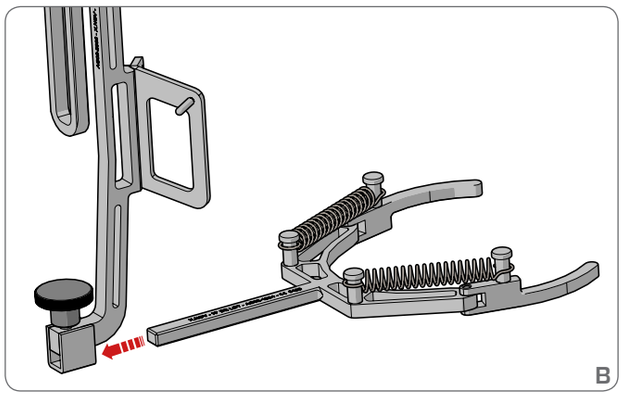
1. Trace the tibial mechanical axis on the frontal X-ray.
2. Trace the joint line : it is a line parallel to the plateau on the healthy side.
3. Position the template so that the line of the X-ray and the line of the template match up.
4. Record the value of the angle which corresponds to the template line closest to the mechanical axis of the X-ray.
5. Transfer this figure to the goniometer (making sure that the direction is correct).

Measuring tibial slope

1. Trace the tibial mechanical axis and the anterior tibial crest on the side X-ray.
2. Position the template so that the tibial mechanical axis matches up.
3. Record the value of the angle which corresponds to the template line closest to the tibial crest of the X-ray.
4. Transfer this figure to the goniometer.

The non-compliance with the recommendations
(Tibial slope, frontal valgus et planning),
will **fatally** have an impact on the success of the implant.


A1
6°
4,5°
3°
1,5°
0
A2
83°
81°
79°
77°
84°
82°
80°
78°
76°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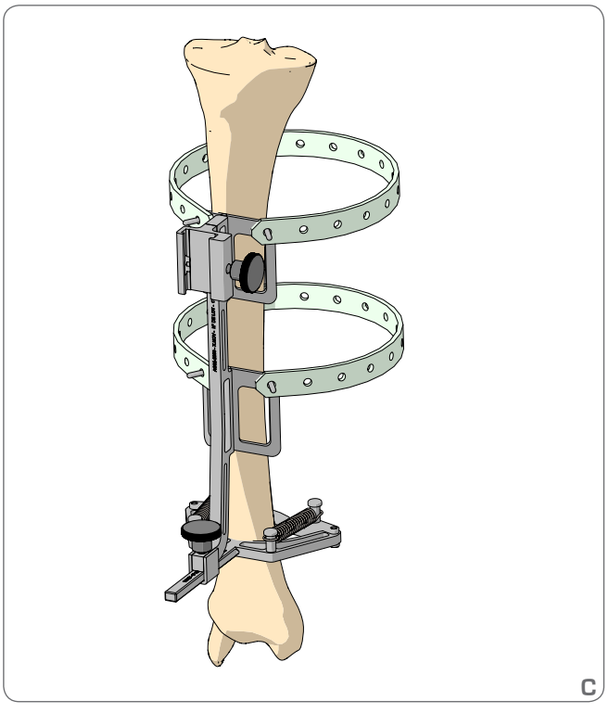
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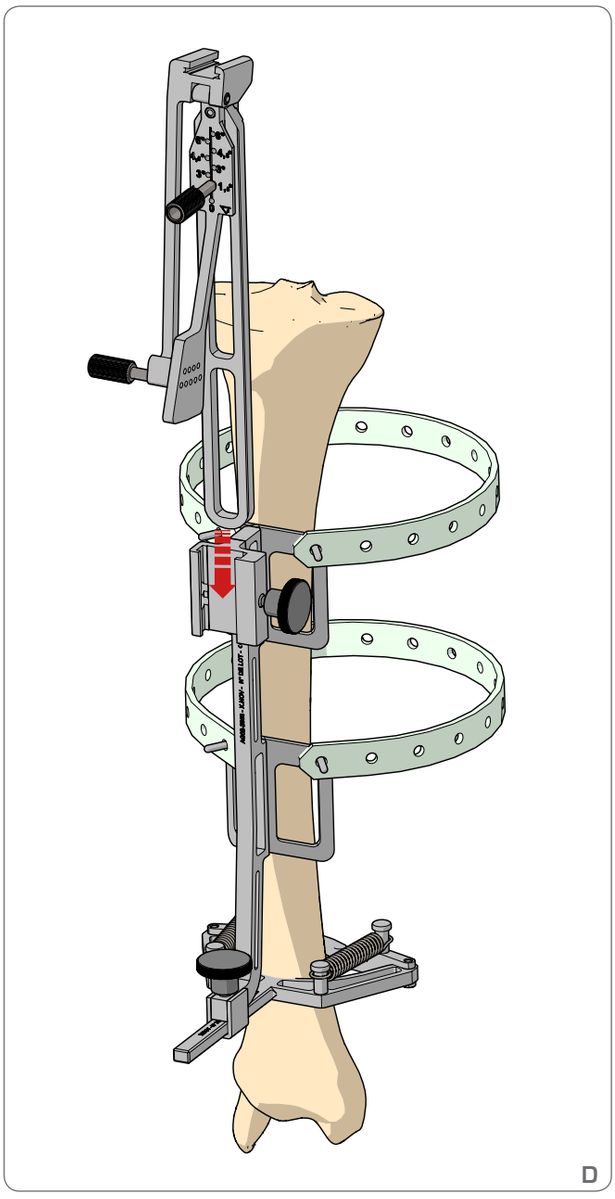

D

Tibial cut

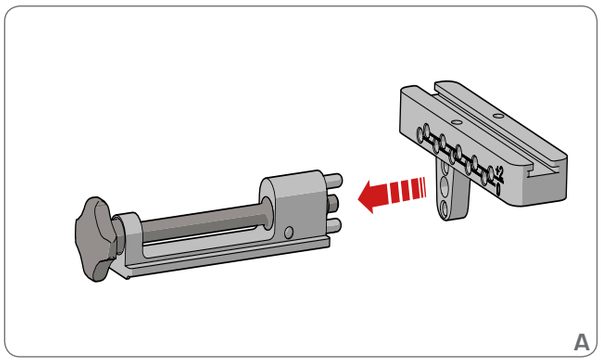
Setting the goniometer

1. Set the goniometer on the basis of the angle values measured during the planning stage :

- Tibial varus / valgus : loosen the varus / valgus setting wheel and move the arm until it points to the desired angle value. Tighten the wheel, but do not over-tighten **[Fig. A[1]]**
- Tibial posterior slope : loosen the slope setting wheel and move the arm until it points to the desired angle value. Tighten the wheel, but do not over-tighten **[Fig. A[2]]**

Positioning the tibial alignment guide

2. Assemble the V-shaped component and the malleolar clamp. **[Fig. B]**
3. Place the V-shaped component against the anterior tibial crest, without pushing on the anterior tibial tuberosity. **[Fig. C]**
4. Use the two elastic bands and the malleolar clamp to lock the guide in position.
5. Insert the goniometer on the alignment guide. **[Fig. D]**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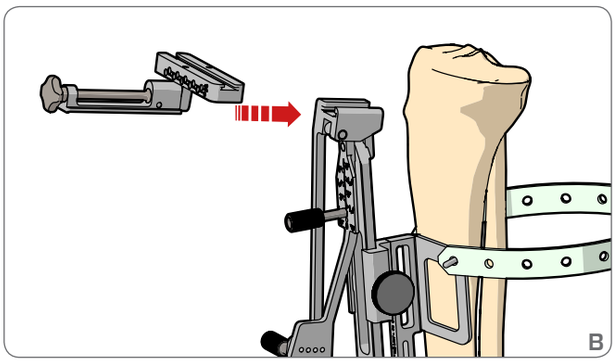
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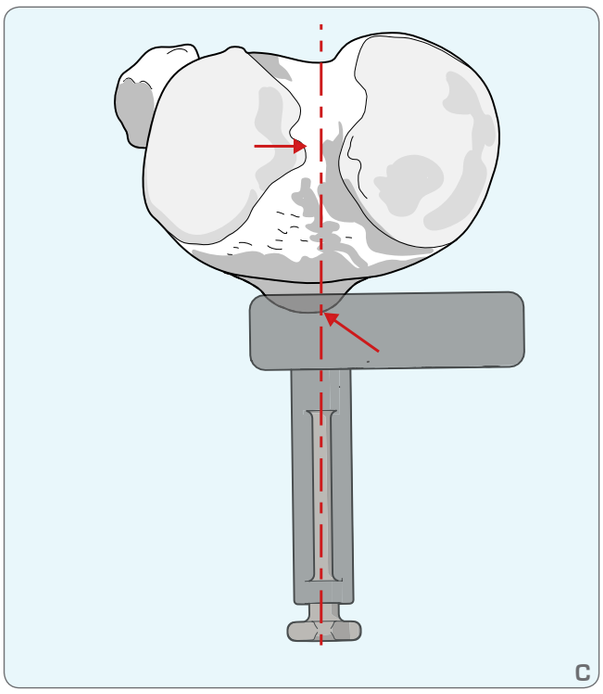
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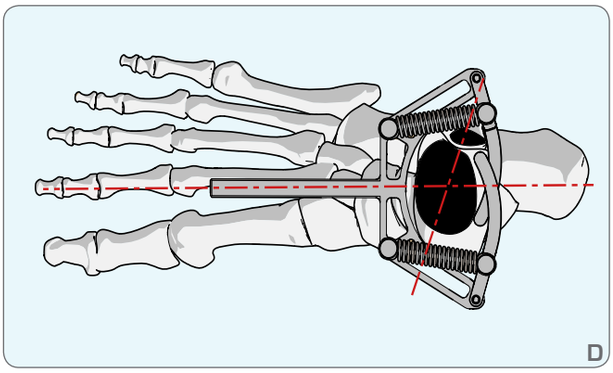
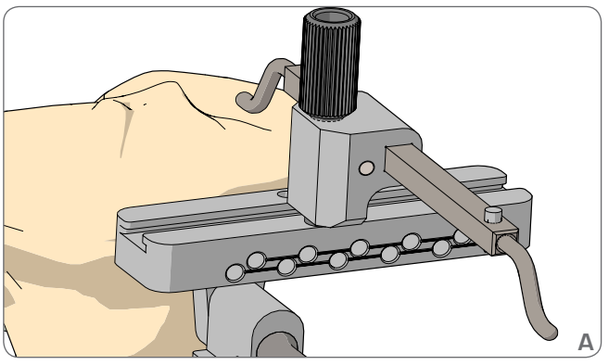
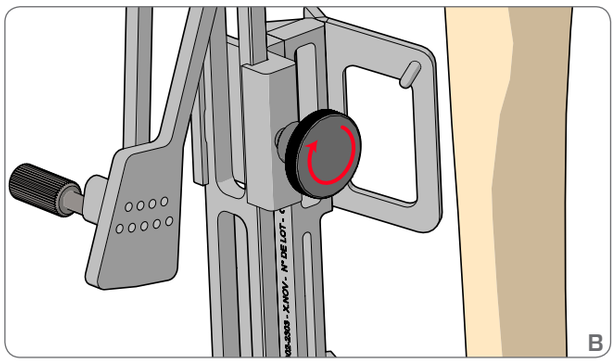

D

Assembling the cutting table

6. Assemble the tibial cutting table and its base [Fig. A] (with the longer part on the side to which the prosthesis is to be fitted).
7. Slide the table base over the goniometer until it reaches the tibia. **[Fig. B]**

The tibial table is aligned with the inner third of the anterior tibial tuberosity and the inner edge of the external tibial spine **[Fig. C]**. The crossbar of the malleolar forceps must be aligned with the second metatarsal, with the foot at a right angle and without rotation **[Fig. D]**.


A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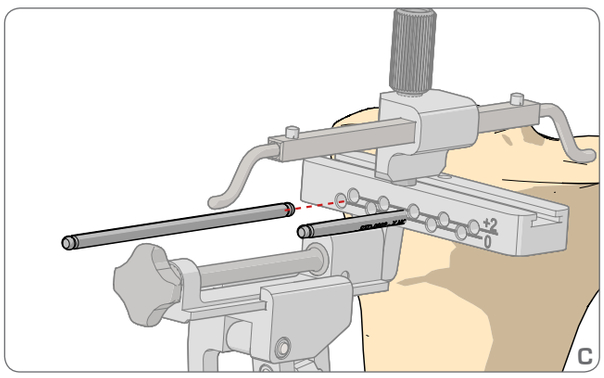
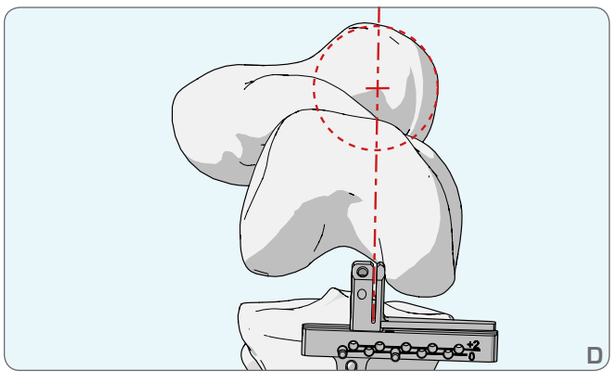

+2
0
C


+2
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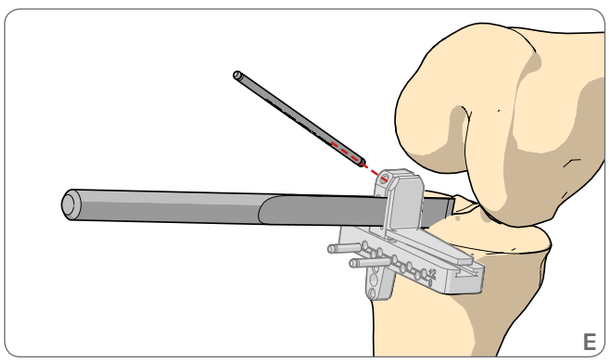
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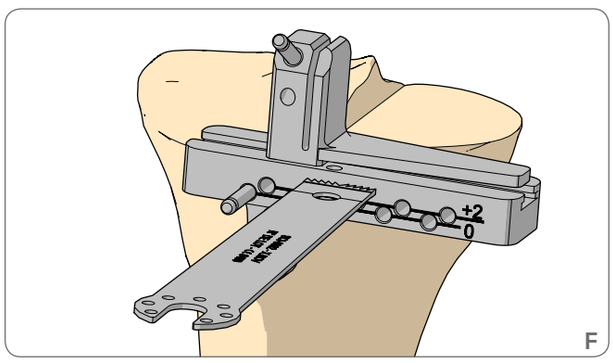

+2
0
F

Tibial resection height

1. Select a probe suitable for the desired cutting height.

The minimum thickness of the tibial implant is 8 mm in the case of the mobile and full-PE versions and 9 mm in the case of the fixed metal-back version. Four cutting values are possible : 2, 4, 6 and 8 mm. The 6 mm probe should be used in most cases, but if tibial wear is severe a 4 mm or 2 mm probe should be used.

2. Screw the probe to be used onto the table
3. Using the stylus, probe the base of the tibial socket **[Fig. A]**], then lock the cutting height using the screw. **[Fig. B]**
4. Use the gauge to check the cutting height and tibial slope, then use two pins to block the table. **[Fig. C]**

Positioning the sagittal cut

5. Insert the sagittal cutting guide onto the tibial table from the side.

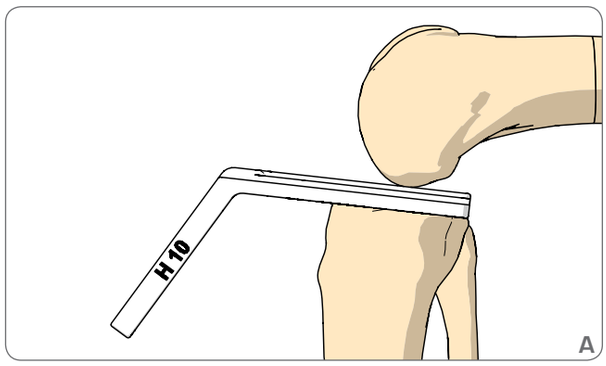
The sagittal cut must be located approximately in a plane running through the centre of the femoral head and the edge of the intercondylar notch. The cut must be located exactly at the mid-point of the top of the inner tibial spine and the source of the ACL, avoiding damage to the latter's fibres. **[Fig. D]**

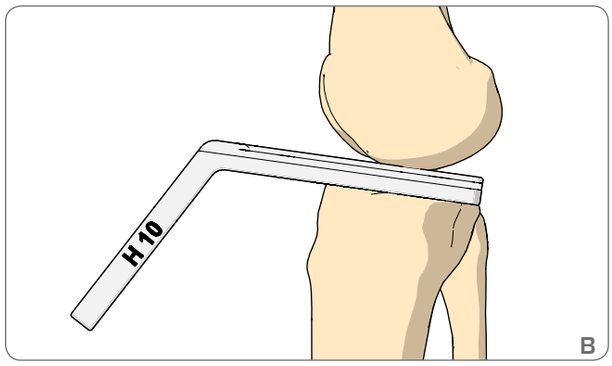
6. Use an osteotome to position and stabilise the sagittal cutting guide, then fix it in place by means of a diverging pin **[Fig. E]**. The osteotome can be left in place while the tibial cut is being made.

Tibial resection

7. Perform the proximal tibial cut and then the sagittal cut. **[Fig. F]**
8. Dismantle the cutting table, remove the table base, the alignment guide and the table. Leave the horizontal pins where they are in case a recut is needed.

The sagittal cut must not be deeper than the proximal tibial cut in order to minimise the risk of plateau fracture.


H 10
A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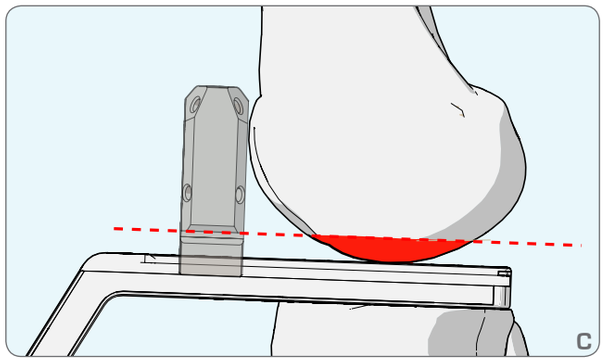
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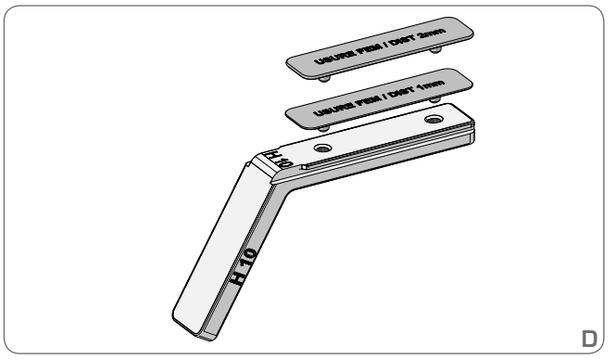
H 10
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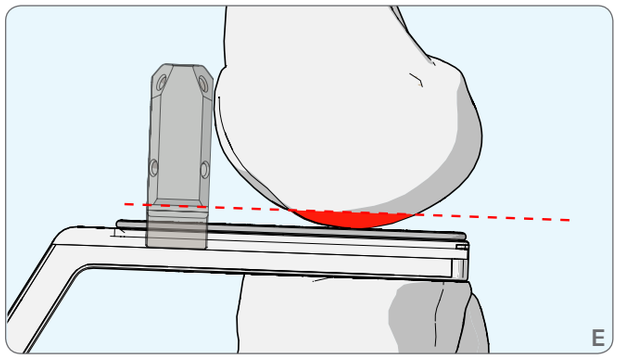

E

Flexion / extension spaces

Checking flexion space

1. Flex the knee at 90°.
2. Choose the thickest spacer possible. It must slide easily so as to maintain functional safety room. **[Fig. A]**
3. If the H8 spacer does not enter easily, repeat the tibial cut at +2 mm. To do this, reposition the tibial cutting block on the pins by means of the holes marked +2.

Checking extension space

4. Extend the knee. **[Fig. B]**
5. Insert the same spacer and check :

- Extension space ;
- Lateral ligament stability ;
- Limb alignment ;
- Whether full extension is achieved.

Distal wear wedge

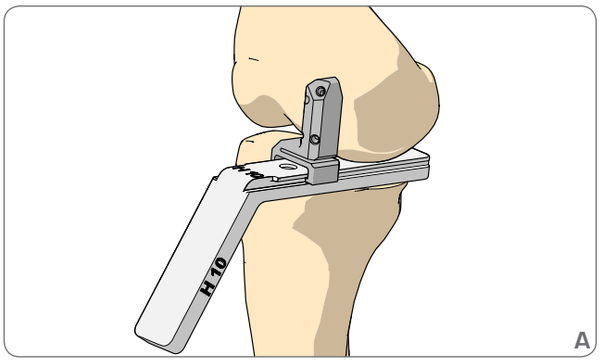
If significant bone loss has occurred, and in order to maintain the same distance in flexion and extension, use the distal wear wedges in the instrumentation. Wedges are available in 1 and 2 mm sizes, allowing accurate compensation for bone loss **[Fig. D]**. Adding the wedge reduces the distal resection height.

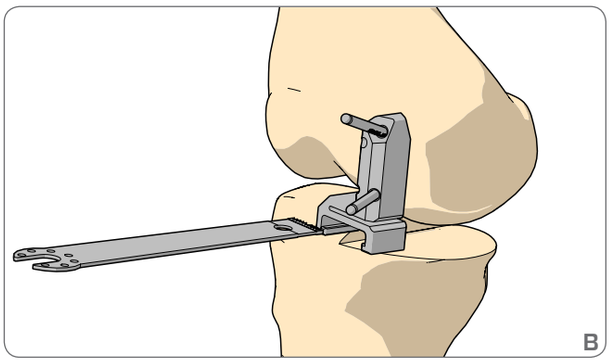
6. Clip the wear wedge selected onto the spacer, then start the process of checking extension space again.

Flex/Ext space table

		EXTENSION		
		Tight	Stable	Lax
FLEXION	Tight	TIBIAL RECUT +2mm		Incorrect space (1)
	Stable	Incorrect space (2)	OK **[Fig. C]**	Distal cut with wear wedge **[Fig. E]**
	Lax		Incorrect space (2)	Choose the next largest spacer

1: Tibial slope too small + distal wear.
2: Tibial slope too large.


H10
A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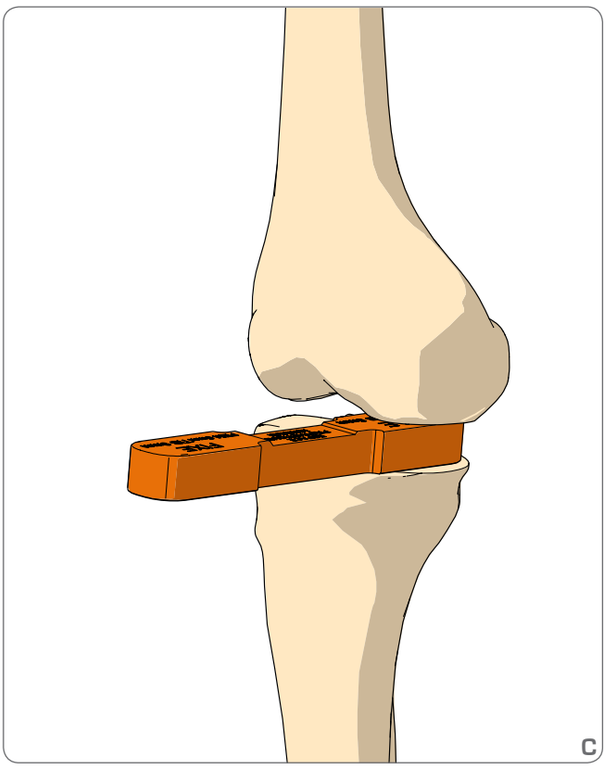

C

Distal femoral cut

Location

1. Extend the knee.

Check that the knee is not hyperextended.

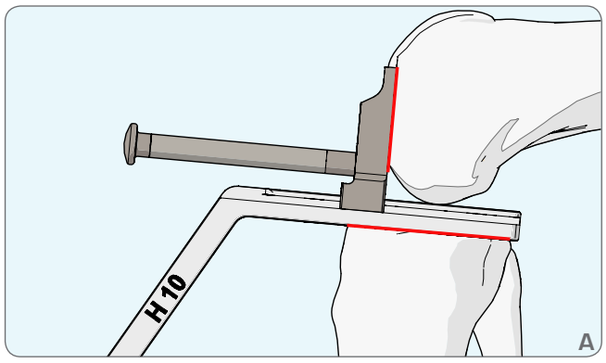
2. Place the cutting guide in the spacer rail **[Fig. A]**. Align the cutting slit so that it faces directly towards the cruciate ligaments.
3. Use 2 pins to fix.
4. Remove the spacer and perform the cut. **[Fig. B]**

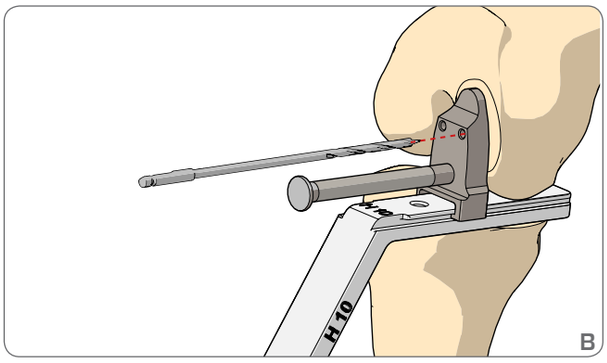
Check

5. Check the minimum total prosthetic space with the spacer **[Fig. C]** :

- 14 mm along the side if the base selected is mobile or full-PE.
- 15 mm along the side if the base selected is fixed metal-back.

The minimum space spacer **must enter easily** and leave safety room. If this is not the case, repeat the tibial cut at -2 mm.


H 10
A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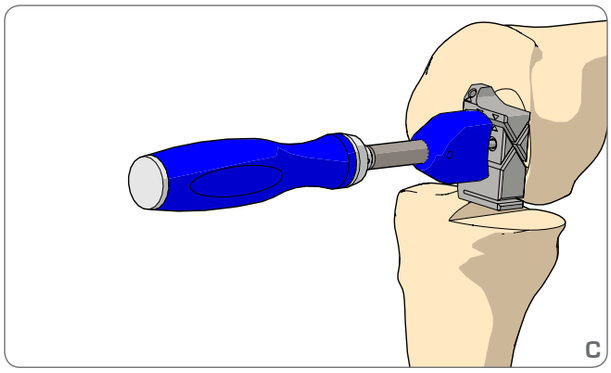
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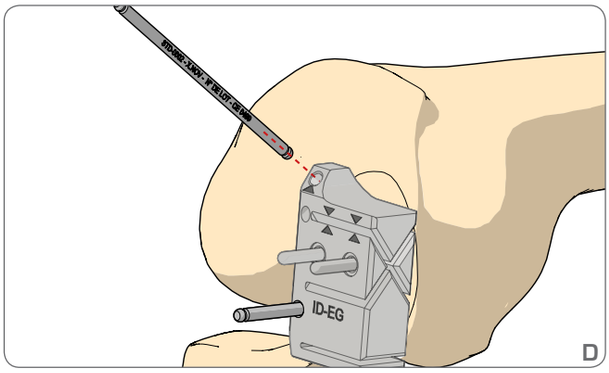
ID-EG
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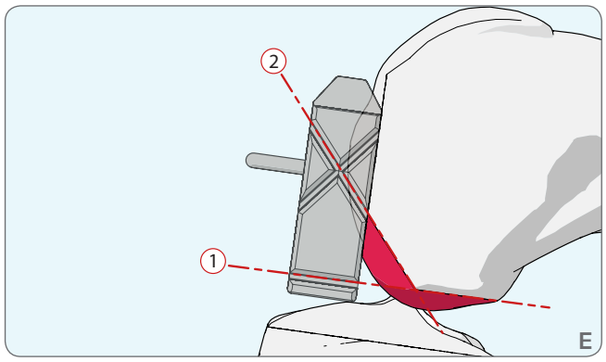
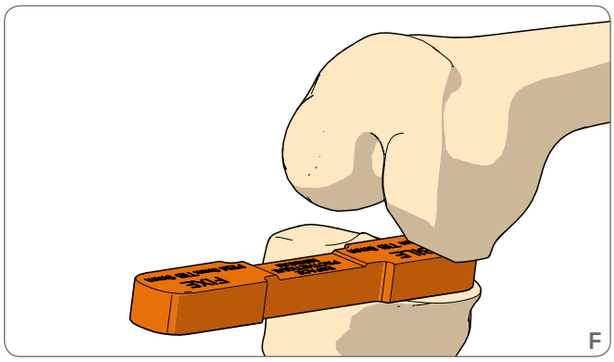

2
1
E


F

Posterior and chamfer femoral cut

Location

6. Flex the knee at 90°.
7. Insert the spacer of the chosen thickness.
8. Slide the drilling gauge into the spacer rail.
9. Make sure that the guide is correctly placed against the distal cut and the spacer against the tibial cut. Adjust knee flexion slightly if necessary to obtain perfect contact. **[Fig. A]**
10. Use the bit to drill two Ø 3.2 mm holes. **[Fig. B]**
11. Remove the spacer and the gauge

Resection

1. Insert the cutting guide into the two holes that you have made. Align the cutting slits so that they face directly towards the cruciate ligaments.
2. Impact gently using the femoral impactor, making sure that it is being applied correctly against the distal cut. **[Fig. C]**
3. Drill a hole and then insert the locking pin **[Fig. D].**
4. Perform the cuts in the order given below **[Fig. E] :**

① Posterior
② Chamfer

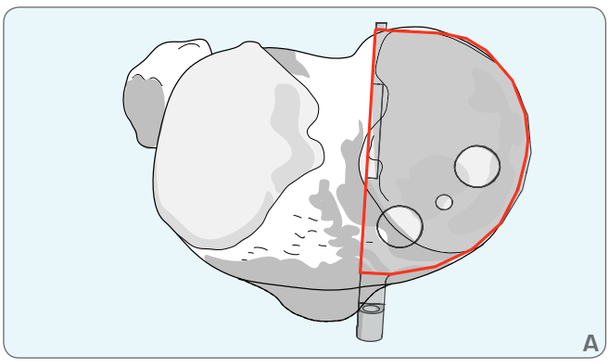
Do not leave the spacer in position when performing the chamfer cut. If necessary, the tibial bone can be protected using the tibial gauge or cutting gauge.

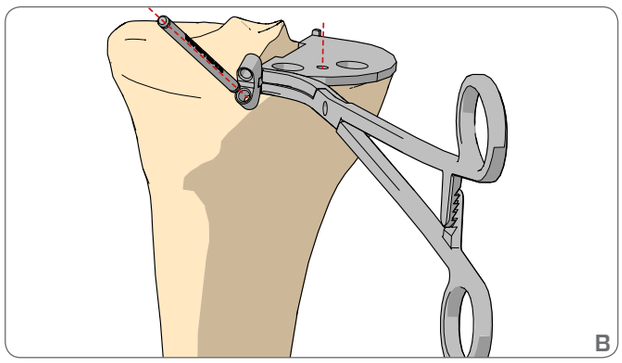
Check

5. Remove the pins and the cutting block using the pin-removal forceps.
6. Check the minimum total prosthetic space with the spacer **[Fig. F]** :

- 14 mm along the side if the base selected is mobile or full-PE
- 15 mm along the side if the base selected is fixed metal-back

The minimum space spacer **must enter easily** and leave safety room.


A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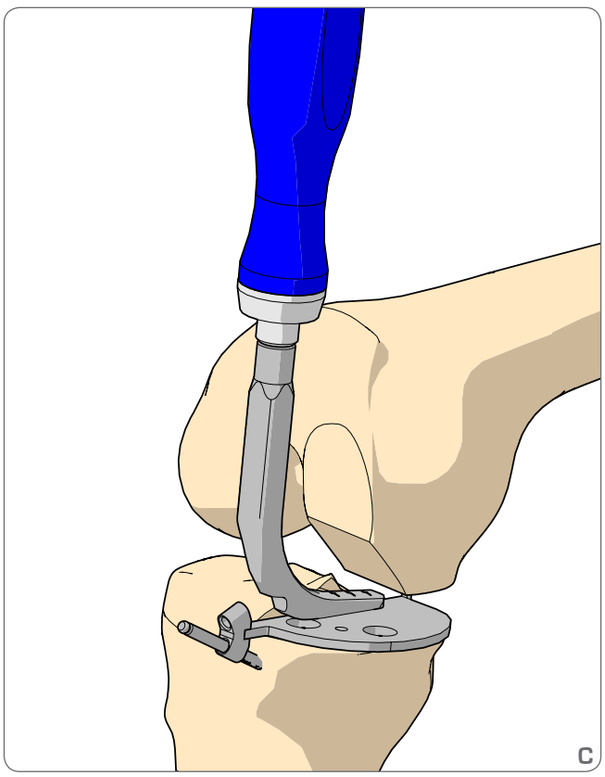
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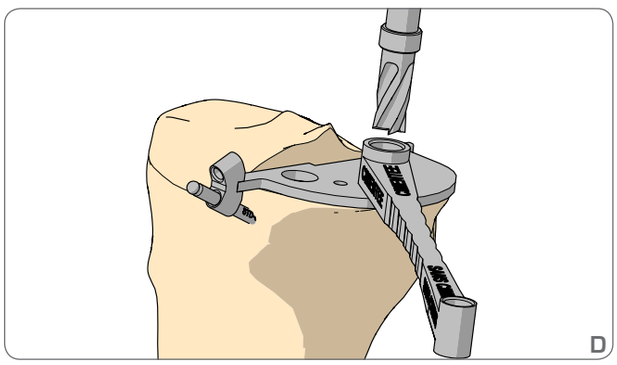

D

Tibial preparation

Positioning the tibial gauge

1. Use the tibial gauges to select the size of the tibial base.
2. Use the forceps to position the tibial gauge so that the best bone cover is achieved. **[Fig. A]**
3. Fix in place using the diverging pin, and lock with the vertical pin if possible. **[Fig. B]**

Pinion compacting

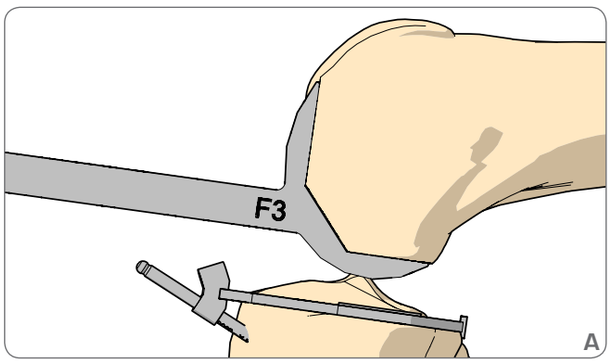
4. Select a suitable pinion compactor (RM / LL or LM / RL).
5. Position the pinion compactor in the opening along the side of the sagittal cut, and impact as far as the stop **[Fig. C]**

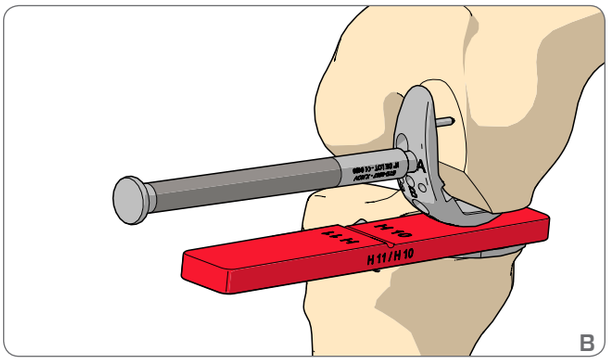
Reaming the pins

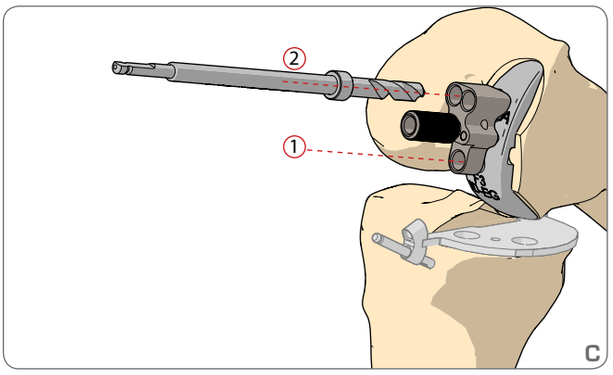
6. Select a pin drilling barrel and reamer suitable for anchoring the base :

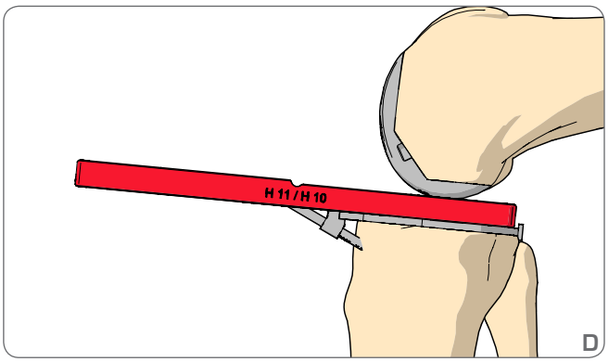
- Cemented : Ø 9 mm
- Uncemented : Ø 7 mm

7. Ream the two pins **[Fig. D]**


F3
A


H 11 / H 10
B


2
1
C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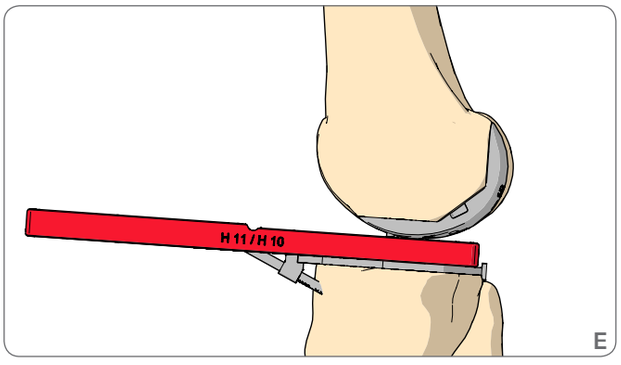

H 11 / H 10
E

Femoral preparation

Placement of the femoral trial component

1. Use the size gauge to determine the size of the femoral implant **[Fig. A].**
2. Flex the knee at 90°.
3. Select a femoral trial component of a suitable size and for the correct side :

    - RM / LL : Right Medial or Left Lateral compartment
    - LM / RL : Left Medial or Right Lateral compartment

4. Screw the tool onto the selected femoral trial component.
5. Use the femorotibial spacer to ensure a good fit at the rear, then impact gently until the component is in its final position. **[Fig. B]**
6. Unscrew the tool and remove the femorotibial spacer.

Drilling the femoral holes

7. Flex the knee as far as it will go.
8. Screw the drilling barrel onto the trial femur.
9. Drill the two holes with the bit at the stop position, starting with the posterior hole. **[Fig. C]** Make sure that the drilling guide is stable.

Flexion / Extension tests

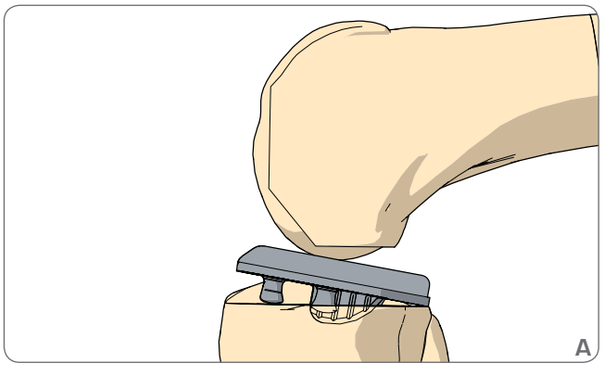
10. Perform the flexion / extension tests and use the femorotibial spacer to check the kinematics. **[Fig. D, Fig. E]**

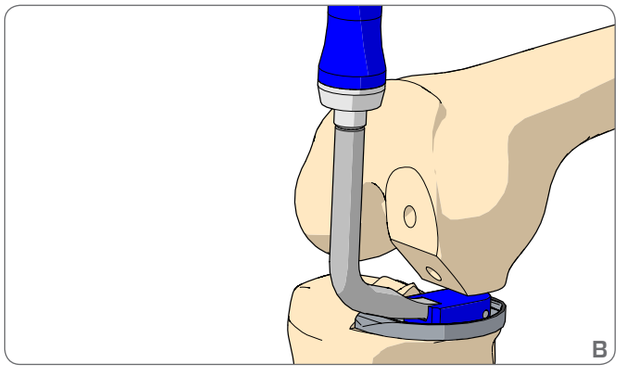
The femorotibial spacer is used to determine the definitive height of the fixed or mobile tibial insert.

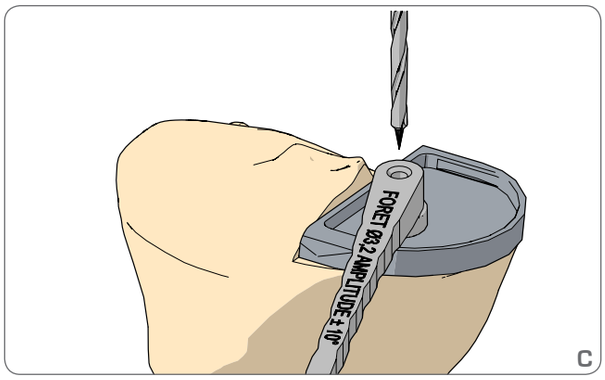
Availability of polyethylene thicknesses :

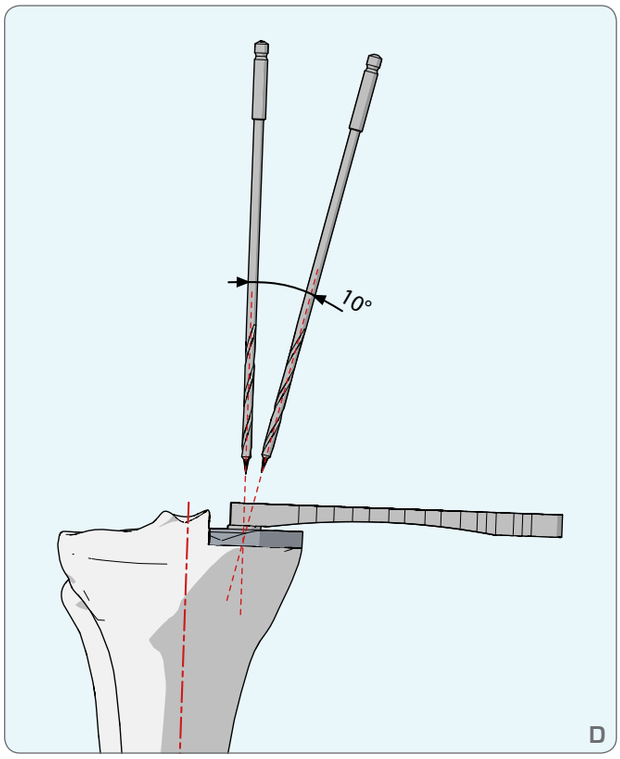
Th.	POLYETHYLENE TYPE		
	FIXED	MOBILE	FULL-PE
H8		√	√
H9	√	√	
H10	√	√	√
H11	√	√	
H12	√	√	√
H14	√		√

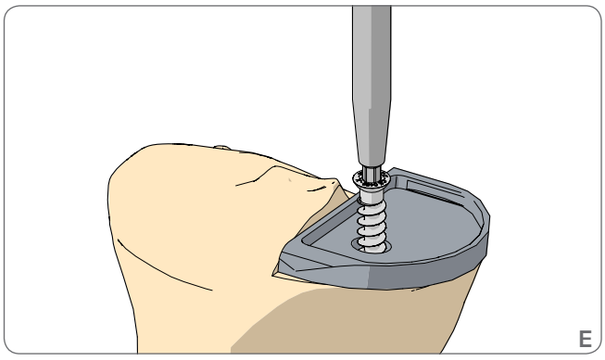
thickness not available


A


B


FORET Ø3.2 AMPLITUDE +10
C


10°
D


E


F

Final impaction

Cemented components are sealed with non-cement-dependent preparations.

Follow the procedure described below whichever version is selected :
1. Impaction of the tibial plateau (fixed, mobile or full-PE)
2. Impaction of the femoral component
3. Insertion of the PE insert

Select femoral and tibial components of a suitable size and for the correct side :
- RM / LL : Right Medial or Left Lateral compartment
- LM / RL : Left Medial or Right Lateral compartment

Cemented tibial plateau

1. Cement the tibial base, including the pins and the pinion.
2. Position the base on the tibia and push first from the rear and then from the front to remove excess cement. **[Fig. A]**
3. Check that there is no soft tissue underneath the base.
4. Impact using the angled tibial impactor. **[Fig. B]**
5. Use a curette to remove excess cement, and check the position of the base.
6. Insert a femorotibial spacer of suitable thickness and hold compressed at 45° flexion until the cement is completely hard.

Do not fully extend the leg, or flex it, as this could cause the plateau to tilt and come loose.

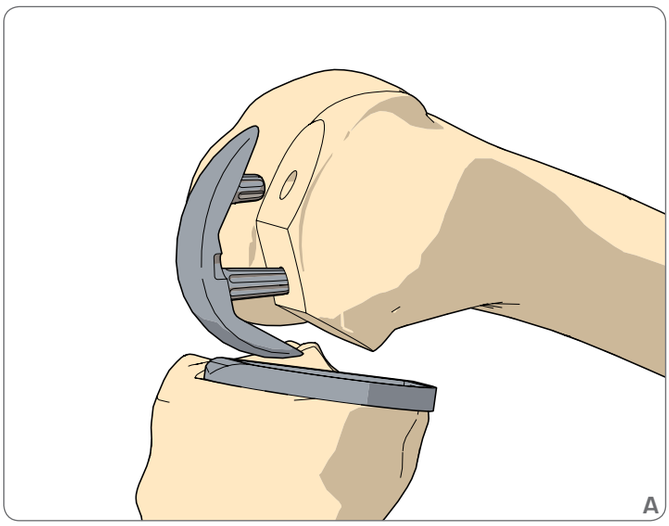
7. Check that there is no excess cement in the corners and the posterior section.

Fixed cementless tibial plateau

8. Place the tibial base on the tibia and engage the middle pinion. **[Fig. A]**
9. Check that there is no soft tissue trapped underneath the base.
10. Use the angled tibial impactor to impact the anterior pins. **[Fig. B]**
11. Impact until the base is in even contact with the bone, with no play or tilting.
12. Position the screw-drilling barrel in the bowl of the base. **[Fig. C]**
13. Align the Ø 3.2 bit approximately 10° towards the centre of the knee and drill approximately 30 mm. **[Fig. D]**

Keep the screw aligned towards the solid part of the spines. **[Fig. F]**. Do not go further than the barrel allows, as this might make the screw extend beyond the plateau, making it impossible to clip the insert in place and tilt the tibial plateau.

14. Place the cancellous bone screw of the selected length in position, and screw until the screw head is flush with the plateau. **[Fig. E]**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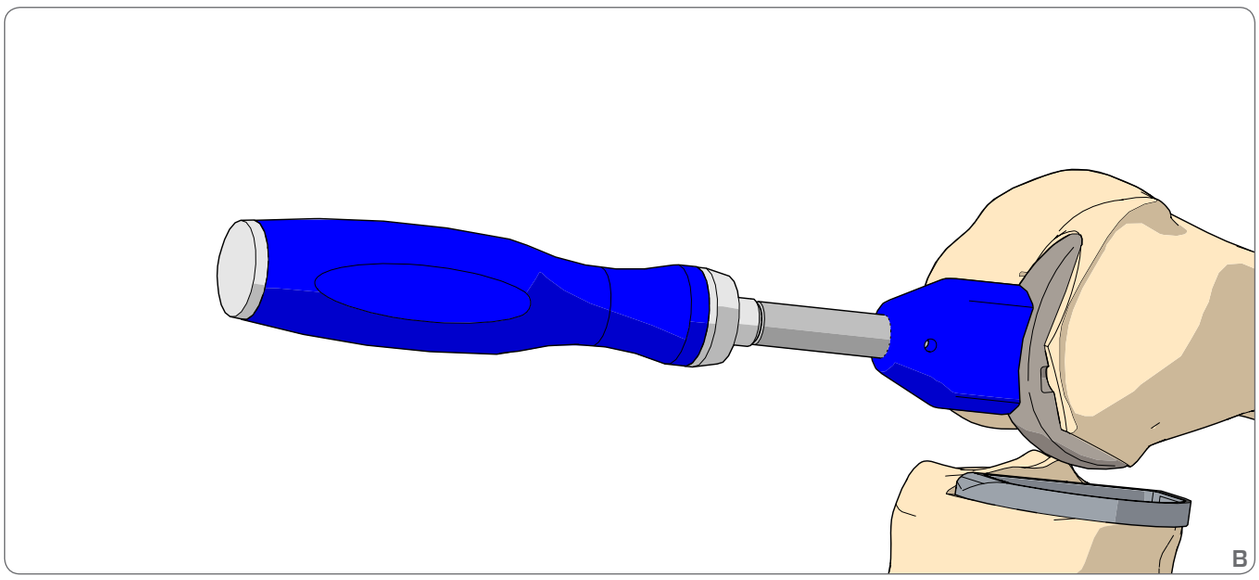

B

Cemented femoral component

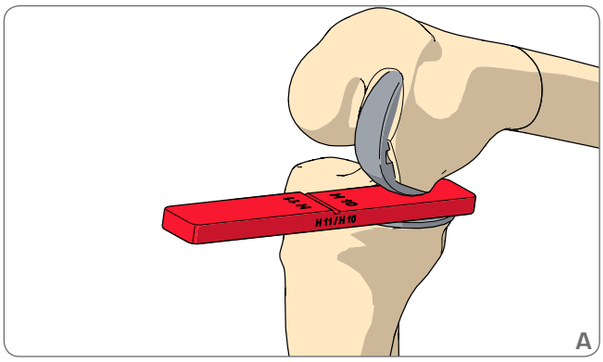
1. Cement the femoral component including the pins.
2. Flex the knee at 110° and insert the longest pin in its hole. **[Fig. A]**
3. Use the condyle impactor to impact firmly in the axis of the pins until contact with the bone cuts is made. **[Fig. B]**
4. Use a curette to remove excess cement, including in the rear section.
5. Insert a femorotibial spacer and hold compressed at 45° flexion until the cement is completely hard.

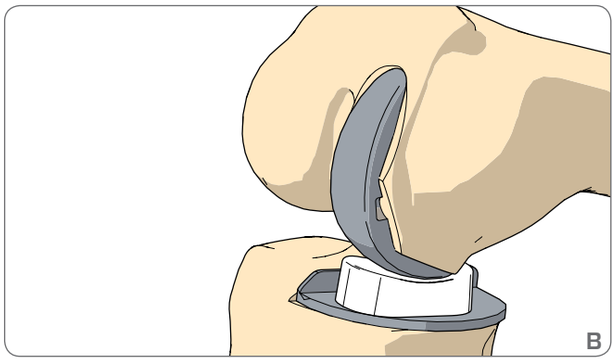
! Do not fully extend the leg, or flex it very far.

6. Remove the spacer and clean away the cement which has emerged from various parts of the component. The posterior edge cannot be seen, but can be probed using a curved curette.

Cementless femoral component

7. Flex the knee at 110° and insert the longest pin in its hole. **[Fig. A]**
8. Use the condyle impactor to impact firmly in the axis of the pins until contact with the bone cuts is made. **[Fig. B]**
9. Check that there is good overall contact between the component and the cuts.


H 11/H 10
A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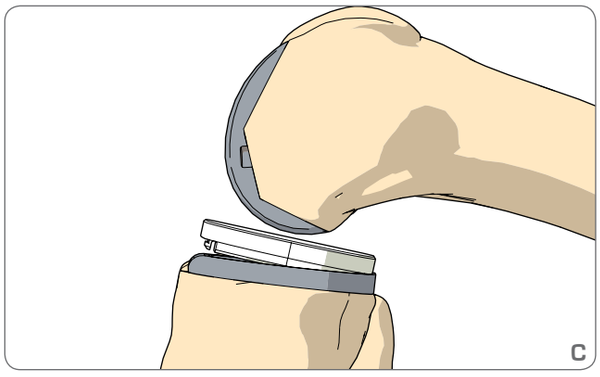
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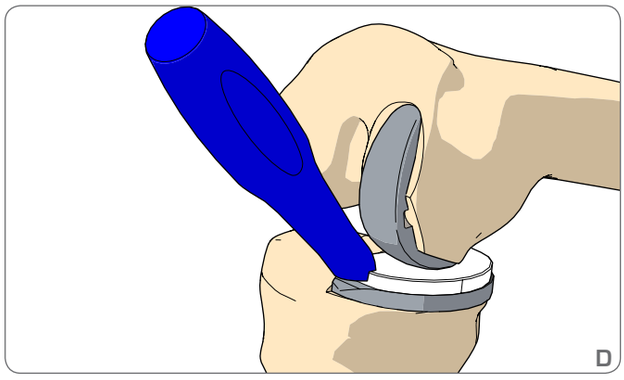
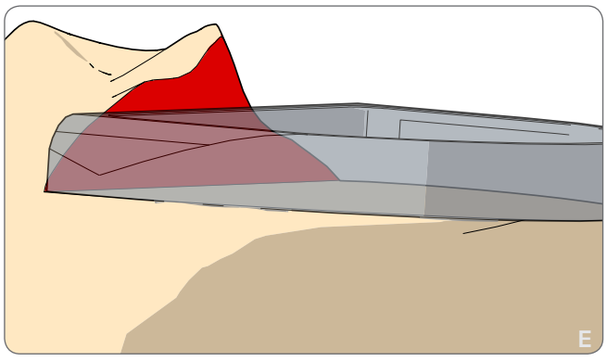

D


E

Positioning the mobile insert

1. Use the femorotibial spacer to check the final space. **[Fig. A]**
2. Select a mobile PE insert of appropriate thickness and the same size as the femoral component. These inserts are symmetrical and so can be placed in either direction.
3. Place the insert between the components. When you hear a click, this means that the insert is in the right position. **[Fig. B]**

The congruence of the insert makes it difficult to position. There are two options :

- Pull the joint as far back as it will go while positioning the insert.
- Placing the knee in valgus position while the surgeon slides the insert in laterally.

4. Perform a function test and make sure that nothing (such as bone, meniscal residue, soft tissue) is trapped, altering the position of the insert, that there is no resistance during flexion, and that the insert remains in place. **[Fig. B]**

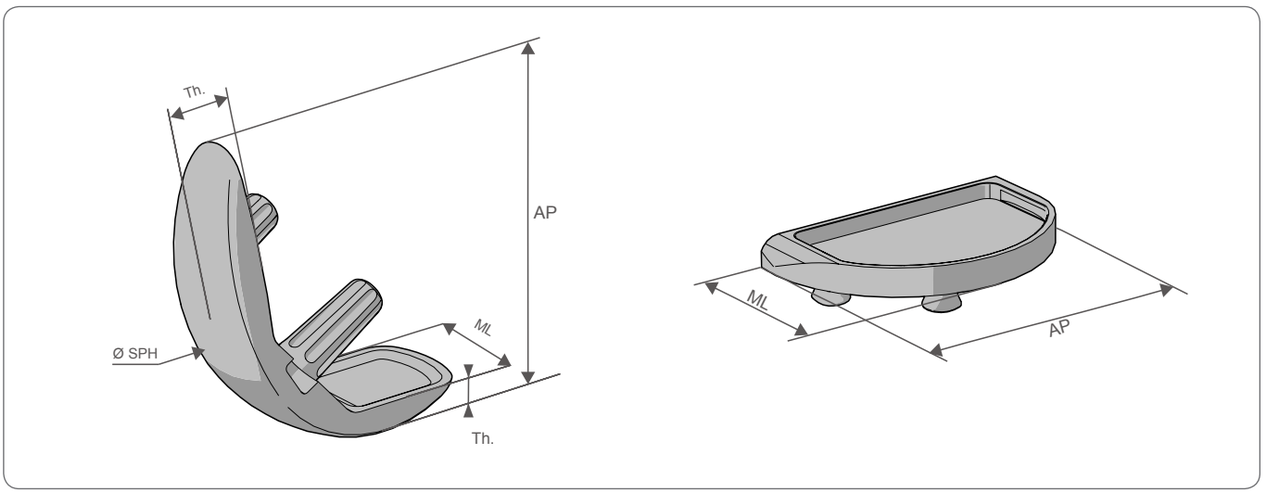
Positioning the fixed insert

5. Select a tibial component of the size and thickness decided on during the trials. These inserts are symmetrical and so can be placed in either direction.
6. Place the insert between the components. Position the posterior section in its housing. **[Fig. C]**
7. Position the clipping tool on the anterior edge of the insert. Align it at a 45° angle then push manually to clip it **[Fig. D]**. When you hear a click, this means that the insert is in place.

Care must be taken not to damage the clipping mechanism when placing the insert in position. The following instructions must be followed :

- Do not use a striking tool.
- The metal base, especially the pouch and the rim, must be clean.
- The PE must be able to “sink” without catching. If necessary, use the rasp to obtain a smooth surface on the solid part of the spines. **[Fig. E]**

8. Perform a function test.


Th.
AP
ML
Ø SPH
Th.
ML
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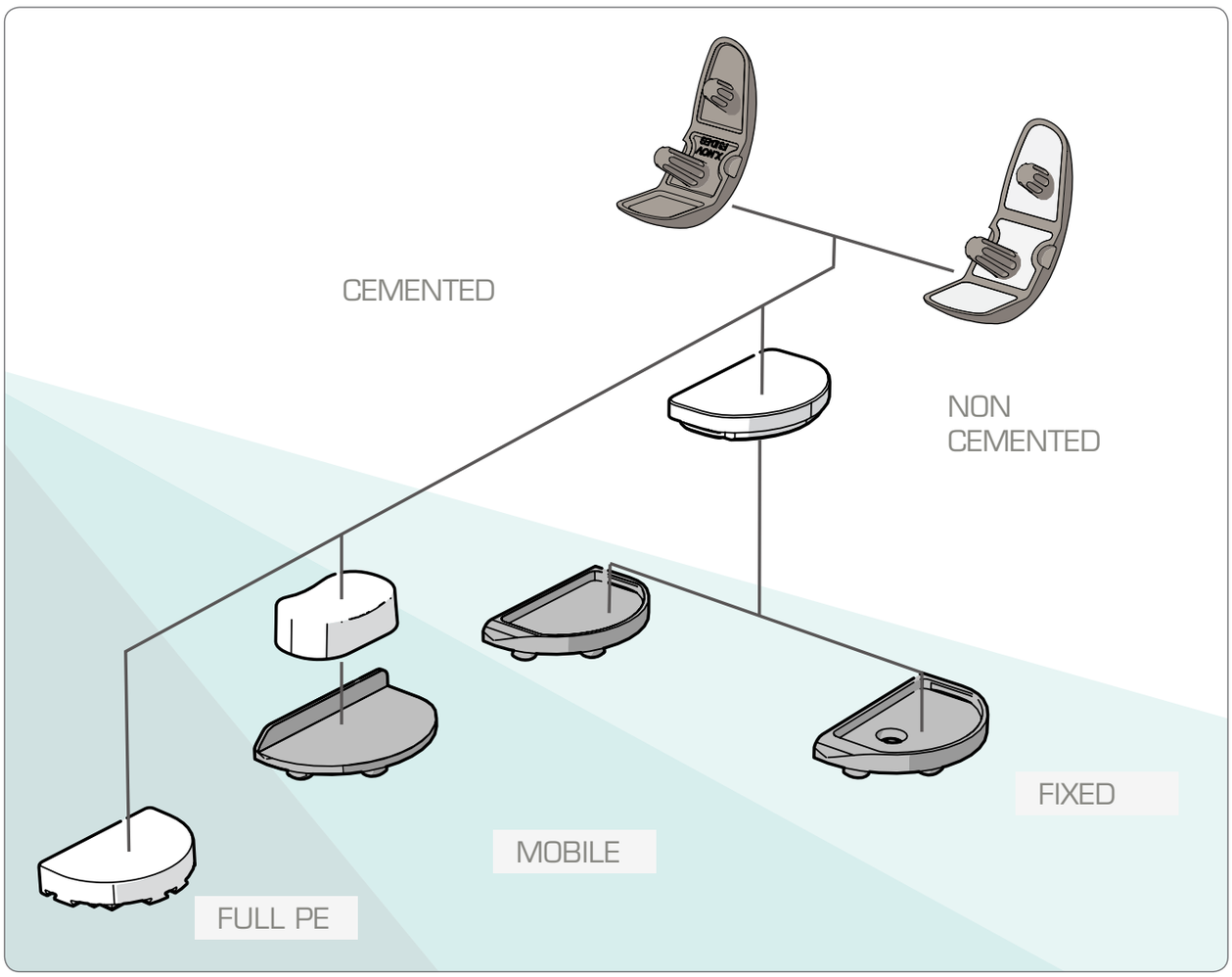

CEMENTED
NON
CEMENTED
FIXED
MOBILE
FULL PE

Technical specifications

Femoral component

Size	ML	AP	Ø SPH.
F1	18	40	27
F2	19	44	31
F3	20	48	35
F4	21	51	37

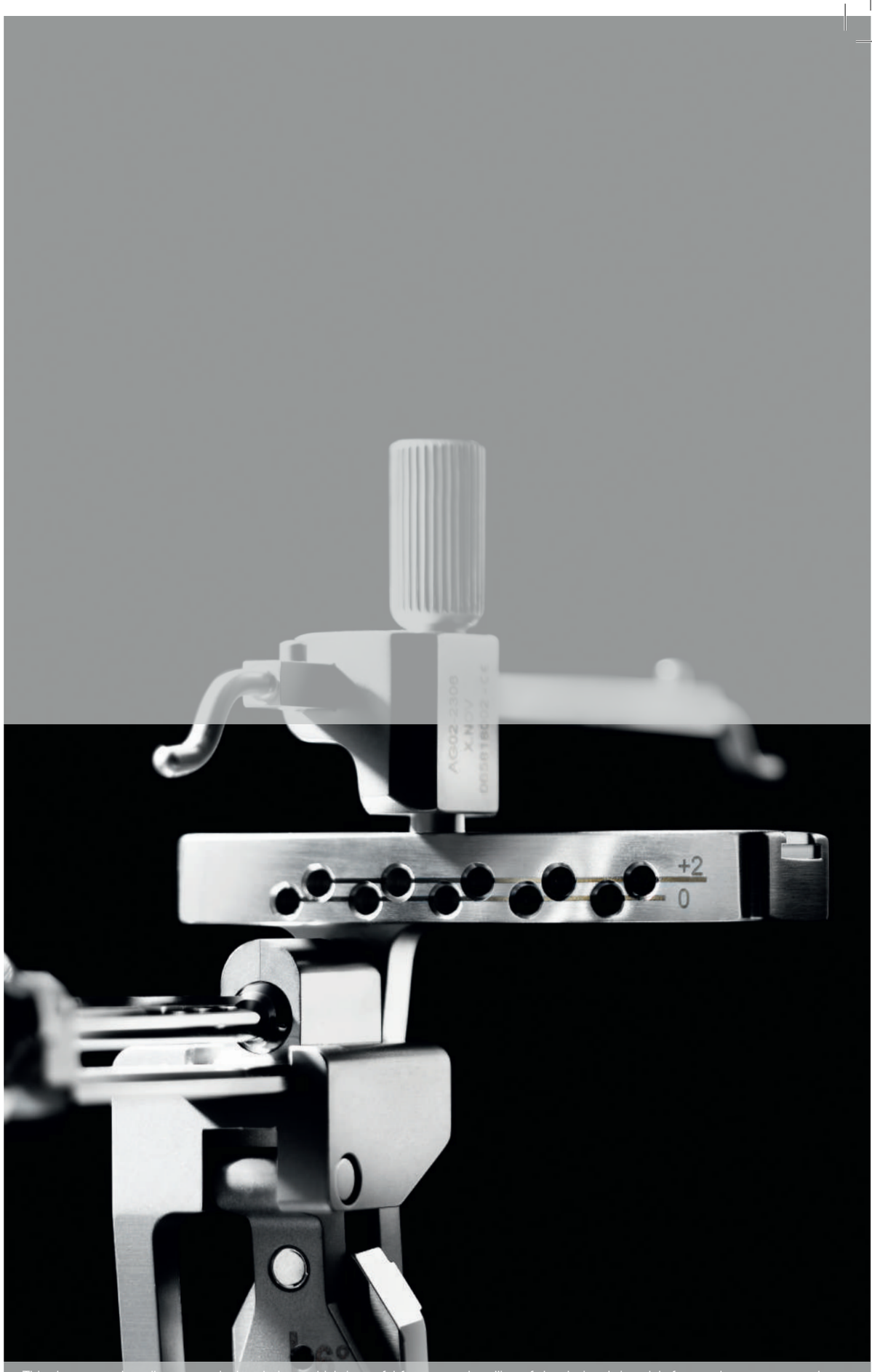
Tibial base

Size	ML	AP
T1	26	41
T2	28	44
T3	30	48
T4	32	52
T5	34	56

Component		Cemented	Cementless	Anatomical	Th.
femoral component		√	√	√	
Tibial baseplate	Mobile	√		√	H8-H9-H10-H1-H12
	Fixed	√	√	√	H9-H10-H11-H12-H14
	Full-PE	√			H8-H10-H12-H14

Cancellous screw

Ø	Lg (mm)
6 mm	25
	30
	35



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