MRS-TITAN STANDARD
MRS-TITAN MAXIMUM
MODULAR REVISION SYSTEM

SURGICAL TECHNIQUE

PETER BREHM
Die Präzision in Titan
für den Menschen

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MRS-TITAN STANDARD
MRS-TITAN MAXIMUM

PRODUCT DESCRIPTION

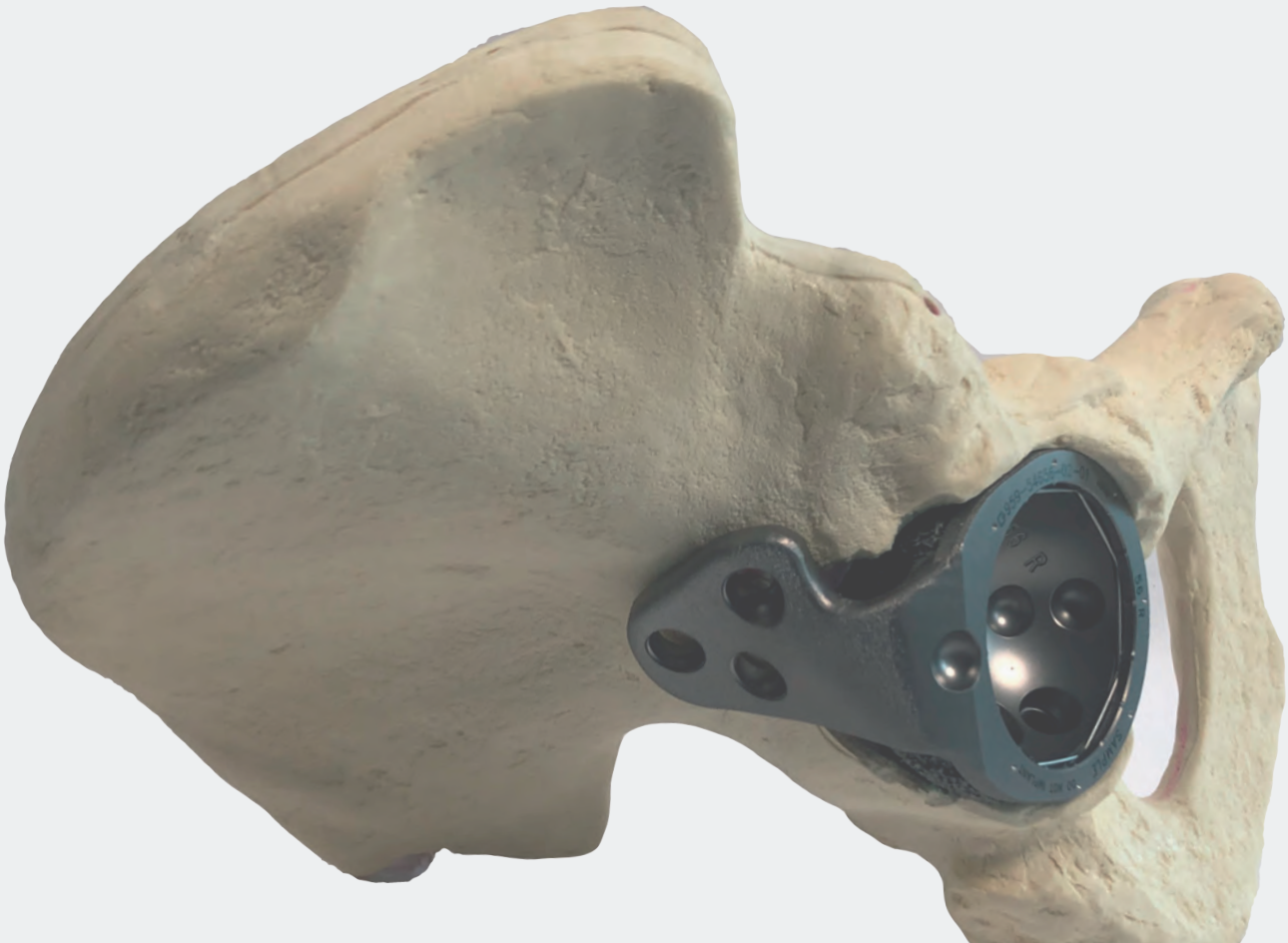
Suggested uses

MRS-TITAN Standard / Maximum		
	MRS-TITAN Standard	Defects up to type IIb* according to Paprosky
	MRS-TITAN Maximum	Defects up to type IIIa* according to Paprosky
	MRS-TITAN Maximum with iliac peg	Defects up to type IIIb* according to Paprosky

**Scuderi G.R., Tria A.J., Long W.J., Kang M.N. et.al. (2015): „Techniques in Revision Hip and Knee Arthroplasty"*

MRS-TITAN STANDARD
MRS-TITAN MAXIMUM

SURGICAL TECHNIQUE



Preoperative planning

The goal of total arthroplasty is the optimal anatomic reconstruction of the affected joint. The first step is to determine the center of rotation of the affected joint. Preoperative planning begins with the evaluation of the size and placement of the acetabular component based on the radiograph with the goal of achieving identical leg length with optimal initial stability. Especially in revision cases, a survey view of the pelvis should be obtained to allow comparison with the contralateral hip.

X-ray templates with a scale 1.16:1 are available for preoperative planning of the procedure.

The optimal implant size and position should be determined on the basis of coronal and lateral radiographs of the pelvis prior to the intervention.

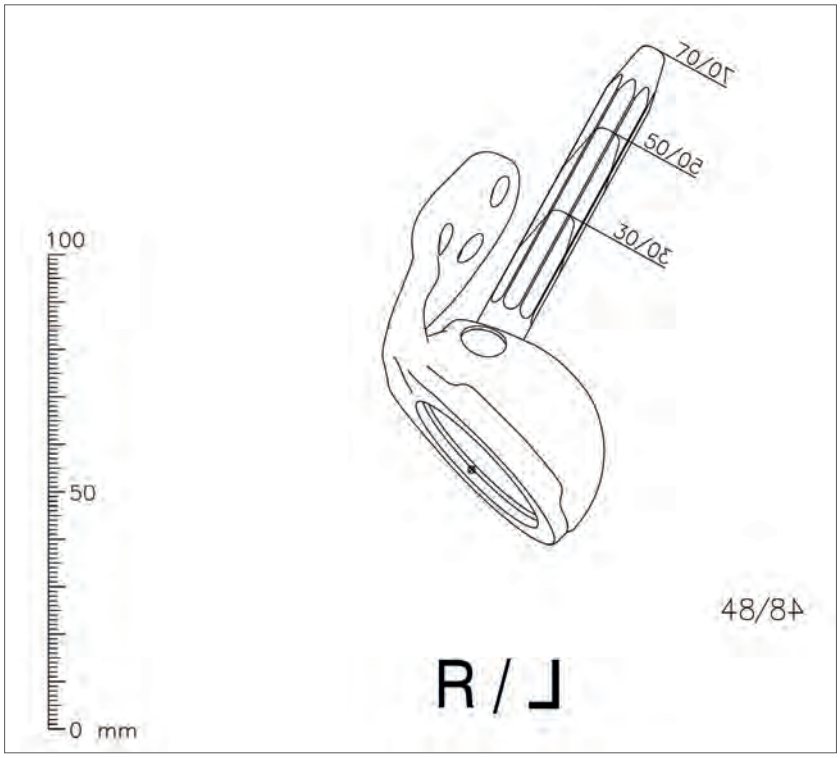


Fig. 1: X-ray template

The purpose of preoperative planning is only to provide an initial estimation. The final size and position of the implant are invariably determined intraoperatively according to the specific defect situation.

! NOTE

The correct selection of the implant (size, shape, composition, etc.) can reduce risks such as loosening.

Patient positioning and surgical approach

This manual of surgical technique does not describe any particular approach for the MRS-TITAN Standard and Maximum. The surgeon can opt for any preferred approach with the patient in a supine or lateral position but must follow the steps described here. The surgeon then modifies these steps as required by the specific approach.

Broad exposure of the acetabulum is required for implantation. The exposure should give the surgeon a clear view of the anatomic structures so that the operation can proceed smoothly and correctly. It is assumed that a careful dissection will be performed in order to spare neurovascular structures.

Any previously placed acetabular implant, bone cement, and screws must be completely removed prior to implantation. PETER BREHM GmbH does not provide any instruments for the removal of previously placed implants supplied by other manufacturers. The respective manufacturer's surgical procedure required for the revision of implants in situ must be observed.

Determining size - evaluating the pelvis and defect situation

Acetabular defects require careful intraoperative evaluation. The *TRIAL Liner/Impactor* can be used to assess the position, degree, and type of bone defect prior to reaming. It is important to determine the quantity, quality, and position of the remaining bone available for implantation.

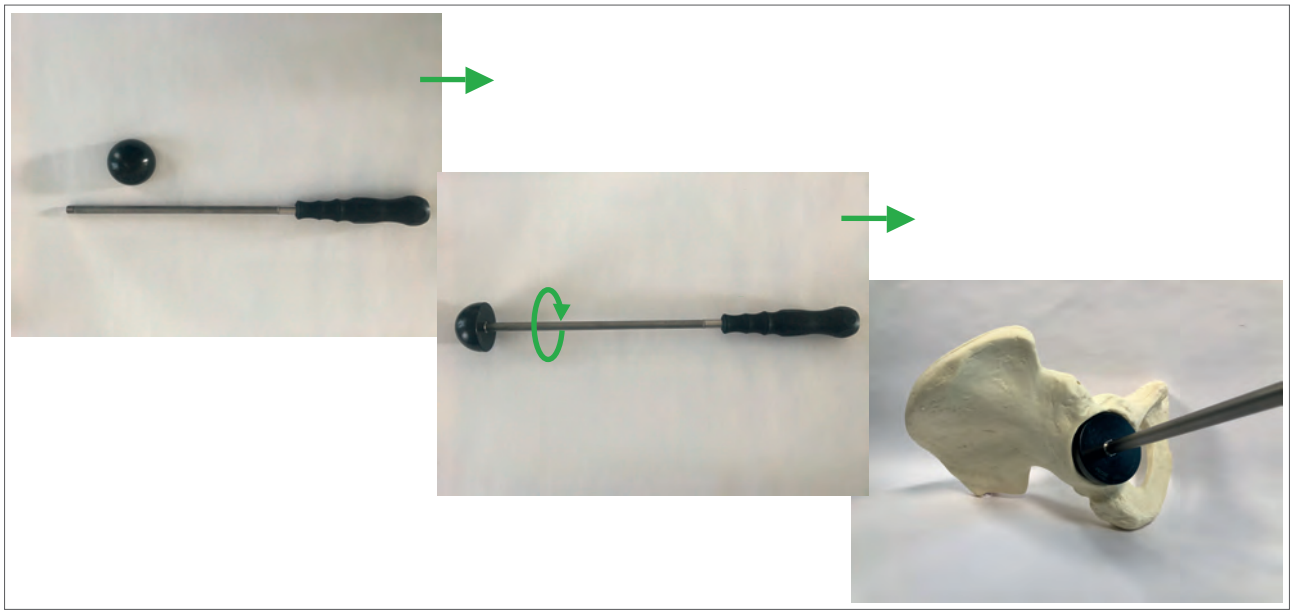


Fig. 2: Assembling the TRIAL Liner/Impactor

Preparing the implant site

The floor and rim of the acetabulum are carefully debrided. Reaming of the acetabulum invariably begins with either the smallest *Acetabular reamer* or a reamer significantly smaller than the diameter of the anatomic acetabular floor (D1). The diameter is successively increased. Bone quality and defect type are again evaluated after reaming.

Preparing the implant site
Anatomic cup rotation center

The MRS-TITAN Standard and Maximum have a cup body with dual radius design. The anatomic cup rotation center is reconstructed with the larger diameter (D1). The smaller diameter (D2) of the cup body is intended to fill cranial defects.

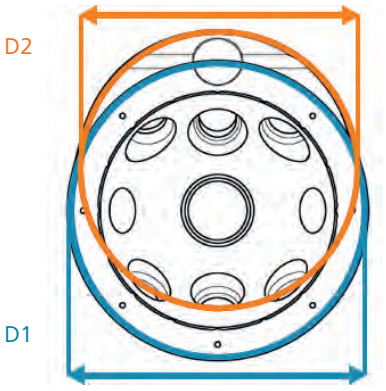


Fig. 3: Cup body dual radius design

! NOTE

There must always be a cranial form closure.

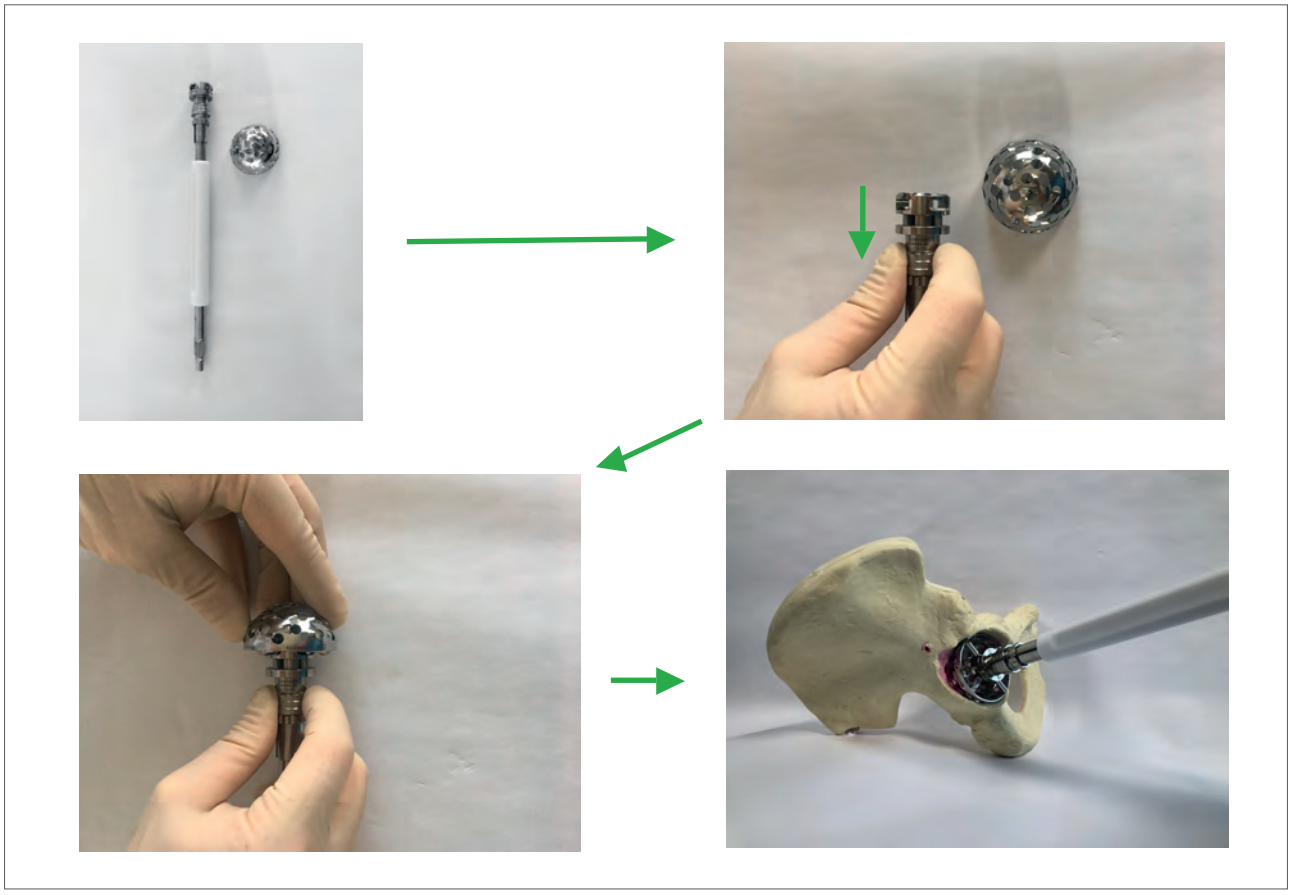


Fig. 4: Assembling the Acetabular reamer

Selecting the size of the definitive implant defines the overall press fit. To achieve an overall press fit of 2 mm, the size of the definitive implant selected must be 2 mm larger than the size of the last acetabular reamer used for the anatomic cup rotation center (D1).

An *Acetabular reamer 50 mm in diameter* combined with a size 52 implant produces a 2 mm press fit (1 mm on each side). TRIAL implant size Ø 52 = 1 mm press fit.

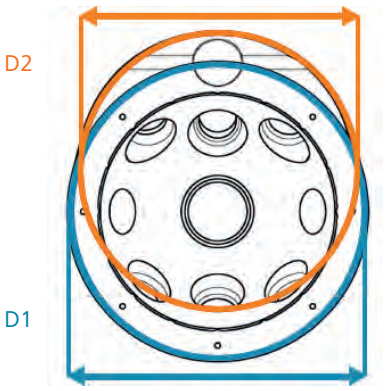
! NOTE

To avoid lateralizing the center of rotation you must ream 4 mm deeper relative to the plane of the acetabular rim.

It is recommended to insert the trial implant already after reamer D1 in order to assess the defect situation before reamer D2.

Nominal dimension = reaming dimension

Table 1 shows the respective size selection and the correlation between reamer diameter and the size of the trial and definitive implants (2 mm overall press fit).



Definitive implant (size)	Trial cup (size)	Ream 1 (D1) cup rotation center [Ø mm]	Ream 2 (D2) cranial defect [Ø mm]
48	48	46	42
50	50	48	44
52	52	50	46
54	54	52	48
56	56	54	50
58	58	56	52
60	60	58	54
62	62	60	56
64	64	62	58
66	66	64	60
68	68	66	62
70	70	68	64
72	72	70	66
74	74	72	68
76	76	74	70

Table 1: Correlation between reamer diameter and the size of the trial and definitive implants with 2 mm overall press fit.

Preparing the implant site
Cranial defect

The smaller diameter (D2) of the cup body is used to fill cranial defects.

The trial implant can be placed in the classic manner or, as shown here, used as an orientation aid for reaming.

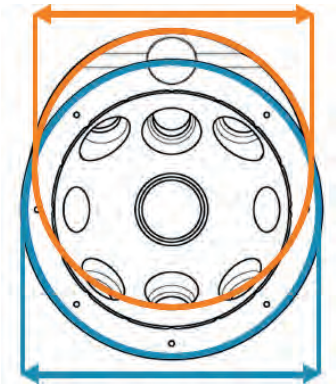
The dissection is performed step by step using a manual technique.

The offset of the outer contour of the second ream (D2; cranial defect augmentation) is 6 mm to the first ream (D1).

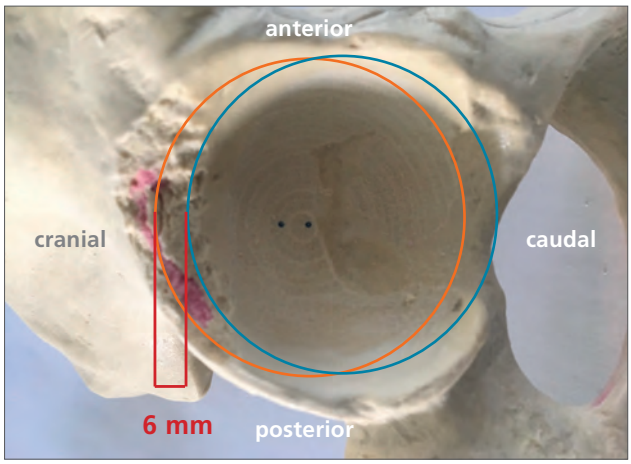
If the edge of ream D2 is to be marked in situ, the marking should be made at a distance of 6 mm from ream D1.

Begin with the smallest acetabular reamer and use increasing sizes up to a diameter 4 mm smaller than ream 1 (D1); see Table 1.

Ream 2 (D2) [Ø] =
Ream 1 (D1) [Ø] – 4 mm



Ream 1 (D1) [Ø]



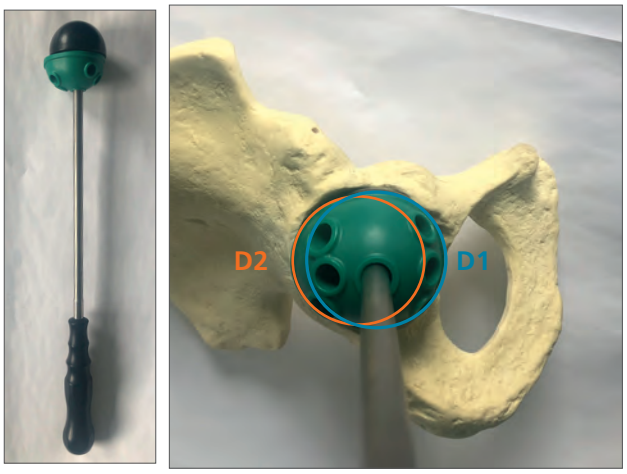


Fig. 6: Trial implant used as orientation for reaming

Ream 1 (D1):
Dissection
Cup rotation center

Ream 2 (D2):
Dissection
Cranial defect

! NOTE

The ream is continuously checked against the trial implant.

Placing the TRIAL cup

To assemble the setting tool, screw the *setting tool* into the *Clamping tube*. Then screw the *setting tool* into the threading on the *TRIAL revision acetabular cup* and secure it with the *Clamping tube*. Make sure that the *Clamping tube* is only hand tightened when connecting it.

The *TRIAL revision acetabular cup* is then impacted into the prepared acetabulum.

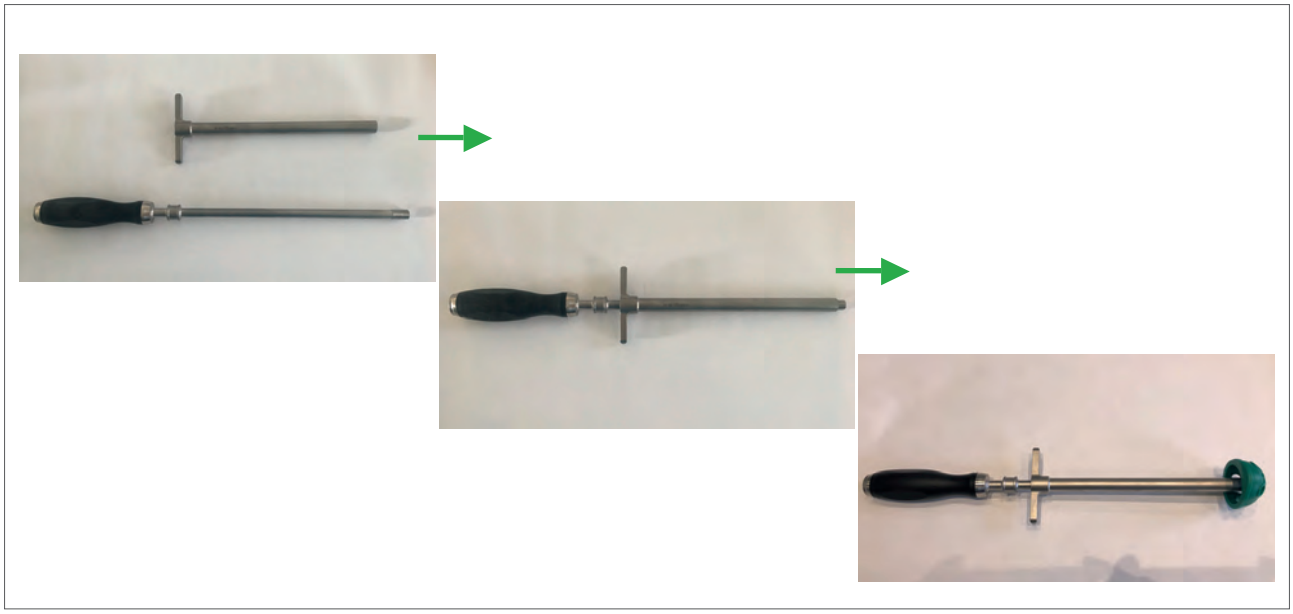


Fig. 7: Assembling the setting tool; shown here is the MRS-TITAN Standard TRIAL

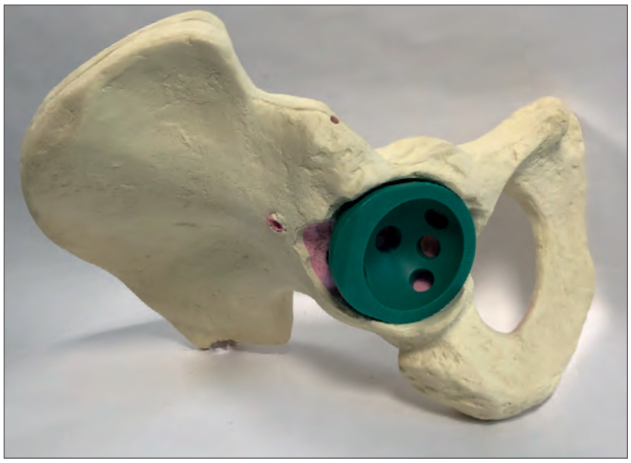


Fig. 8: MRS-TITAN Standard TRIAL

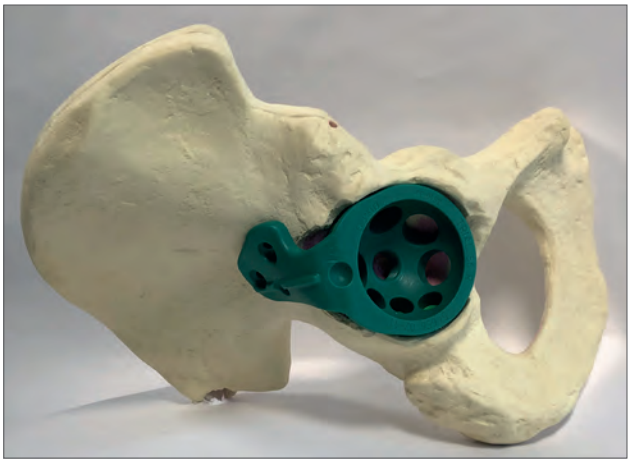


Fig. 9: MRS-TITAN Maximum TRIAL

! NOTE

- Make sure that the threading of the setting tool is screwed completely into the threading of the cup but does not project beyond it.
- When using the Trial revision acetabular cup with strap, it is advisable to seek for the widest possible contact between the strap and the Os illium. If this cannot be achieved, bone must be removed at the upper edge of the acetabulum at the transition from the cup body to the strap.

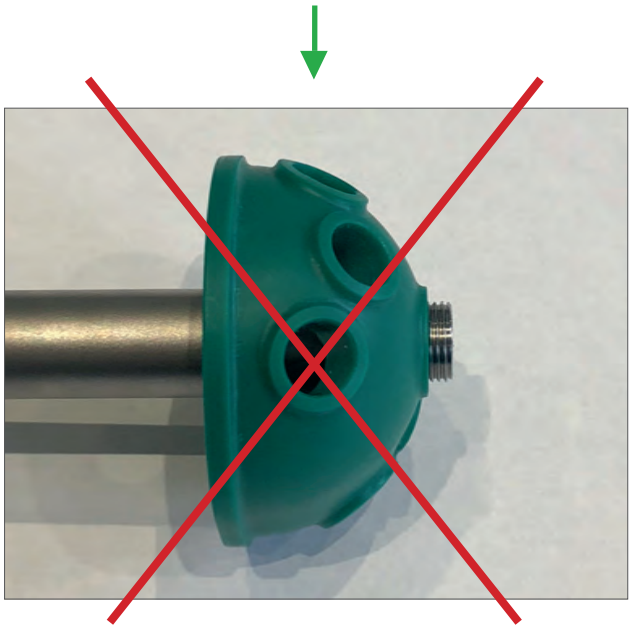


Fig. 10: Incorrectly assembled TRIAL and setting tool

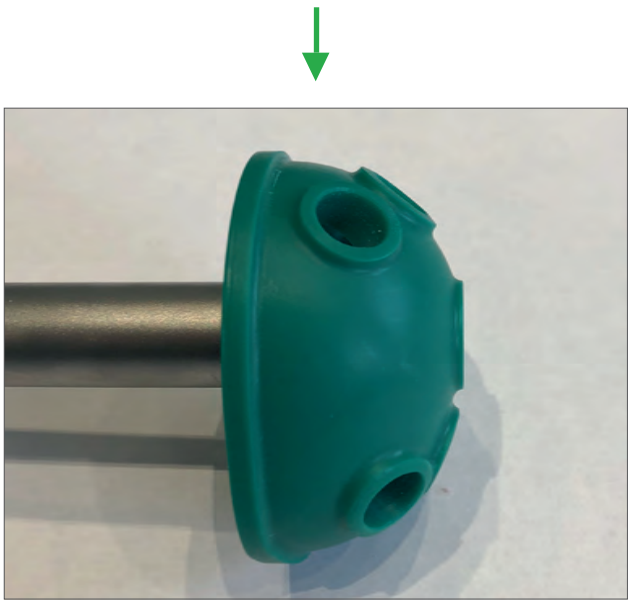


Fig. 11: Correctly assembled TRIAL and setting tool

Evaluating the position and setting of the TRIAL cup

The hemispheric shape and congruency of the trial implant with the implant site can be evaluated through the large viewing windows in the trial implant. On the trial implant for the MRS-TITAN Maximum, the position of the iliac peg is also indicated on the strap.

! NOTE

The overall press fit of the *TRIAL revision acetabular cup* is not sufficient to evaluate the stability of the definitive implant against tilting, rotational and tensile forces.

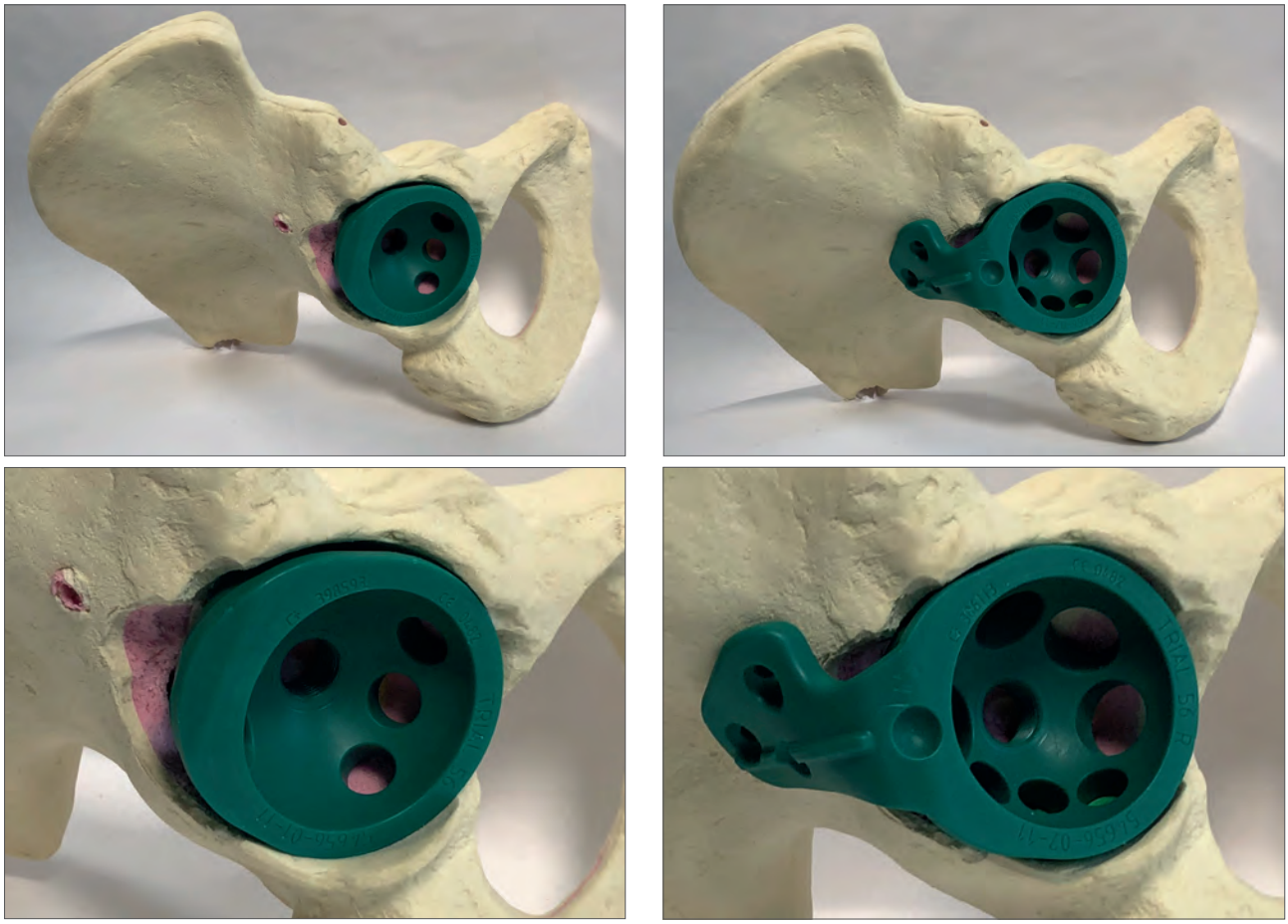


Fig. 12: MRS-TITAN Standard TRIAL

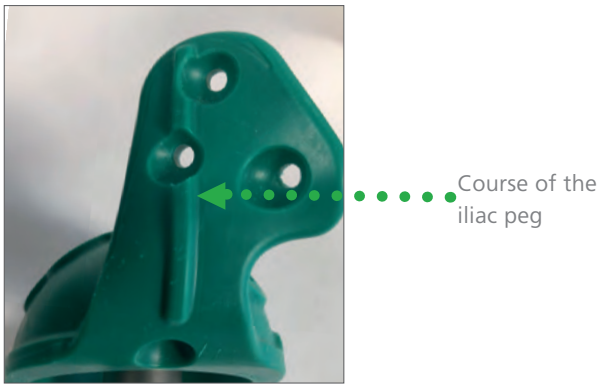


Fig. 13: MRS-TITAN Maximum TRIAL

Placing the definitive implant

After the trial cup has been removed, the definitive implant with the same diameter as the final trial is impacted in the position determined previously. To do this, unscrew the transport plug from the definitive cup and attach the cup to the setting tool.

Using the touch probe, test whether the implant has good contact with the bone of the acetabular floor and rim. The implant must be stable against tilting, rotational, and tensile forces. Consider selecting a different size if necessary. (Titanium) Flat-head spongiosa screws can increase the initial stability of the implant.

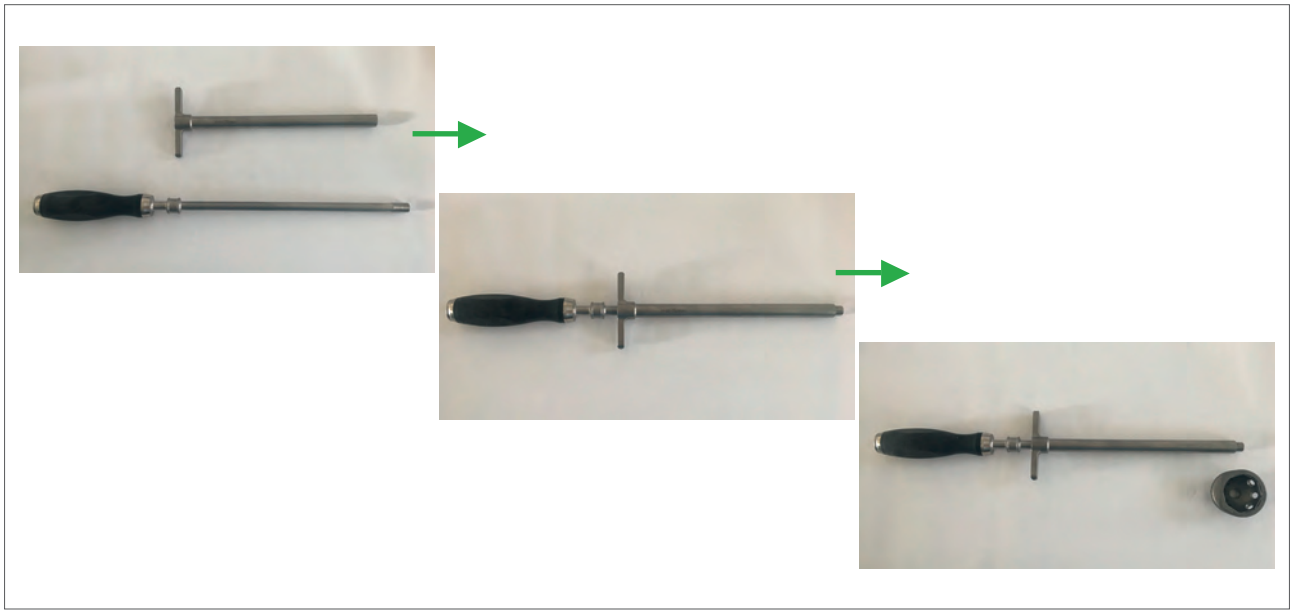


Fig. 14: Assembling the setting tool; shown here is the MRS-TITAN Standard

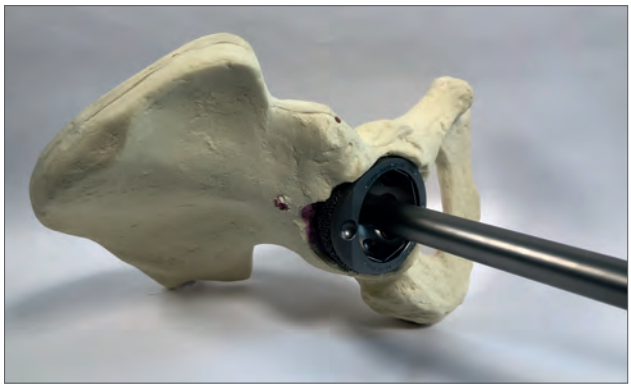


Fig. 15: Setting tool

! NOTE

- Make sure that the threading of the setting tool is screwed completely into the threading of the cup but does not project beyond it.
- When using a revision acetabular cup with strap, every effort should be made to achieve a broad area of contact between the strap and the ilium. If this is not feasible, then bone must be removed from the superior margin of the acetabulum at the junction of the cup body and the strap.

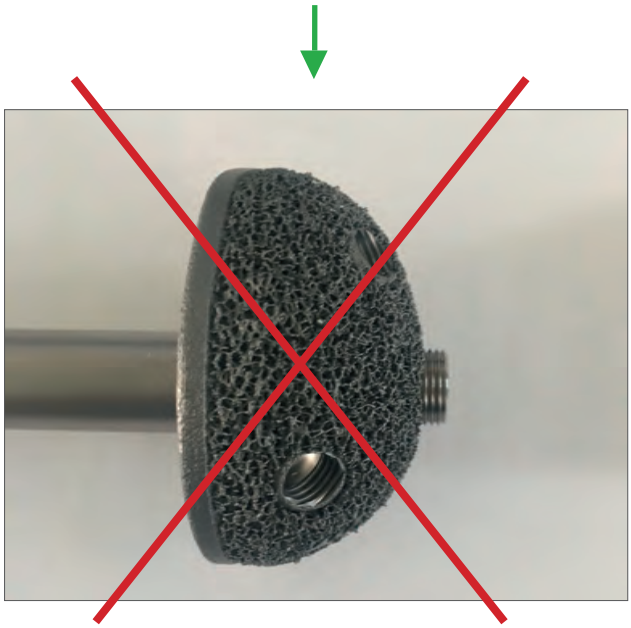


Fig. 16: Incorrectly assembled implant and setting tool

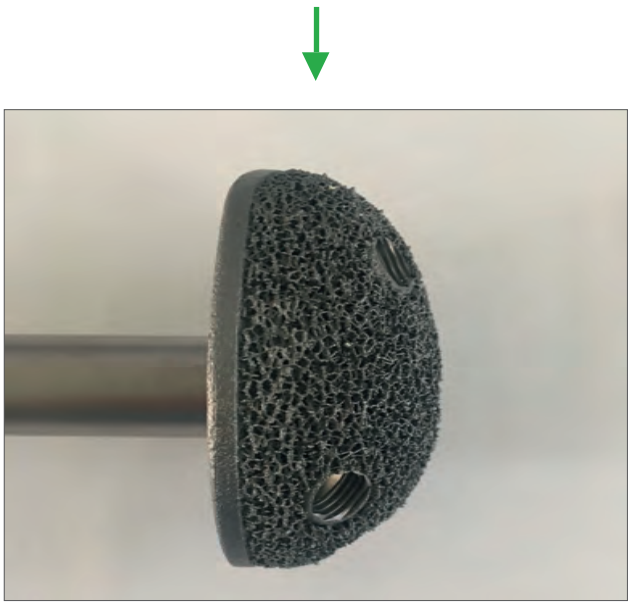


Fig. 17: Correctly assembled implant and setting tool

If a slight change in the position of the implant is required, this can be achieved by using the additional impactors (*Reposition impactor attachment, crescent, or Reposition Impactor*).

Fig. 18: Reposition impactor attachment, crescent

Fig. 19: Reposition Impactor

! NOTE

- Make sure that the implants (MRS-TITAN Maximum) for the right side are used in the right hip and the implants for the left side are used in the left hip.
- Do not touch rough surfaces with cloths or any materials that produce lint.
- Make sure that the threading of the setting tool is screwed completely into the threading of the cup but does not project beyond it.
- When using a revision acetabular cup with strap, it is advisable to seek for the widest possible contact between the strap and the Os illium. If this cannot be achieved, bone must be removed at the upper edge of the acetabulum at the transition from the cup body to the strap.
- The impactor may only be applied to the ball countersinks, screw countersinks and the reducing screw. It is not permitted to apply the impactor on surfaces without countersinks as this may damage the structure or the implant surface.
- Make sure the circlip is intact. If it was damaged during impaction of the implant, it must be replaced.

Fixation of the definitive implant and screw fixation in the acetabular floor

Drilling pilot holes

A 3.2 mm flexible drill and appropriate *Drill guide* are used to drill pilot holes for the (Titanium) Flat-head Spongiosa Screws. The holes are drilled in the direction of stress transfer into the hip.

! NOTE

The *Drill Bit Size Ø 4.5 mm* can be used in hard or sclerotic bone.

Determine screw length

A measuring gauge is used to determine the length of the screws. Take care to ensure that the measuring gauge is inserted into the drill hole as far as it will go.

Insert screws

First, (Titanium) Flat-head Spongiosa Screws are inserted into the inner row of drill holes. These screws are essential to the long-term stability of the implant system.

If there is no need for an additional iliac peg for fixation, then the strap is screwed down.

! NOTE

- Use only (Titanium) Flat-head Spongiosa Screws in the inside of the cup.
- Always use the proper *Drill guide* when drilling.
- The screw length is determined with the aid of the depth gauge. Make sure that the depth gauge is inserted into the hole up to the stop.
- The (Titanium) Flat-head Spongiosa Screws in the inner row must be countersunk flush with the surface of the cup body so they will not interfere with the locking mechanism of the acetabular cup insert.
- In order to achieve long-term stability and rigid fixation of the MRS-TITAN Maximum, at least two screws or an iliac peg must be inserted in the dome of the cup.
- When setting the screws, make sure that they do not collide with each other.

Fig. 20: Flexible drill and Drill guide

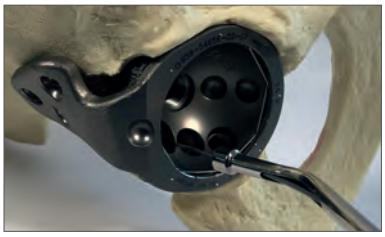


Fig. 21: Introducing the measuring gauge

Fig. 22: Measuring gauge has contact within the fixation hole

Fig. 23: Cardan Screw Driver AF 3,5 and Screw Holding Forceps Ø 5,4

Placing the iliac peg

The MRS-TITAN Maximum can be fixed in the acetabulum with an optional iliac peg. A reducing screw for (Titanium) Flat-head Spongiosa Screws is screwed into the drill hole for the iliac peg at the factory.

! NOTE

Provided that a spongiosa screw has not been placed yet, it may be necessary to reimpact the entire implant in the direction of the axis of the iliac peg after placing the iliac peg to ensure contact between the implant and the bone. It is not allowed to hit the locking screw with the *Reposition impactor*. It is absolutely necessary to retighten the locking screw with a defined torque.

Removing the iliac peg reducing screw

To use the iliac peg, the reducing screw must first be removed with the *Setting tool for drill sleeve, iliac peg*.

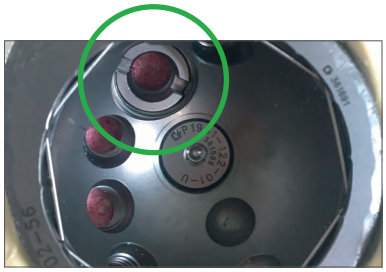


Fig. 24: Iliac peg reducing screw

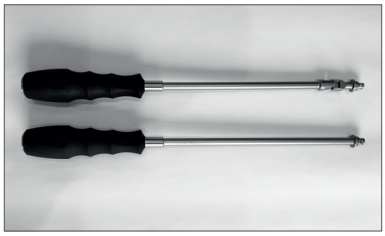


Fig. 25: Setting tool for drill sleeve, iliac peg

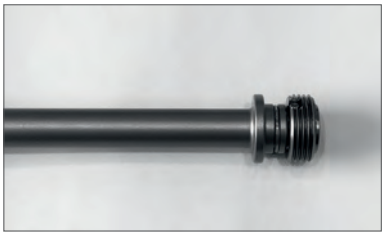


Fig. 26: Removing the iliac peg reducing screw

Inserting the drill sleeve, iliac peg

The *Setting tool for drill sleeve, iliac peg* is used to screw the *Drill sleeve, iliac peg* into the drill hole.

Fig. 27: Drill sleeve, iliac peg with Setting tool for drill sleeve, iliac peg

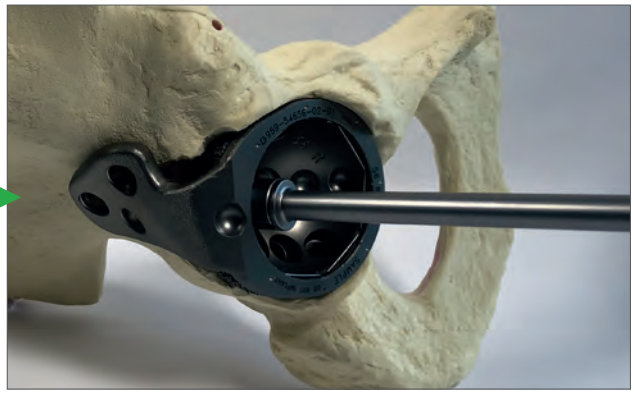


Fig. 28: Inserting the Drill sleeve, iliac peg

! NOTE

- The threading must not be damaged when the reducing screw is removed. It is required to secure the iliac peg.
- The *Drill sleeve, iliac peg* must be used to prepare the peg.
- Screw the *Drill sleeve, iliac peg* all the way in to ensure that it properly guides the drill.
- Avoid tilting the *Drill sleeve, iliac peg* when screwing it in.

Determining the length of the iliac peg

The length of the iliac peg is determined solely with the aid of the *K-wire* on the basis of the size markings.

The *K-wire* is inserted under fluoroscopic control through the attached *Reducing sleeve, K-wire* in the *Drill sleeve, iliac peg*. Iliac pegs are available in sizes 30, 50, and 70.

! NOTE

- Before using the K-wire, check that it is intact.
- Do not use damaged and/or bent K-wire.
- The K-wire indicates the end position of the iliac peg. To ensure free entry of the iliac peg (DBZ), the end position (stop) of the *Drill with stopper* is used to overdrill the indicated length by 6.5 mm.
- If a press-fit anchorage of the iliac peg tip is desired, the drilling must be correspondingly shorter.
- If the end position of the K-wire during the X-ray check is at the edge of joints, vessels, nerves, soft tissues and bony countercorticalis, the shorter iliac peg length should be selected or the 6.5 mm should be taken into account during preparation.

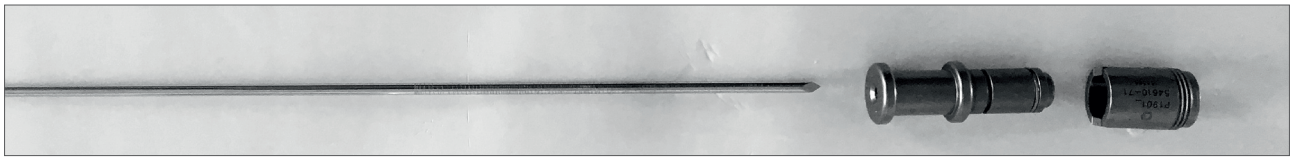


Fig. 29: K-wire Reducing sleeve, K-wire Drill sleeve, iliac peg

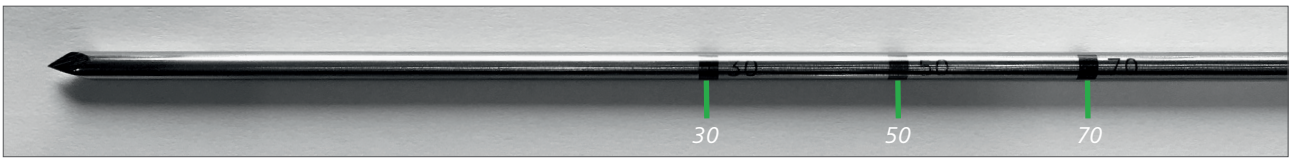


Fig. 30: K-wire size markings

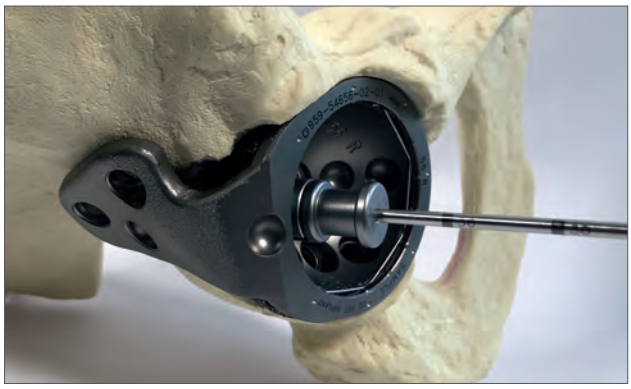


Fig. 31: Determining the size of the iliac peg

Drilling for and preparation of the iliac peg

The site is prepared for the iliac peg with a *Drill with stopper* of the required size of iliac peg (30, 50, and 70 mm).

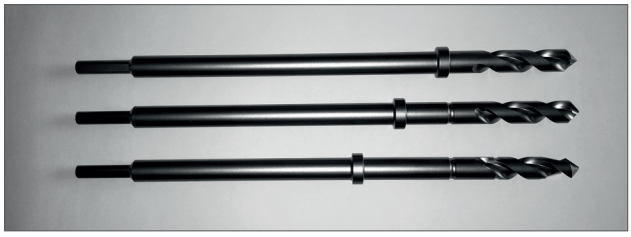


Fig. 32:
Drill with stopper Ø 10 x 30 mm / 54600-07
Drill with stopper Ø 10 x 50 mm / 54600-08
Drill with stopper Ø 10 x 70 mm / 54600-09

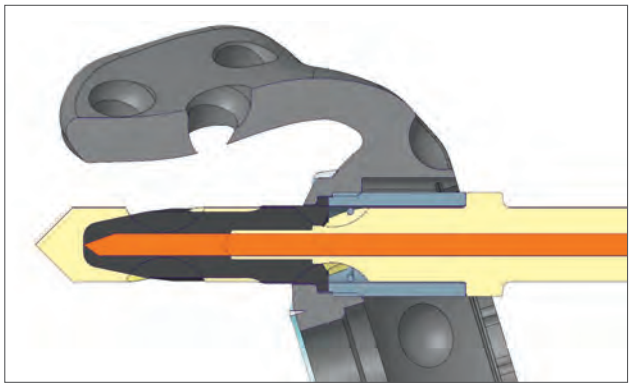


Fig. 33:
Drilling depth Drill with stopper

! NOTE

- The K-wire indicates the end position of the iliac peg. To ensure free entry of the iliac peg (DBZ), the end position (stop) of the *Drill with stopper* is used to overdrill the indicated length by 6.5 mm.
- If a press-fit anchorage of the iliac peg tip is desired, the drilling must be correspondingly shorter.
- If the end position of the K-wire during the X-ray check is at the edge of joints, vessels, nerves, soft tissues and bony countercorticalis, the shorter iliac peg length should be selected or the 6.5 mm should be taken into account during preparation.

When using the *Drill sleeve, iliac peg*, drill all the way to the stop to ensure that the necessary depth is achieved.

! NOTE

- Note that the stop provided by the *Drill with stopper* overdrills the iliac peg by 6.5 mm.
- Avoid tilting the drill bit within the *Drill sleeve, iliac peg*. For this reason, the position/working area of the drilling machine must be displayed at an early stage (access).
- Always use the *Drill sleeve, iliac peg* when preparing the site for the iliac peg.

! CAUTION

It must be ensured that no sparkover occurs between high-frequency instruments and the implant, as this reduces the endurance strength of the implant.

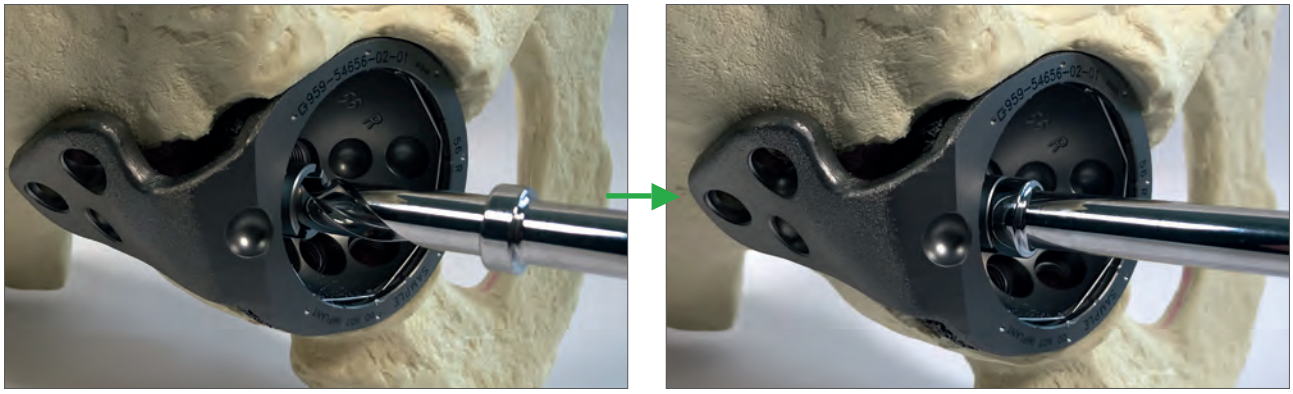


Fig. 34: Drill hole for the Iliac peg

Alternatively, the site can be prepared for the peg using the *Drill Ø 10 x 400 mm* in combination with *tissue protection sleeve, iliac peg*.

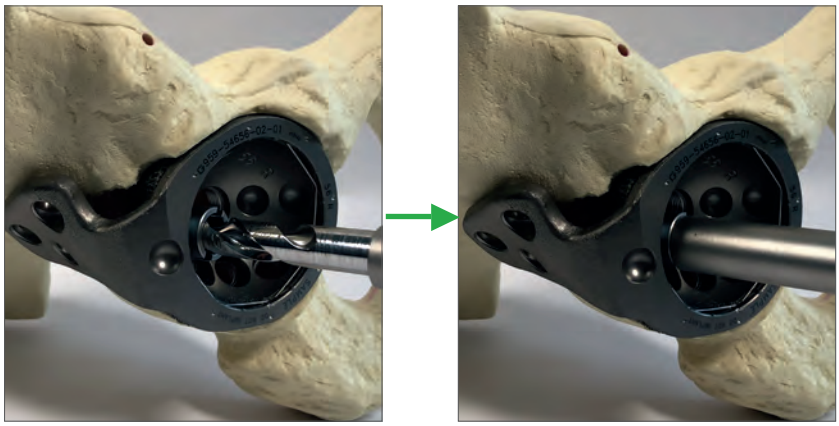


Fig. 35: Drill hole for the Iliac peg

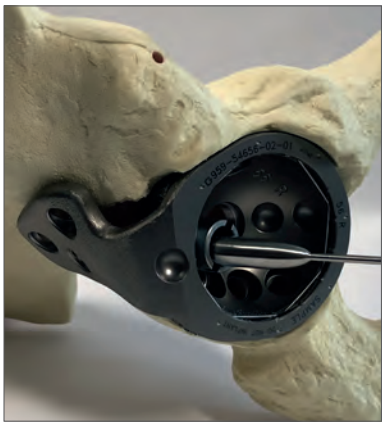


Fig. 36: Touch probe in drop form

Fig. 37:
Tissue protection sleeve, iliac peg 30 mm
+
Tissue protection sleeve, iliac peg 70 mm

▶ *30 mm iliac peg*

Fig. 38:
Tissue protection sleeve, iliac peg 50 mm
+
Tissue protection sleeve, iliac peg 70 mm

▶ *50 mm iliac peg*

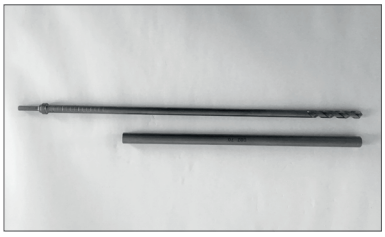


Fig. 39:
Tissue protection sleeve, iliac peg 70 mm

▶ *70 mm iliac peg*

! NOTE

Note that the stop provided by the *Drill sleeve, iliac peg* overdrills the length of the iliac peg by 6.5 mm.

When using the *Drill sleeve, iliac peg*, drill all the way to the stop to ensure that the necessary depth is achieved. Verify the proper depth of the drill hole with the *Touch probe in drop form*.

! NOTE

- Avoid tilting the drill bit within the *Drill sleeve, iliac peg*. For this reason, the position/working area of the drilling machine must be displayed at an early stage (access).
- Always use the *Drill sleeve, iliac peg* when preparing the site for the iliac peg.
- The K-wire indicates the end position of the iliac peg. To ensure free entry of the iliac peg (DBZ), the end position (stop) of the *Drill with stopper* is used to overdrill the indicated length by 6.5 mm.
- If a press-fit anchorage of the iliac peg tip is desired, the drilling must be correspondingly shorter.
- If the end position of the K-wire during the X-ray check is at the edge of joints, vessels, nerves, soft tissues and bony countercorticalis, the shorter iliac peg length should be selected or the 6.5 mm should be taken into account during preparation.

Placing the iliac peg

The definitive implant is placed with the *Impactor, iliac peg*. To do this, the attached *Drill sleeve, iliac peg* must first be removed.

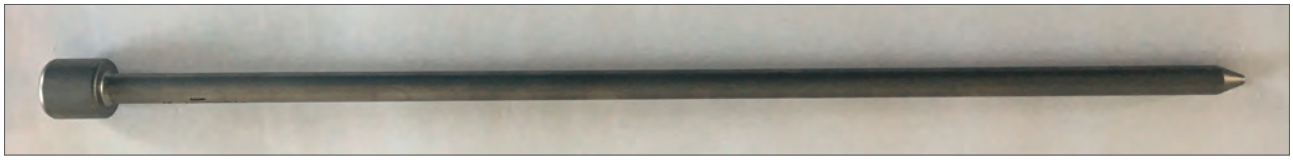


Fig. 40: Impactor, iliac peg

! NOTE

- To ensure secure fixation of the peg in the drill hole in the cup, the inner contour of the cup and the threading must be free of residues and contaminants.
- Make sure the peg is impacted all the way to the metal stop.
- The peg may only be placed with the *Impactor, iliac peg* designed for this purpose. Make sure that the threading is not damaged as it is required for implant removal.

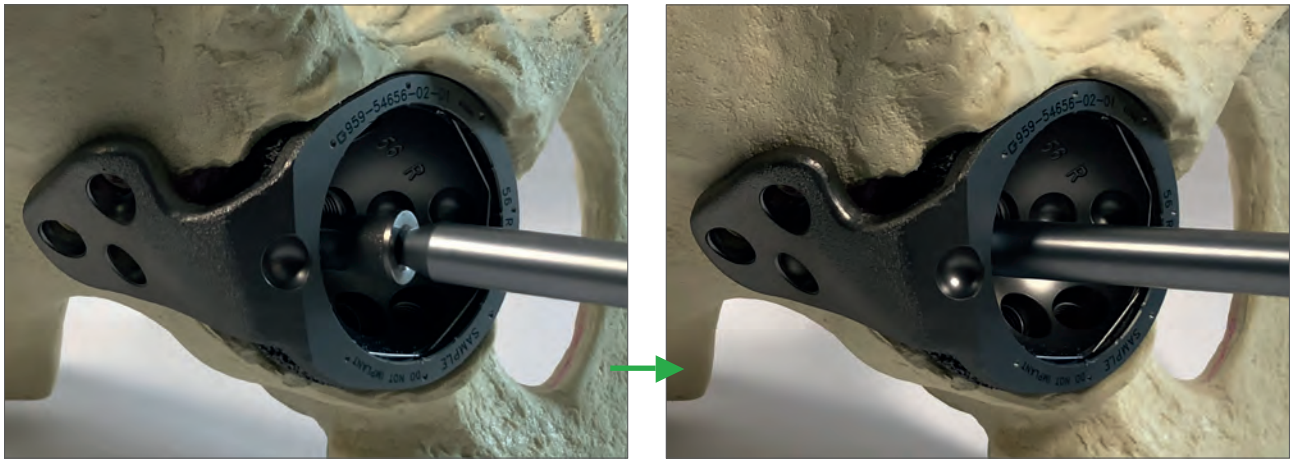


Fig. 41: Placing the iliac peg

Securing the iliac peg

Once the iliac peg has been completely impacted, it is secured with the locking screw iliac peg. The screw should be screwed in all the way and tightened to a defined torque of 8 Nm.

To do this, insert the *Bit AF 3,5* attached to the *T-torque handle 8 Nm short* through the *Counterholder*.

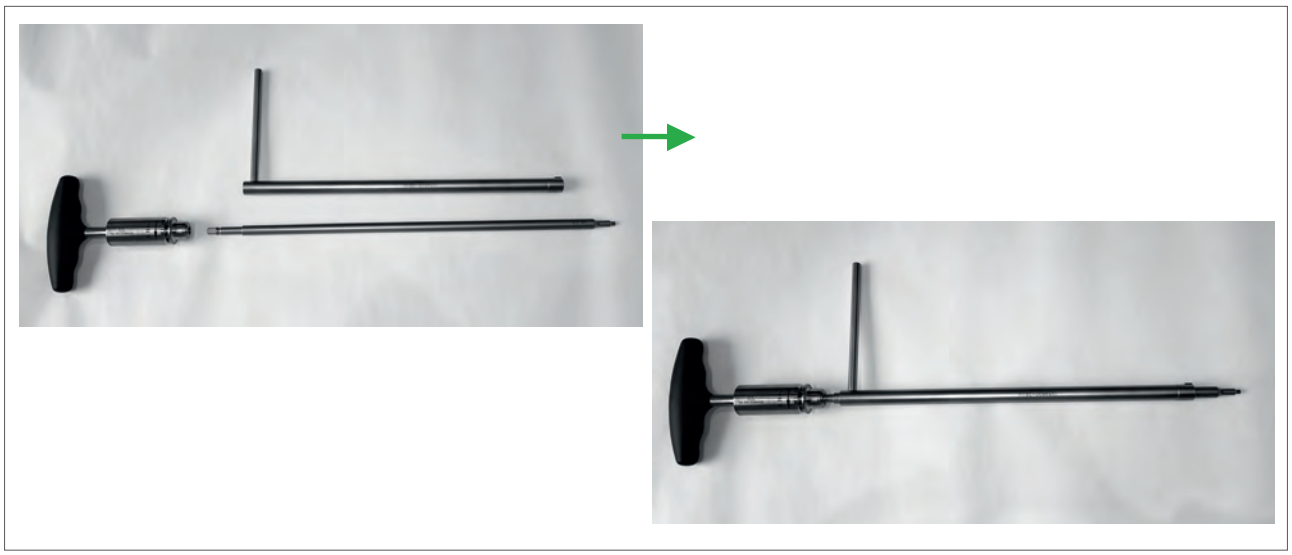


Fig. 42: Securing the iliac peg

The *Bit AF 3,5* is inserted into the locking screw iliac peg. Then, as shown here, the tip of the *Counterholder short* is advanced into the recess of the iliac peg drill hole of the implant. Then the locking screw iliac peg is tightened by immobilizing it with the brace and turning the *T-torque handle 8 Nm short*.

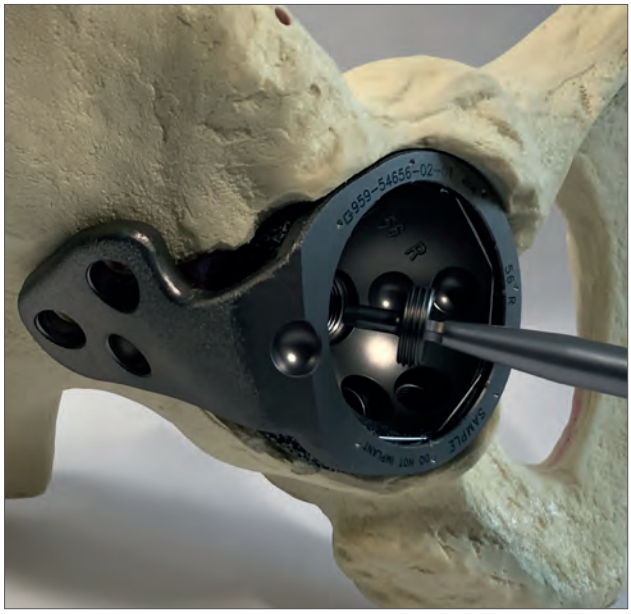


Fig. 43: Bit for torque limiter AF 3,5

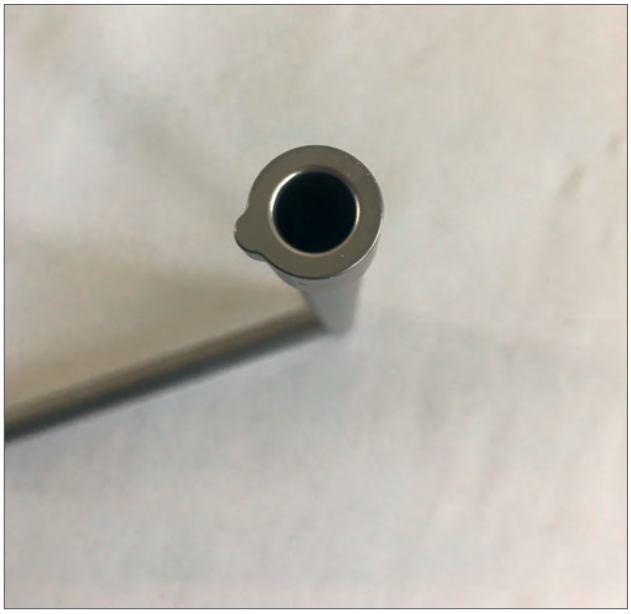


Fig. 44: Counterholder

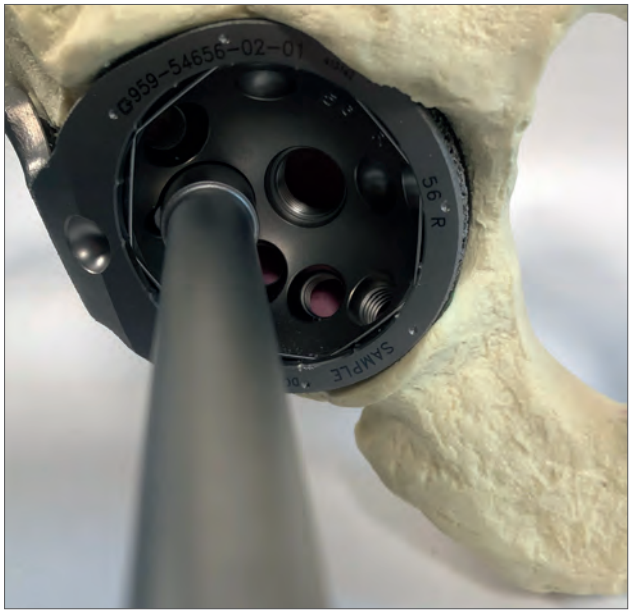


Fig. 45: Counterholder correctly inserted into the implant

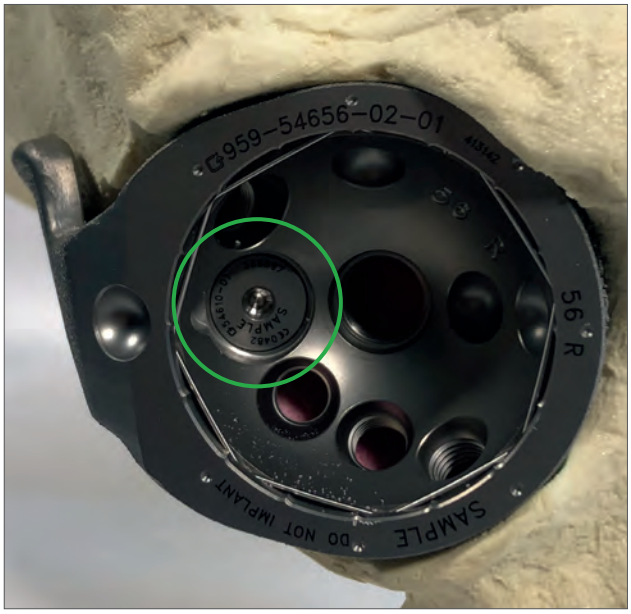


Fig. 46: Locking screw iliac peg

! NOTE

- To ensure secure fixation of the locking screw iliac peg, the threading must be free of residues and contaminants.
- Avoid tilting the screw within the threading as broad contact is essential for long-term stability.
- The locking screw iliac peg must be completely countersunk within the screw hole so as not to interfere with the locking mechanism of the acetabular cup insert.
- The locking screw iliac peg must be securely tightened to a defined torque of 8 Nm.
- Make sure that the torque wrench's limiting mechanism is triggered.
- Always use the *counterholder* when working with the torque wrench handle in order to avoid inducing rotational stresses in the bone.
- Make sure that there are no shear forces acting on the instruments as they could reduce the forces securing the implant.
- The Locking screw iliac peg must only be used once! If repeated tightening is necessary due to changes, a new locking screw iliac peg must be used.
- Provided that a spongiosa screw has not been placed yet, it may be necessary to reimpact the entire implant in the direction of the axis of the iliac peg after placing the iliac peg to ensure contact between the implant and the bone. It is not allowed to hit the locking screw with the *Reposition impactor*. It is absolutely necessary to retighten the locking screw with a defined torque.

Fixation of the strap

The final step is to fix the strap with (Titanium) Flat-head Spongiosa Screws. Proceed as described in the section "Fixation of the definitive implant and screw fixation in the acetabular floor". If possible, use all fixating options!

! NOTE

- When placing screws to fix the strap, pay attention to the position of the iliac peg. Avoid placing them so they strike the peg.
- If possible, use all screw options of the strap!
- The *Drill Bit Size Ø 4.5 mm* can be used in hard or sclerotic bone.
- To avoid soft tissue irritation, the set screws must be completely countersunk in the strap.

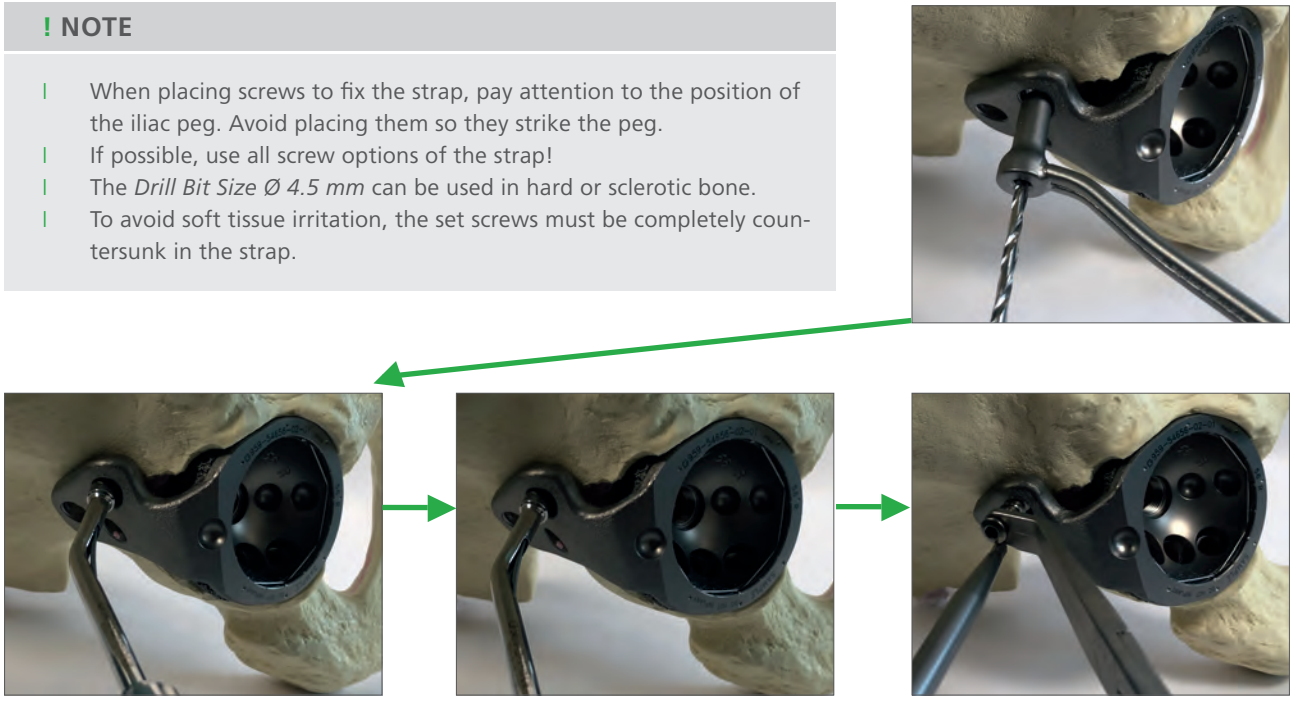


Fig. 47: Fixing the strap with a (Titanium) Flat-head Spongiosa screw

Sealing drill holes, iliac peg drill hole, and pole screw threads

The first step is to seal the cup with the pole plug screw. This avoids a situation where the smaller drill hole plug screw could fall through the pole screw hole on the acetabular floor. The pole plug screw, locking screw iliac peg, and drill hole plug screw are supplied in sterile packaging. They are screwed in with the 3.5 mm hex key.

Placing the pole plug screw

Placing the drill hole plug screw

! NOTE

- The pole plug screw must be inserted first.
- All plug screws must be completely countersunk within the screw hole so as not to interfere with the locking mechanism of the acetabular cup insert.
- All drill holes in the interior of the cup must be sealed to minimize the risk of osteolysis due to polyethylene particulate wear. (source: Harris WH (1995) The problem is osteolysis. Clin Orthop Relat, Res 46-53)
- Use drill hole plug screw to seal all screw holes not used for screw fixation. Use the pole plug screw for the pole threading. If neither an iliac peg nor a (Titanium) Flat-head Spongiosa Screw with reducing screw have been used, then the drill hole must be sealed with the locking screw iliac peg. Make sure to remove the reducing screw first.
- Avoid tilting the screws.
- The screws are hand tightened.

Trial reduction

A trial reduction with a *TRIAL Insert* can now be performed to evaluate the inclination and anteversion of the cup.

The appropriate trial for the cup size is selected.

TRIAL Insert versions:

- *TRIAL Insert*
- *TRIAL Insert 20°*

The *TRIAL Insert* is pressed into the cup by hand at the desired position and the trial reduction is performed.

Then the *TRIAL Insert* is pried back out of the cup using the *Socket wrench for Trial Insert*.

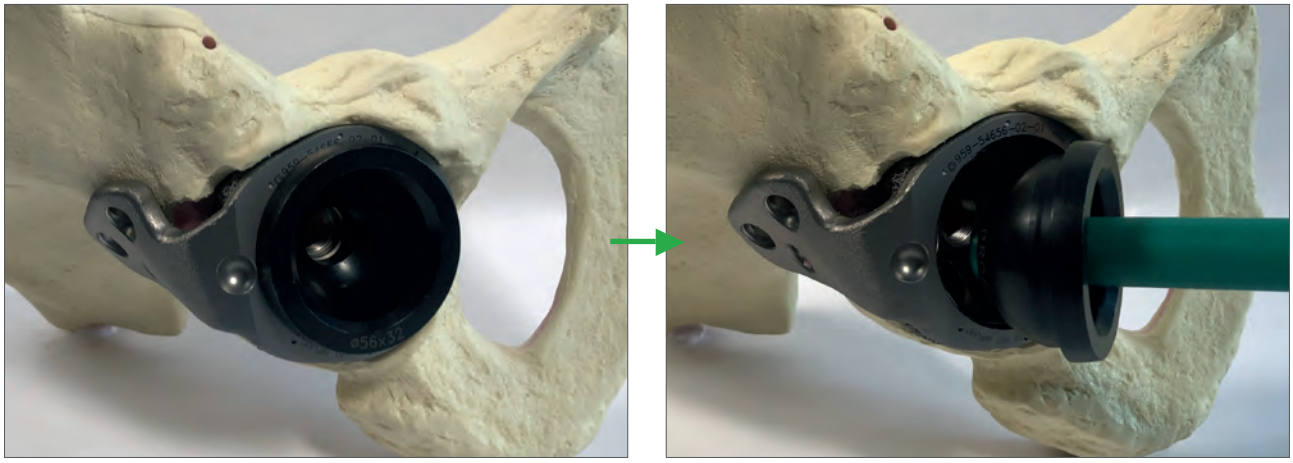


Fig. 48: Removing the TRIAL Insert

Placing the acetabular cup insert

The acetabular cup insert is inserted into the cup by hand. Then it is fixed in place with the setting tool and light taps with a hammer. The offset of the dysplastic insert can be positioned as desired.

! NOTE

- To ensure secure fixation of the insert in the cup, the inner contour of the cup must be free of residues. Remove any contaminants and adherent tissue residues.
- Make sure the circlip is intact. If it was damaged during impaction of the implant, it must be replaced.
- Make every effort to avoid tilting the insert when placing it.
- Ensure that the acetabular cup insert is fully in contact with the margin of the acetabulum cup.

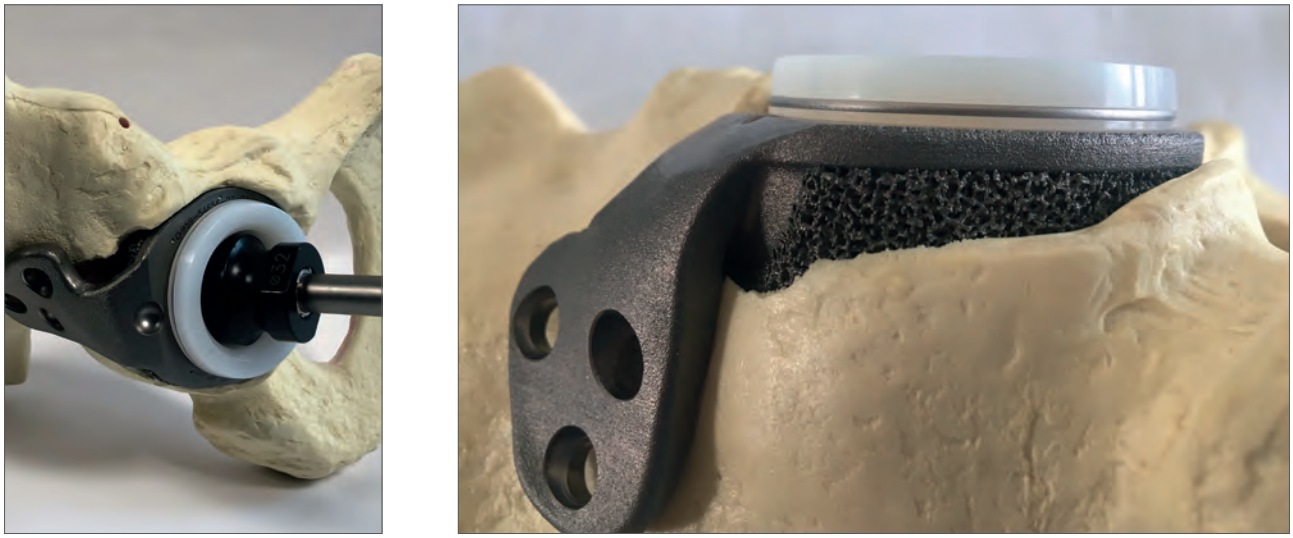


Fig. 49: Placing the acetabular cup insert

Replacing the acetabular cup insert

Remove the circlip from the revision acetabular cup. A new circlip is placed in the recess by hand.

! NOTE

- When changing the insert, the circlip of the titanium cup must be replaced.
- The size of the circlip depends on the size of the acetabular cup insert.

Fig. 50: Revision acetabular cup with circlip

Revision and removal of the iliac peg

After the insert and all (Titanium) Flat-head Spongiosa Screws have been removed, the iliac peg can be removed using the *Finisher scutcher, iliac peg*. To do this, first unscrew the locking screw iliac peg using the *Counterholder* and the *Bit SW3,5 long* attached to the *T-torque handle 8 Nm short* . The second step is to screw in the *Finisher scutcher, iliac peg* and extract the iliac peg with the aid of the slotted hammer.

Fig. 51: Slotted hammer

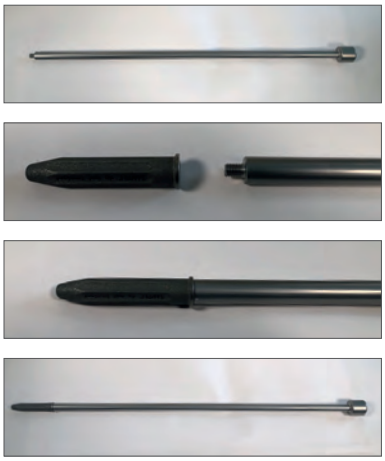


Fig. 52: Finisher scutcher, iliac peg

! NOTE

- The *Finisher scutcher, iliac peg* must be completely screwed into the implanted iliac peg.
- In the interest of reliable instrumentation, avoid placing shear forces on instruments during the entire operation. Lateral forces can damage instruments or impair their function.

Notes

Notes

! NOTE

This brochure is intended for physicians only and is not suitable as a source of information for laypersons. The information about the products and/or procedures described in this brochure is of a general nature and does not represent a medical advice or a medical recommendation. The information provided here does not in any way represent an opinion on the diagnosis or treatment of any specific medical case. The respective patient must be examined individually and advised accordingly. This brochure can neither completely nor partially substitute these measures.

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