



Zimmer® CAS ORTHOsoft® Hip 2.2 Universal

Surgical Technique



Simple Solutions for Precise Total Hip Replacements

ORTHOsoft Hip 2.2 Universal Surgical Technique

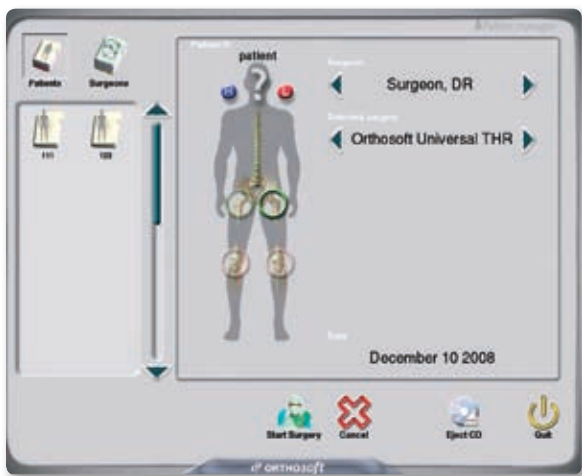
Table of Contents

| SECTION | | PAGE |
|----------|--|--------------|
| 1 | OR Setup | 1 |
| 2 | Surgical Workflow - Leg Length Only | |
| | Technique Summary | 2 |
| | Pre-incision Steps | |
| | Step 1: Define Surgeon Profile | 3 |
| | Step 2: Verify Patient Information | 3 |
| | Step 3: Calibrate Registration Pointer | 4 |
| | Step 4: Calibrate Reamer Shaft | 5 |
| | Step 5: Install Pelvic Reference | 6 |
| | Post-Incision Steps | |
| | Step 6: Define Table Plane | 6 |
| | Step 7: Define Predislocation Femur Position | 7 |
| | Step 8: Define Acetabular Center of Rotation | 7-8 |
| | Step 9: Define Acetabular Implant Center of Rotation | 8 |
| | Step 10: Determine Leg Length Discrepancy and Offset | 9 |
| | Option: Leg Length Only in Supine Position - Surgical Workflow | 10 |
| 3 | Surgical Workflow - Cup Navigation | |
| | Technique Summary | 11-12 |
| | Pre-incision Steps | |
| | Step 1: Define Surgeon Profile | 13 |
| | Step 2: Verify Patient Information | 14 |
| | Step 3: Calibrate Registration Pointer | 14 |
| | Step 4: Calibrate Reamer Shaft | 15 |
| | Post-incision Steps | |
| | Step 5: Install Pelvic Reference | 16 |
| | Step 6: Digitize Pelvic Coordinate System | 16-17 |
| | Step 7: Measure Pelvic Tilt | 17 |
| | Step 8: Flip Technique | 18 |
| | Step 9: Define Predislocation Femur Position | 18 |
| | Step 10: Define Acetabular Center of Rotation | 19 |
| | Step 11: Define Edge of Acetabulum | 20 |
| | Step 12: Define Deepest Points of Acetabulum | 20 |
| | Step 13: Navigate Reamer | 21 |
| | Step 14: Calibrate Universal Impactor | 21-22 |
| | Step 15: Navigate Impactor | 23 |
| | Step 16: Define Edge of Acetabular Implant | 23 |
| | Step 17: Determine Leg Length Discrepancy and Offset | 24 |
| | Option: Define/Verify Pelvic/Femoral Landmark | 25 |
| 4 | Post-Operative Information | 26 |
| 5 | Catalog Information | 27-30 |

OR Setup

Powering-Up the System (Sesamoid® System/Sesamoid® Plasty System)

- Unroll the power cable and connect it to a power outlet.
- Turn on the power switch at the bottom rear of the *Sesamoid*® Computer.
- After the camera warm-up is complete (approximately 20 minutes), you will be ready to launch an application.



Starting the Application

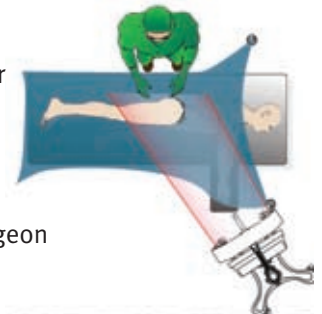
- Click on **Start**, then **Patient Manager** from the Toolchest Menu on the screen.
- When the Patient Manager module is launched and you are using the software for the first time, access the Surgeon Browser by clicking the **Surgeons** button in the upper left portion of the screen. Click on **Create New Surgeon**, then enter the surgeon name, hospital, city, and country.
- To create a new patient file, access the Patient Browser by clicking the **Patients** button in the upper left portion of the screen. Click on **Create New Patient**, and then enter the patient ID number. Additional relevant information can be entered in the Info1 and Info2 fields (optional). Once the process is completed, click on the **Save** button.
- Click on the appropriate circle to select the right or left hip. Then click the surgery type (OS Hip 2.2 - Universal).
- Click on the **Start Surgery** button to launch the application.

Optimal System Position

The optimal camera position depends on the side of the operated hip, surgical approach, OR setup, surgeon preferences, and position of the tracked instruments on the patient.

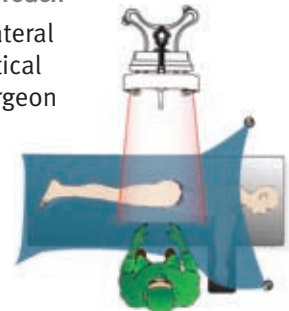
Setup when the Modular Reference Base (110.029) is used (Cup Navigation or Leg Length Only) – Posterior Approach

For a posterior approach in the lateral decubitus position it is suggested to use the Tracker for Modular Reference Cranial (110.031) and to place the optical camera near the anaesthesiologist equipment on the opposite side of the surgeon (anterior side of the patient).



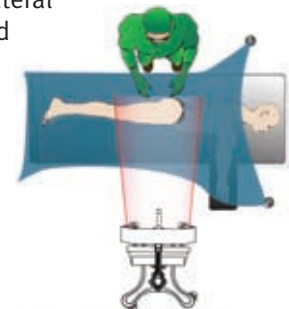
Setup when the 2 Pins Reference (110.025) is used (Leg Length Only) – Anterior Approach

For an anterior approach in the lateral decubitus position, place the optical camera directly in front of the surgeon (posterior side of the patient).



Setup when the 2 Pins Reference (110.025) is used (Leg Length Only) - Posterior Approach

For a posterior approach in the lateral decubitus position it is suggested to place the optical camera directly in front of the surgeon (anterior side of the patient).



Leg Length & Offset – Technique Summary

Pre-Incision Steps



Step 1
Define Surgeon Profile



Step 2
Verify Patient Information



Step 3
Calibrate Registration Pointer
Calibrate the Registration Pointer with the Universal Hip Calibration Device or the Universal Validation Tool.



Step 4
Calibrate Reamer Shaft
Calibrate the Straight Reamer Shaft or the Curved Reamer Shaft.



Step 5
Install Pelvic Reference
Install the Pelvic Reference with the CAS Fix Pins Fluted 3.2mm.

Post-Incision Steps - After making the incision and before dislocating the hip...



Step 6
Define the Table Plane.
With the patient in the lateral decubitus position, align the femur along the longitudinal axis of the body. Digitize three points in a triangular shape on the operating table.



Step 7
Define Predislocation Femur Position
Mark a fix point on the greater trochanter and on the patella. Digitize the 2 points with the femur aligned along the longitudinal axis of the body, while holding the leg still.

After dislocating the hip...



Step 8
Define Acetabular Center of Rotation
Use the Registration Pointer or the Reamer to define the acetabular center of rotation.

After positioning the cup in the acetabulum and before broaching the femur...



Step 9
Define Acetabular Implant Center of Rotation
Define the acetabular Implant COR. Place the Registration Pointer (with the COR Digitizer attached) on the surface of the liner to define the acetabular implant COR.

After reducing the leg...



Step 10
Determine Leg Length Discrepancy and Offset
Calculate the leg length discrepancy and offset by repositioning the leg in its initial position (Step 7) and redigitizing the point of the greater trochanter and the patella. Step 10 can be redone several times.

Pre-incision Steps

Step 1: Define Surgeon Profile



The system uses the concept of profiles to store the particular surgical preferences. Once a profile is created, it can be used to perform a surgery without specifying the surgical preferences each time.

Procedure

This preference defines the navigated surgical technique: navigation of the cup and measurement of the leg length discrepancy, or measurement of the leg length discrepancy only.

Select **Leg Length Only**.

Warning:

The leg length option can be used only when the patient is positioned in a lateral position.

Hip Capture Mode

This preference defines the technique used to acquire the acetabulum center of rotation, either with the Registration Pointer or the Acetabular Reamer.

Calibration Device Type

This preference defines the type of calibration device that will be used to calibrate the Registration Pointer: either the Universal Hip Calibration Device (100.033), or the Universal Validation Tool (108.050).

Reamer Type

This preference defines the type of acetabular reamer shaft that will be used during the surgery: either the Bridgeback or Precimed 4 Legs.

Reamer Dome

This preference defines the type of reamer dome that will be used throughout the surgery.

Caution:

Incorrect selection of the dome type or reamer type could lead to inaccuracies.

Step 2: Verify Patient Information



The patient information that was previously entered in the Patient Manager is summarized on the Patient Information screen.

X-ray Leg Length Discrepancy

This parameter defines the preoperative leg length discrepancy as measured on an x-ray film.

Step 3: Calibrate Registration Pointer

Universal Hip Calibration Device



1. Firmly tighten the long tip.
2. Insert the Registration Pointer (104.034) in the Hip Calibration Device (100.033).
3. Make sure that the tip of the pointer is in contact with the base. Fasten the pointer with the Wing Screw (111.006).
4. Position the trackers toward the camera so that they appear in the optimal camera volume on the screen.

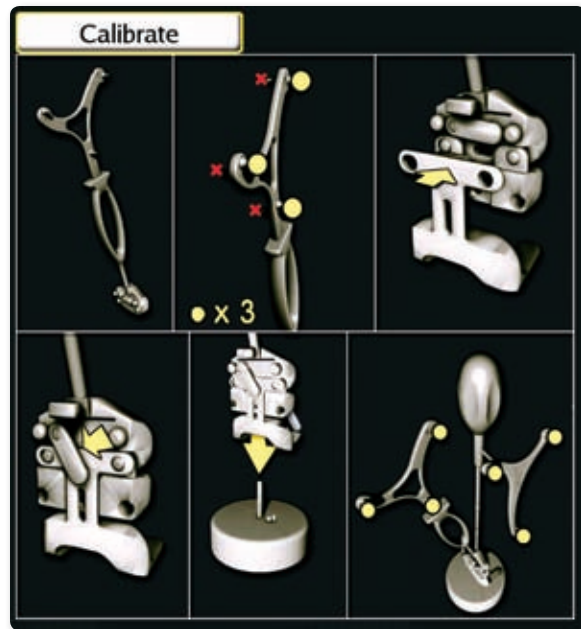
Caution:

It is not recommended to use the sharp tip to calibrate the pointer as the tip can be damaged over time.

OR

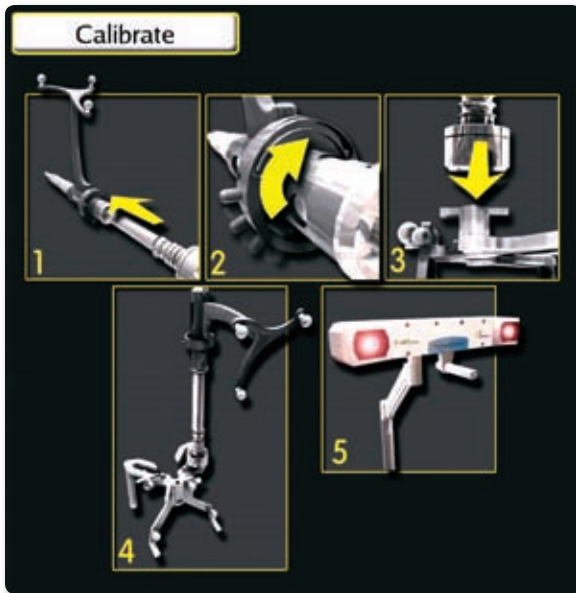
Universal Validation Tool

1. Firmly tighten the long tip.
2. Insert the Registration Pointer in the Validation Tool Body (108.050).
3. Make sure that the tip of the pointer is in contact with the base of the pointer hole. Fasten the pointer with the Wing Screw.
4. Position the trackers toward the camera in the optimal camera volume.



Step 4: Calibrate Reamer Shaft (Optional)

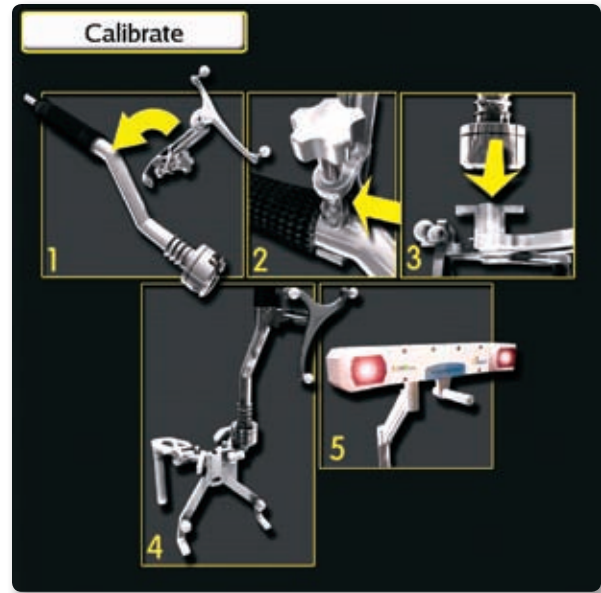
Straight Reamer Shaft



1. Slide the Optical Rotational Tracker (111.020) onto the reamer shaft.
2. Safely lock the Optical Rotational Tracker.
3. Connect the reamer shaft to the Universal Hip Calibration Device.
4. Position the trackers towards the camera in the optimal camera volume.

OR

Curved Reamer Shaft



1. Place the Universal Optical Tracker Fixation (111.031) above the shoulder on the reamer shaft.
2. Firmly tighten the fixation using the Wrench for Knob (116.005).
3. Connect the reamer shaft to the Universal Hip Calibration Device.
4. Position the trackers towards the camera in the optimal camera volume.

Step 5: Install Pelvic Reference



1. Fix straight pins in the iliac bone through the Modular Reference Base. The reference base is designed to be used with CAS Fix Pin Fluted 3.2mm (116.015).
2. Tighten the set-screws firmly with the screwdriver.
3. Cut the pins extremities to make way for the tracker.
4. Assemble the tracker to the Modular Reference Base (cranial or lateral orientation - cranial preferred).

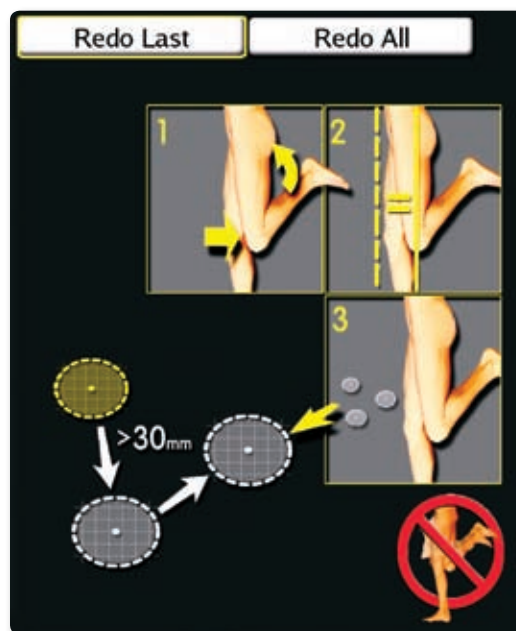
Alternatively, the 2 Pins Reference (110.025) can be fixed on the pelvis in the same orientation.

Caution:

The bone reference must be firmly attached to the bone and must not move throughout the procedure.

Post-incision Steps

Step 6: Define Table Plane

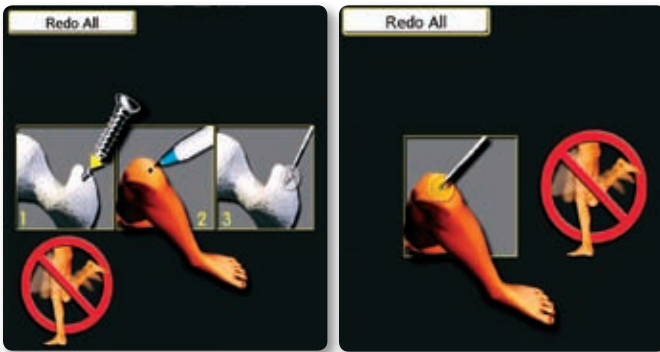


1. With the patient in the lateral decubitus position, align the femur along the longitudinal axis of the body and flex the knee at 90°.
2. Digitize three points in a triangular shape (at least 30mm apart) on the operating table or on any sterile surface considered parallel to the table.

Caution:

If a sterile surface other than the operating table is used, the surface of the object where the points will be digitized must be lower than the pelvic tracker. The pelvis should not move during the acquisition of the three points.

Step 7: Define Predislocation Femur Position



1. Mark the greater trochanter in the posterior area as close as possible to the cutting line with a cortical screw or an electrosurgical unit.
2. Mark the patella with a self-adhesive electrode pad placed on the patella before draping, or a marker on a hard part of the patella over the drape.
3. Make sure the femur is positioned along the longitudinal axis of the body and the knee flexed at 90°.
4. Digitize the greater trochanter.
5. Without moving the leg, digitize the patella.

Caution:

Points on the greater trochanter and patella should be digitized on an easily identifiable area so the points can be relocated once the implants are inserted.

Caution:

It is very important to keep the leg still during the digitization of the two points since there is no femoral tracker.

Step 8: Define Acetabular Center of Rotation

After the hip has been dislocated, the acetabular center of rotation can be determined either with the Registration Pointer or with the Acetabular Reamer.

Once the COR has been determined, validate it by placing the pointer on the bone surface and verifying that the displayed distance of the pointer tip to the surface of the fitted sphere is minimal.

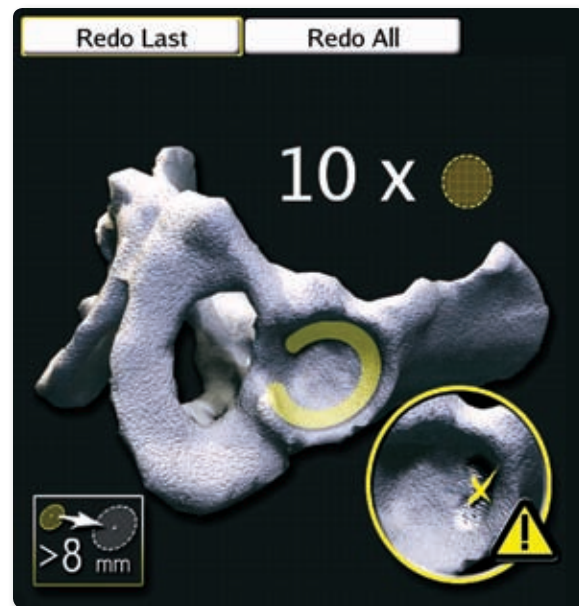
Caution:

Due to the pathology of the hip joint, differences between the acetabulum center and hip joint center of rotation could create inaccuracy in the leg length discrepancy estimation.

Warning:

Center of rotation can only be accurately defined for primary cases and nondysplastic hip.

Registration Pointer

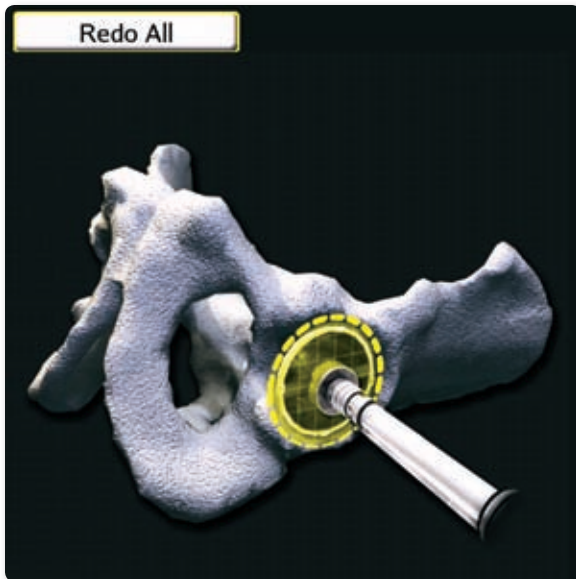


Digitize 10 points on the healthy part of the acetabulum on the surface of the anterior, posterior, and superior acetabular walls. Points should not be digitized in the fossa acetabuli.

OR

Step 9: Define Acetabular Implant Center of Rotation

Acetabular Reamer



1. Choose the best Acetabular Reamer size that fits in the acetabulum.
2. Position the center of the reamer according to the presumed center of rotation. Care must be taken to position the reamer in a way to avoid dysplastic or osteoarthritic areas of the acetabulum.
3. Orient the reamer shaft at $\sim 45^\circ$ of abduction and $\sim 20^\circ$ of anteversion.

Caution:

Incorrect selection of the reamer size could lead to inaccuracies.



1. After positioning the cup in the acetabulum and before broaching the femur, snap the COR Digitizer on the Pointer Tip with Groove.
2. Select the liner/head size.
3. Digitize the COR of the liner, if any, or the COR of the cup, by seating the COR Digitizer stably and in full contact with the surface of the liner or the cup.

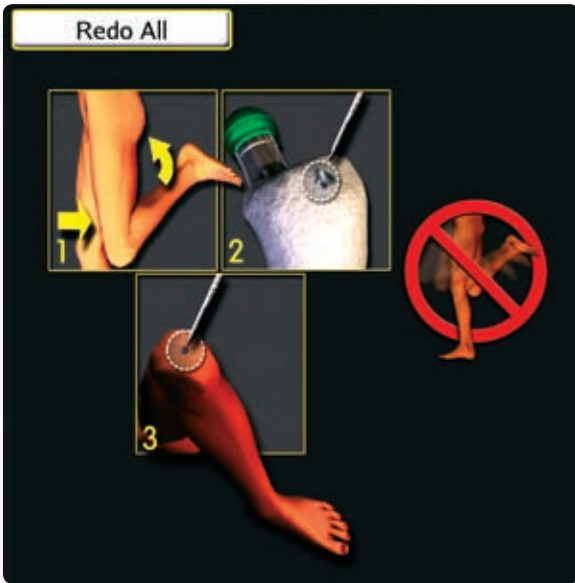
Caution:

To avoid deterioration of the liner or the implant, inspect the COR Digitizer for any mechanical damages before use.

Warning:

If the liner is changed, the COR of the liner, the greater trochanter, and the patella should be digitized again to calculate the new leg length discrepancy and offset values.

Step 10: Determine Leg Length Discrepancy and Offset



1. Reduce the leg.
2. Align the femur along the longitudinal axis of the body and flex the knee at 90°. Make sure the leg is repositioned in the same orientation as when the points on the greater trochanter and the patella were initially digitized (Step 7).
3. Digitize the greater trochanter in the same location as prior to dislocation.
4. Without moving the leg, digitize the patella in the same location as prior to dislocation.
5. Repeat Steps 3 and 4 as many times as required.

Caution:

Due to the pathology of the hip joint, differences between the acetabulum and hip joint centers of rotation could create inaccuracy in the leg length discrepancy estimation.

Caution:

It is very important to keep the leg still during digitization of the two points since there is no femoral tracker.

Warning:

Do not forget to remove the cortical screw, if it was used to mark the greater trochanter.

Option: Leg Length Only in Supine Position - Surgical Workflow

For a patient positioned in the supine position, it is possible to measure the mediolateral offset and the leg length discrepancy without navigating the acetabular cup using the Cup Navigation sequence. The steps are as follows:

1. Surgeon Profile: Select **Cup Navigation** as the Procedure and **Points** or **Reamer** as the Hip Capture Mode.
2. Patient Information: See Step 2 - Cup Navigation.
3. Pointer Calibration: See Step 3 - Cup Navigation.
4. Reamer Calibration: Calibrate the reamer drive shaft only if **Reamer** was selected as the Hip Capture Mode in the Surgeon Profile. Otherwise, skip the screen by pressing the next arrow button.

Caution:

The Universal Hip Calibration Device is mandatory to calibrate the pointer and/or the reamer drive shaft for the Cup Navigation sequence. The Universal Validation Tool is not supported as a calibration tool for this sequence.

5. Define Pelvic Coordinate System: See Step 6 - Cup Navigation.
6. Measure Pelvic Tilt: See Step 7 – Cup Navigation.
7. Define Predislocation Femur Position: Mark a point on the greater trochanter and the patella. Align the leg, in extension, along the longitudinal axis of the body and digitize the greater trochanter and the patellar points (The leg must be kept still between the digitization of the two points.)
8. Define Acetabulum Center of Rotation: See Step 10 – Cup Navigation.
9. Define Edge of Acetabulum: Skip the screen by pressing the next arrow button.
10. Define Deepest Points of Acetabulum: Skip the screen by pressing the next arrow button.
11. Impactor Calibration: Skip the screen by pressing the next arrow button.
12. Define Edge of Acetabulum Implant: Skip the screen by pressing the next arrow button.
13. Define Acetabular Implant COR: See Step 17 – Cup Navigation.
14. Leg Length Discrepancy and Offset: Replace the leg in the same position as prior to dislocating the hip and digitize the same greater trochanter and patellar points. (The leg must be kept still between the digitization of the two points.)

Cup Navigation – Technique Summary

Pre-Incision Steps



Step 1
Define Surgeon Profile



Step 2
Verify Patient Information



Step 3
Calibrate Registration Pointer
Calibrate the Registration Pointer with the Universal Hip Calibration Device.



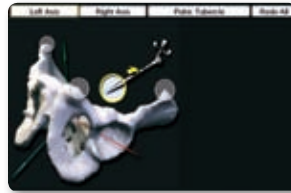
Step 4
Calibrate Reamer Shaft
Calibrate the Straight Reamer Shaft or the Curved Reamer Shaft.

Starting in Supine Position...

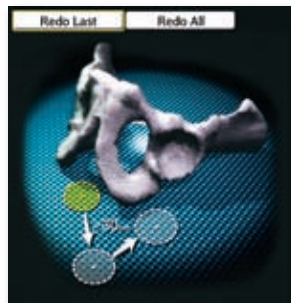


Step 5
Install Pelvic Reference
Install the Pelvic Reference with the CAS Fix Pins Fluted 3.2mm.

Starting in Supine Position... (cont.)



Step 6
Digitize Pelvic Coordinate System
Digitize the Pelvic coordinate system with the pointer (with the sharp pointer tip on).



Step 7
Measure Pelvic Tilt
Measure the pelvic tilt by digitizing three points in a triangular shape on the operating table.

Step 8

Flip Technique

Flip the patient from a supine to a lateral position. The patient is positioned in lateral decubitus if operated in this position.

After flipping the patient in lateral decubitus and before dislocating the hip...



Step 9
Define Predislocation Femur Position
Mark a fix point on the greater trochanter and on the patella. Digitize the 2 points with the femur aligned along the longitudinal axis of the body, while holding the leg still.

After dislocating the hip...



Step 10
Define Acetabular Center of Rotation
Define the acetabular center of rotation, using the Registration Pointer or the Acetabular Reamer.

Cup Navigation – Technique Summary (cont.)

After dislocating the hip... (cont.)



Step 11

Define Edge of Acetabulum

Define the edge of the acetabulum, digitizing six points with the pointer.



Step 12

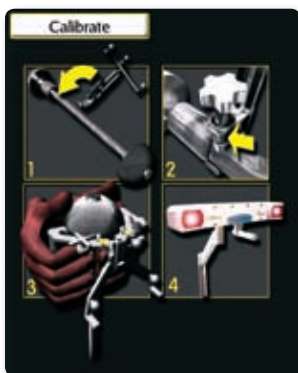
Define Deepest Points of Acetabulum

Define the deepest points of the acetabulum, digitizing four points with the pointer.



Step 13

Navigate Reamer



Step 14

Calibrate Universal Impactor

Calibrate the impactor using the technique for standard cups OR the technique for cups used with large diameter femoral heads.

After dislocating the hip... (cont.)



Step 15

Navigate Impactor



Step 16

Define Edge of Acetabular Implant

Define the edge of the implant using the pointer.

After positioning the cup and before broaching the femur...



Step 17

Determine Leg Length Discrepancy and Offset

Define the acetabular implant COR by placing the Registration Pointer (with the COR digitizer on) on the surface of the liner.

After reducing the leg...



Calculate the length discrepancy and offset by repositioning the leg in its initial position (Step 9) and redigitizing the point of the greater trochanter and the patella. Step 17 can be redone several times.

Pre-incision Steps

Step 1: Define Surgeon Profile/Preferences



This system uses the concept of profiles to store the particular surgical preferences. Once a profile is created, it can be used to perform a surgery without specifying the surgical preferences each time.

Procedure

This preference defines the navigated surgical technique: navigation of the cup and measurement of the leg length discrepancy, or measurement of the leg length discrepancy only.

Select **Cup Navigation**.

Hip Capture Mode

This preference defines the technique used to acquire the acetabulum center of rotation: either with the Registration Pointer or an Acetabular Reamer.

Reamer Type

This preference defines the type of acetabular reamer shaft that will be used during the surgery: either the Bridgeback or Precimed 4 Legs.

Reamer Dome

This preference defines the type of reamer dome that will be used throughout the surgery.

Caution:

Incorrect selection of the dome type or the reamer type could lead to inaccuracies.

Femoral Head Type

This preference defines the type of head used and consequently the type of cup that will be navigated.

Standard means that a cup with a liner is used, thus the cup should be calibrated using the Universal Hip Calibration Device. **Large Femoral Head** means that a cup is used with a large femoral head. For these cups, the acetabular impactor is attached at the rim of the cup and the Universal Calibration Hip Device cannot be used to calibrate the cup. The Registration Pointer must be used.

Caution:

Incorrect selection of the femoral head type could lead to inaccuracies or impossibility to calibrate the Acetabular Impactor.

Use Femoral Tracker

This preference defines the leg length calculation method (with or without femoral tracker). Additional information about the technique using a femoral tracker can be found in the Hip 2.2 User Guide.

Use Landmark Verification

This preference determines whether the Digitize/Verify Landmark screens are part of the main sequence.

Show Background Images

This preference determines whether the background images are displayed in the viewers while navigating the acetabular reamer and the impactor.

Show Acetabular Plane

This preference determines whether the acetabular plane is displayed in the viewers while navigating the acetabular reamer and the impactor.

Step 2: Verify Patient Information



The patient information that was previously entered in the Patient Manager is summarized on the Patient Information screen.

X-ray Leg Length Discrepancy

This parameter defines the preoperative leg length discrepancy as measured on an x-ray film.

Step 3: Calibrate Registration Pointer



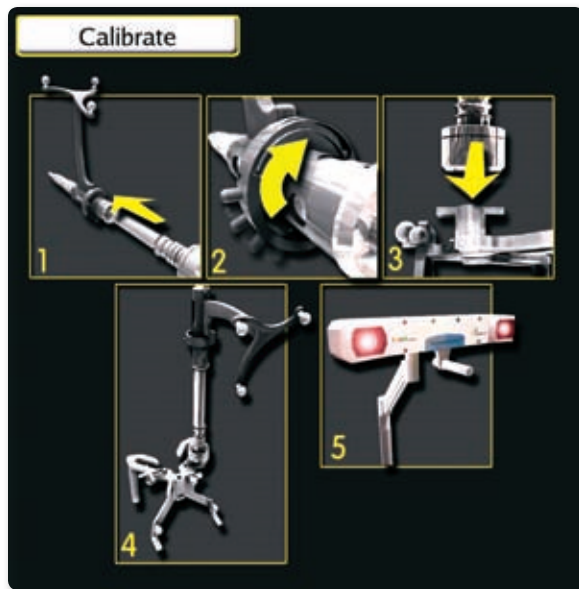
1. Firmly tighten the long tip.
2. Insert the pointer in the Universal Hip Calibration Device.
3. Make sure that the tip of the pointer is in contact with the base. Fasten the pointer with the Wing Screw.
4. Position the trackers towards the camera in the optimal camera volume.

Caution:

It is not recommended to use the sharp tip to calibrate the pointer as the tip can be damaged over time. The groove tip should be used for the calibration step.

Step 4: Calibrate Reamer Shaft

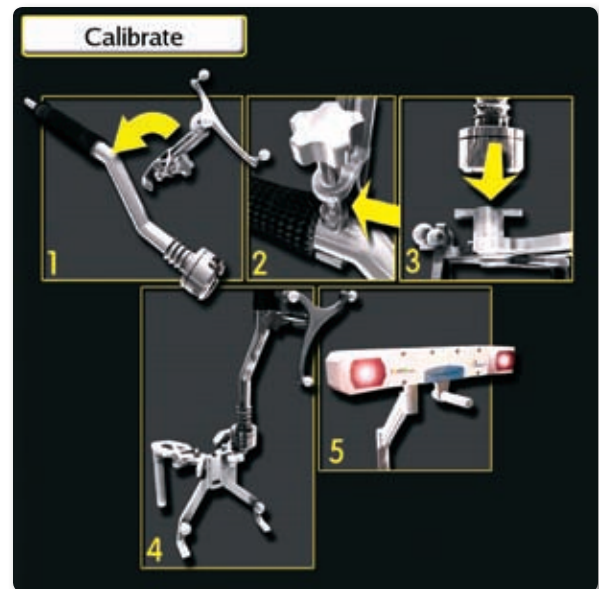
Straight Reamer



1. Slide the Optical Rotational Tracker onto the reamer shaft.
2. Safely lock the tracker.
3. Connect the reamer shaft to the Universal Hip Calibration Device.
4. Position the trackers towards the camera in the optimal camera volume.

OR

Curved Reamer



1. Place the Universal Optical Tracker Fixation against a shoulder to prevent motion toward the handle during impaction on the reamer shaft.
2. Firmly tighten the fixation using the Wrench for Knob (116.005).
3. Connect the reamer shaft to the Universal Hip Calibration Device.
4. Position the trackers towards the camera in the optimal camera volume.

Post-Incision Steps

Step 5: Install Pelvic Reference

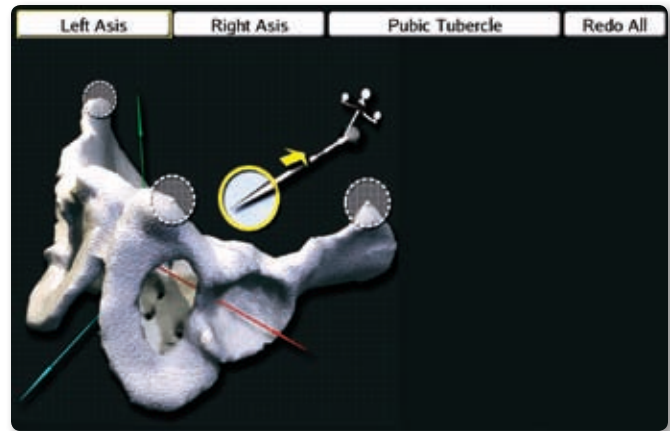


1. Fix straight pins in the iliac bone through the Modular Reference Base. The Reference Base is designed to be used with CAS Fix Pin Fluted 3.2mm (116.015).
2. Tighten the set-screws firmly with the screwdriver.
3. Cut the pins extremities to make room for the tracker.
4. Assemble the tracker to the Modular Reference Base (cranial or lateral orientation - cranial preferred).

Caution:

The bone reference must be firmly attached to the bone and must not move throughout the procedure.

Step 6: Digitize Pelvic Coordinate System



The landmarks must be digitized with the Sharp Pointer Tip according to the following sequence:

1. Lateral anterior superior iliac spine.
2. Contralateral anterior superior iliac spine.
3. One of the pubic tubercles.

Caution:

An inappropriate digitization of the pelvic coordinate system could lead to inaccuracies.

Warning:

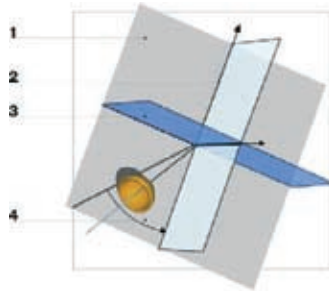
Laboratory testing has indicated that cutaneous digitization could decrease the accuracy of the orientation angles by up to about 3° under normal conditions as compared to percutaneous digitization.

The system provides abduction and anteversion angle readings according to the following definitions:

The abduction is calculated as the angle between the axis of the cup projected on the frontal plane and the longitudinal axis.

Abduction Calculation Method

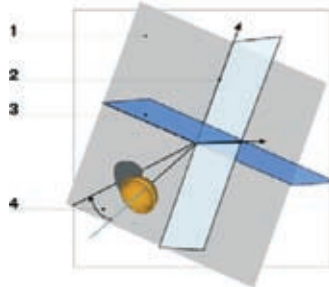
1. Frontal plane
2. Longitudinal axis
3. Transverse plane
4. Abduction angle



The anteversion is calculated as the angle between the axis of the cup and the frontal plane.

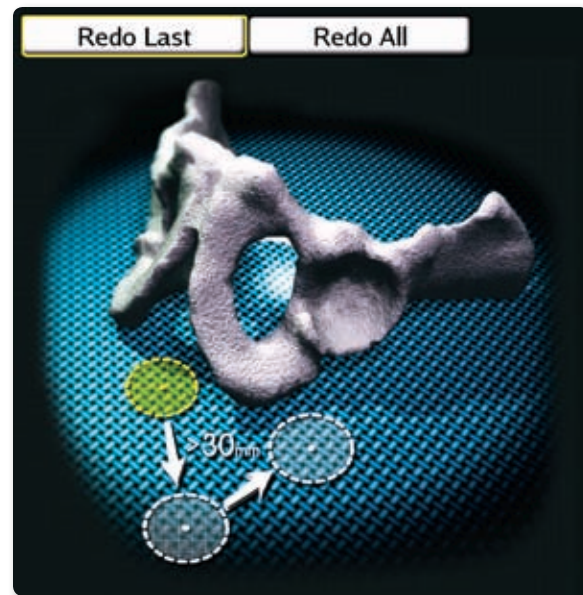
Anteversion Calculation Method

1. Frontal plane
2. Longitudinal axis
3. Transverse plane
4. Anteversion angle



Step 7: Measure Pelvic Tilt

This feature provides information on the anteroposterior and mediolateral orientations of the pelvic coordinate system relative to the operating table's plane.



Digitize three points in a triangular shape (at least 30mm apart) on the operating table or on any sterile surface considered parallel to the table.

Caution:

If a sterile surface other than the operating table is used, the surface of the object where the points will be digitized must be lower than the pelvic tracker.

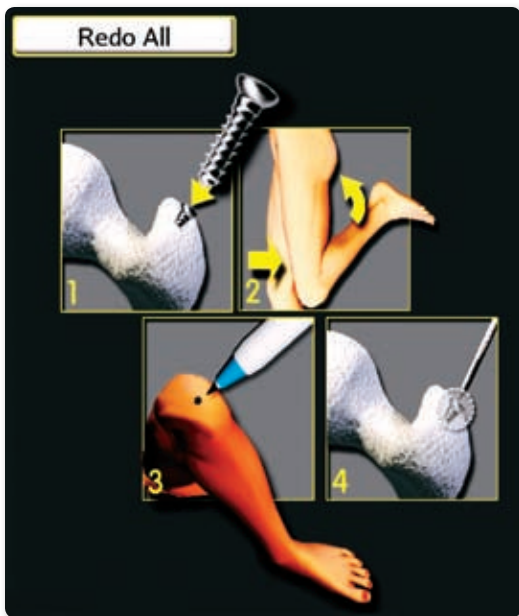
Note:

The leg length discrepancy and offset measurements are calculated on a plane parallel to the table instead of the pelvic frontal plane when the tilt is defined.

Step 8: Flip Technique

To continue the procedure in lateral decubitus position, the patient must now be flipped in the lateral position. In order to do so, the tracker of the Modular Pelvic Reference should be removed to facilitate the manipulations and avoid contaminations while the base needs to stay firmly fixed to the patient. The patient should be prepared normally for the surgery and the modular base needs to be part of the preparation. A plastic membrane can be used to cover the base of the Modular Pelvic Reference. The tracker can then be set back in its original location going through this plastic membrane.

Step 9: Define Predislocation Femur Position



Step 9: Define Predislocation Femur Position (cont.)



1. Mark the greater trochanter in the posterior area as close as possible to the cutting line with a cortical screw or an electro-surgical unit.
2. Mark the patella with a self-adhesive electrode pad placed on the patella before the draping or a marker on a hard part of the patella over the drape.
3. Align the femur along the longitudinal axis of the body and flex the knee at 90°. If the patient is in the supine position, do not flex the knee as it could lead to inaccuracies.
4. Digitize the greater trochanter.
5. Without moving the leg, digitize the patella.

Caution:

Points on the greater trochanter and patella should be digitized on an easily identifiable area to be able to relocate the points once the implants are inserted.

Caution:

It is very important to keep the leg still during the digitization of the two points since there is no femoral tracker.

Step 10: Define Acetabular Center of Rotation

The acetabular center of rotation can be determined either with the Registration Pointer or with the Acetabular Reamer.

Once the COR has been determined, validate it by placing the Pointer on the bone surface and verifying that the displayed distance of the pointer tip to the surface of the fitted sphere is minimal.

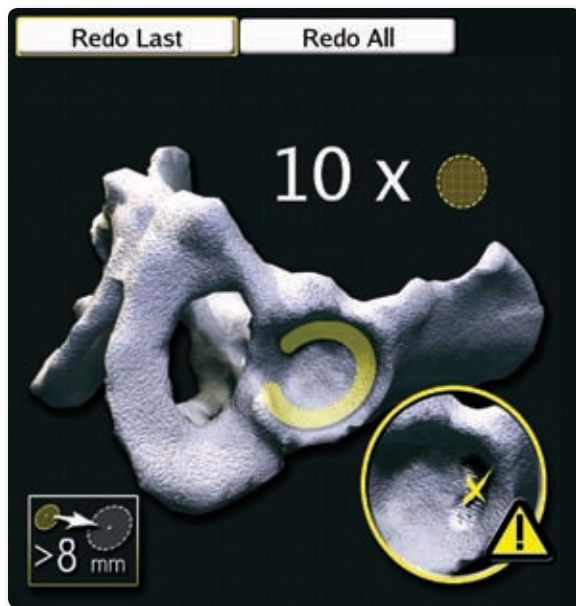
Caution:

Due to the pathology of the hip joint, differences between the acetabulum center and hip joint centers of rotation could create inaccuracy in the leg length discrepancy estimation.

Warning:

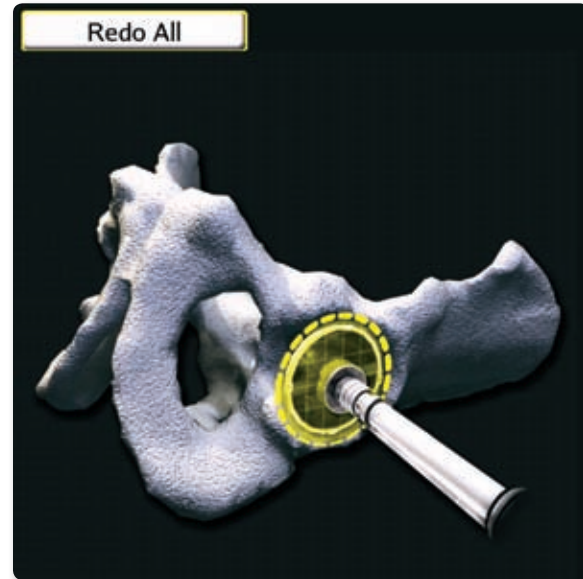
The center of rotation can be defined for primary cases and nondysplastic hips.

Registration Pointer



Digitize 10 points on the healthy part of the acetabulum on the surface of the anterior, posterior, and superior acetabular walls. Points should not be digitized in the fossa acetabuli.

Acetabular Reamer



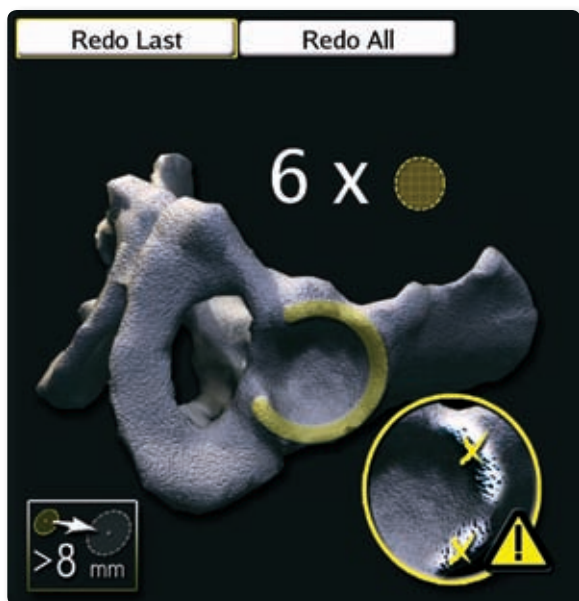
1. Choose the best Acetabular Reamer size that fits in the acetabulum.
2. Position the center of the reamer according to the presumed center of rotation. Take care to position the reamer in a way to avoid dysplastic or osteoarthritic areas of the acetabulum.
3. Orient the reamer shaft at $\sim 45^\circ$ of abduction and $\sim 20^\circ$ of anteversion.

Caution:

Incorrect selection of the reamer size could lead to inaccuracies.

OR

Step 11: Define Edge of Acetabulum



1. Digitize six points in a planar configuration on the edge of the acetabulum. Select the position of the points to be digitized according to the landmarks normally used to orient the cup with regard to the abduction and anteversion.

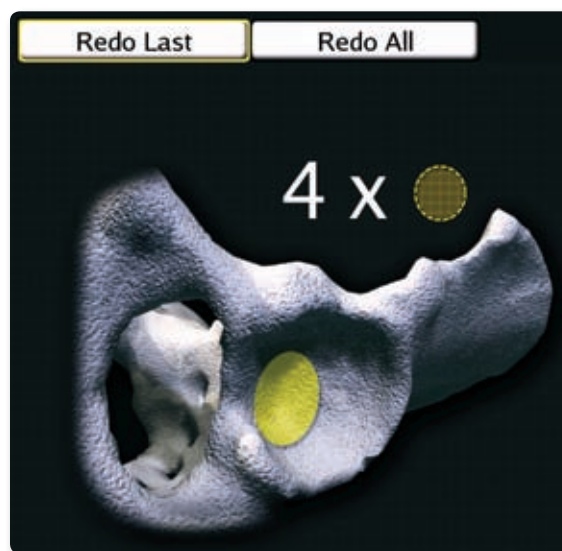


2. Once the points have been digitized, the orientation of the acetabulum is computed and the abduction, version and version, adjusted with the A/P tilt (if the table's plane has been digitized) are displayed.

Caution:

The orientation of the plane generated from the six points digitized around the acetabulum does not represent the ideal cup orientation, and different plane orientations can be obtained depending on the position of the landmarks digitized.

Step 12: Define Deepest Points of Acetabulum



Digitize up to four landmarks in the fossa acetabuli.

Step 13: Navigate Reamer



1. Select the appropriate Acetabular Reamer size. Navigate the position and orientation of the reamer.
2. The angles (abduction, version, and adjusted version) and distances from the reamer center of rotation to the acetabular center of rotation are displayed.

Previously digitized points are displayed in different colors.

- The acetabular center of rotation is yellow.
- Points on the edge of the acetabulum are green.
- Points in the fossa acetabuli are blue.

Caution:

The version adjusted with the A/P tilt shall be considered solely as the amount of version to expect when measured on a postoperative A/P x-ray film taken while the patient is in supine position. The match between the A/P tilt adjusted version reading and the version measured on an A/P x-ray film is based on the assumption that the pelvic tilt of the patient measured intra-operatively is the same as when the postoperative x-ray film is taken.

Step 14: Calibrate Universal Impactor

The application supports press-fit acetabular implants of hemispherical shape with a flat rim, including *Converge*® Porous Acetabular Cup System Implants.

There are two different calibration methods. One is for standard cups and the other is for cups used in conjunction with large femoral heads. The tracker fixation is primarily designed to be attached to a circular section of an impactor shaft.

Warning:

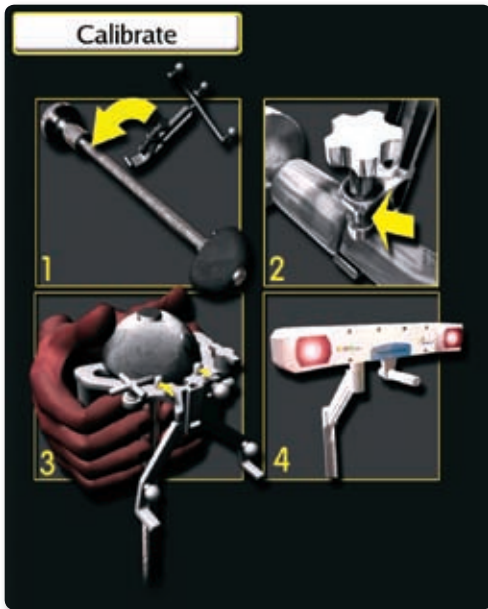
A conical section is not suited to receive the Universal Optical Tracker Fixation. Preferably, the tracker fixation must be placed below a shoulder on the impactor shaft. It has to be firmly tightened using the wrench to avoid loosening and displacement throughout the impacting process (hand tightening is not sufficient). The optical markers must be in line with the screw holes found in the cup (if any) to have a good line of sight.

Caution:

Misplacement of the Universal Optical Tracker Fixation could lead to loosening of the tracker and potential inaccuracies.

Step 14: Calibrate Universal Impactor (cont.)

Standard Cups

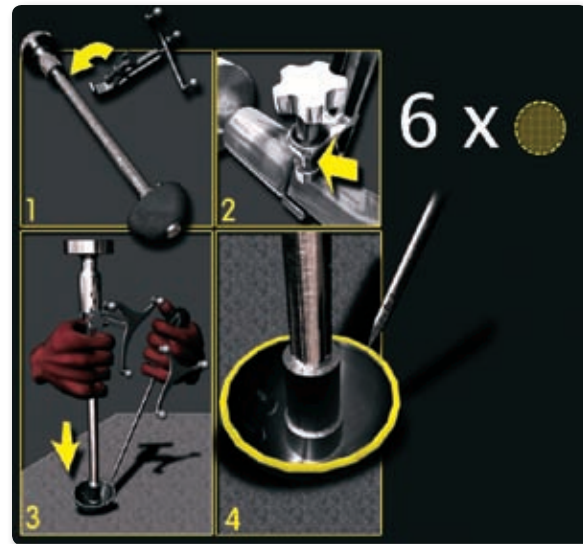


1. Screw the cup firmly on the Impactor.
2. Place the Universal Optical Fixation against a shoulder to prevent motion towards the handle during the impaction of the cup.
3. Firmly tighten the fixation using the Wrench for Knob.
4. Place it flat on the surface of the Universal Hip Calibration Device and in contact with the pins. Hold the cup with the thumbs while the shaft of the Impactor points downward.
5. Position the trackers towards the camera in the optimal volume.
6. Select the cup size.

Warning:

If used, care must be taken to hold the Optical Rotational Tracker against the shoulder to avoid any free play that can lead to inaccuracies.

Cups Used in Conjunction with Large Femoral Heads



1. Connect the Universal Optical Tracker Fixation to the Impactor (see fixation instructions detailed in Step 14 - Standard Cups).
2. Screw the cup firmly on the Impactor. Then hold the Impactor with the cup resting on the table.
3. With the Pointer, digitize six points evenly on the edge of the cup.
4. Digitize one point on the apex of the cup.

Step 15: Navigate Impactor



1. Navigate the orientation of the cup. It is possible to navigate only the calibrated shell size.
2. The angles (abduction, version, and adjusted version) are displayed.
3. Impact the implant once the position and orientation of the cup is satisfactory. Click on the **Lock** button before unscrewing the Impactor. The virtual implant will be fixed in the viewer to indicate that the cup was attached to the bone and the angles will remain displayed.

Step 16: Define Edge of Acetabular Implant



1. Digitize six points around the rim of the cup after screws have been placed.
2. Once the points have been digitized, the orientation of the cup is computed and the abduction, version, and version adjusted with the A/P tilt (if the tilt has been digitized) are displayed.

Step 17: Determine Leg Length Discrepancy and Offset

Define Acetabular Implant COR



1. Snap the COR Digitizer on the Pointer Tip with Groove.
2. Select the liner/head size.
3. Digitize the COR of the liner, if any, or the COR of the cup by seating the COR Digitizer stably and in full contact with the surface of the liner or the cup.

Caution:

Due to the pathology of the hip joint, differences between the acetabulum center and hip joint centers of rotation could create inaccuracy in the leg length discrepancy estimation.

Caution:

To avoid deterioration of the liner or the implant, the user must inspect the COR Digitizer for any mechanical damages before use.

Warning:

If the liner is changed, the COR of the liner, the greater trochanter, and the patella should be digitized again to calculate the new leg length discrepancy and offset values.

Define Leg Length Discrepancy and Offset



1. Reduce the leg.
2. Align the femur along the longitudinal axis of the body and flex the knee at 90°. If the patient is in the supine position, do not flex the knee as it could lead to inaccuracies.
3. Digitize the greater trochanter in the same location as prior to dislocation.
4. Without moving the leg, digitize the patella in the same location as prior to dislocation.

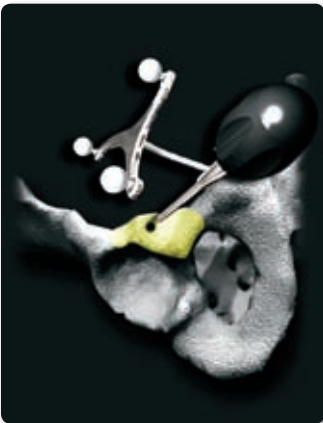
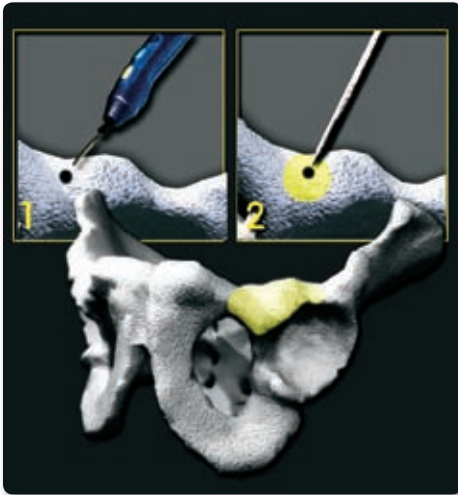
Warning:

It is very important to keep the leg still during the digitization of the two points since there is no femoral tracker.

Option: Define/Verify Pelvic/ Femoral Landmark

This feature allows the surgeon to verify whether the reference on the pelvis has moved.

1. Mark the location of a landmark on the pelvis to allow accurate identification.
2. Digitize the landmark on the bone.



At anytime during the navigation, it is possible to verify whether the reference has moved by selecting this task through the menu and by placing the pointer on the landmark. Verify that the distance displayed is minimal.

Exit the Application

- Click on the **Menu** button
- Click on **Quit Application**
- Answer Yes to the question **Are you sure you want to quit the application?**



Archive Patient Files

- Access the Patient Browser by clicking the **Patients** button in the upper left portion of the display;
- Select the patient to be archived;
- Press on the **Select Patient for Archiving** button on the lower left side of the screen;
- Repeat this process with all patient files to be archived;
- Alternatively, all patient files can be archived in a single step using the **Select All for Archiving** button. To remove a patient from the list of files to be archived, press on the **Deselect from Archive List** button. Each patient to remove must be deselected individually;
- Once all patient files to archive have been identified, press on the **Burn CD** button in the lower right-hand part of the screen;
- The computer CD tray will automatically eject when the burning process is finished.

Snapshot Viewer

- Access the Patient Browser by clicking the **Patients** button in the upper left portion of the display;
- Select the Patient for which the snapshots has to be viewed;
- Select the anatomy part (right/left hip/knee circle);
- If more than one surgery has been done, select the surgery with the **Procedure** selector at the bottom of the body;
- Press on the **View Snapshots** button. This button is only displayed if snapshots were taken during the selected surgery.
- Press on the thumbnails to select the snapshot to view. To browse through the thumbnails, use the left and right arrows beneath the viewer.
- To close the snapshot viewer, press on the Patient Manager main background.

Exit the Patient Manager

- Press on the **Quit** button on the bottom right corner of the screen.
- Answer **Ok** to the question: **Are you sure you want to quit the Patient Manager?**

Shut Down the System

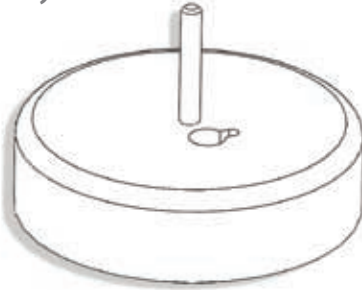
- From the Menu box, select **Tools**.
- Select **Shut Down** from the drop-down list
- Answer **Yes** to the question: **You are about to shut down, proceed?**



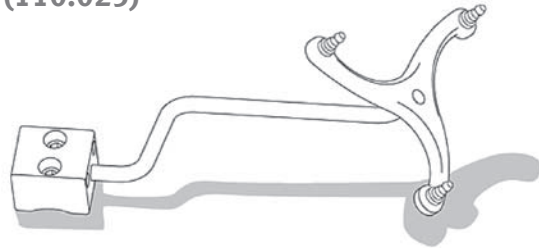
View the Surgery Report

- Insert the CD with the patient files in a computer
- Open the folder **PATIENTS2\PATIENT_NAME\PROCEDURES\DATE_OF_SURGERY**
- Open with a Web Browser the Report.html

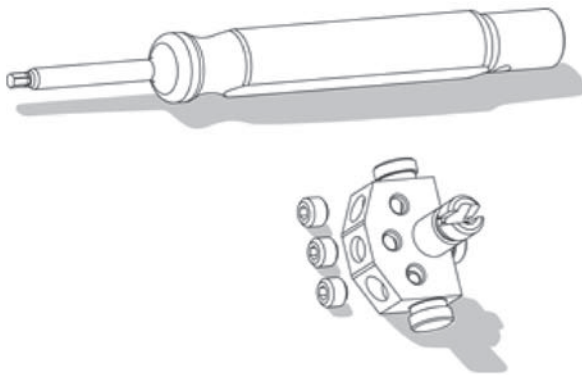
**CAS Calibration Star Holder - 20-8000-010-01
(100.026)**



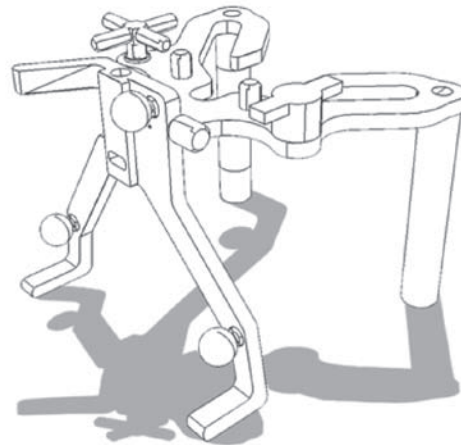
**CAS 2 Pins Reference - 20-8000-010-33
(110.025)**



**CAS Modular Reference Base -
20-8000-020-12 (110.029)**



**CAS Universal Hip Calibration Device with
Handles - 20-8000-020-02 (100.033)**

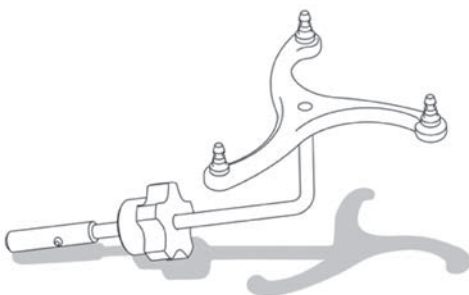


**CAS Trackers used with the Modular
Reference Base**

**CAS Tracker for Modular Reference -
Lateral - 20-8000-020-13 (110.030)**

**CAS Tracker for Modular Reference -
Cranial - 20-8000-020-14 (110.031)**

**CAS Tracker for Modular Reference -
Size 6 - 20-8000-020-15 (110.032)**

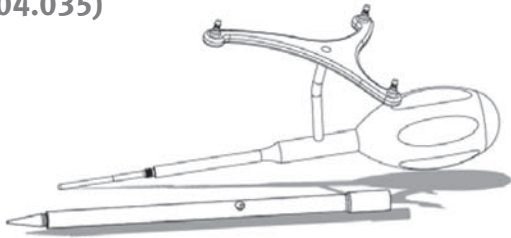


**CAS Universal Validation Tool -
20-8000-010-06 (108.050)**

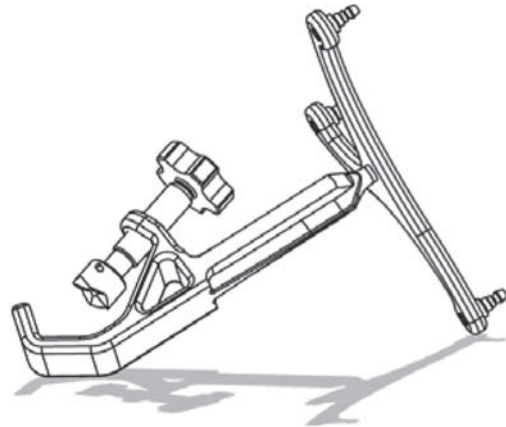


CAS Registration Pointer - 20-8000-070-01 (104.034)

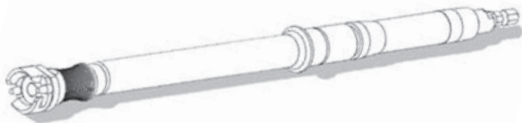
CAS Sharp Pointer Tip - 20-8000-020-03 (104.035)



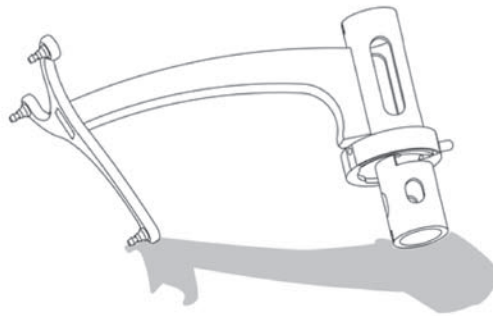
CAS Universal Optical Tracker Fixation - 20-8000-020-17 (111.031)



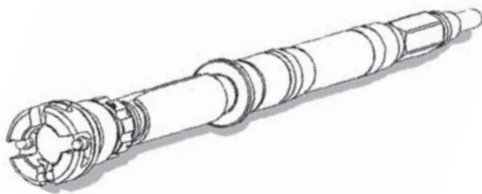
CAS Reamer Shaft Bridgeback - 20-8000-020-10 (106.011)



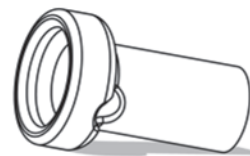
CAS Optical Rotational Tracker - 20-8000-020-16 (111.020)



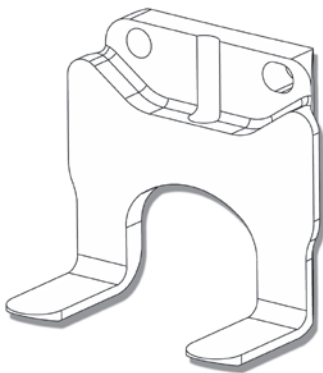
CAS Reamers Shaft Precimed 4 Legs - 20-8000-020-11 (106.012)



CAS COR Digitizer - 20-8000-020-04 (104.040)



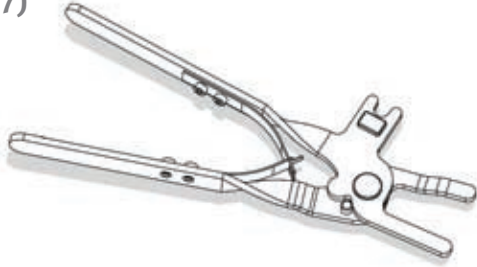
CAS Posterior & Distal Condyles Digitizer 20-8000-010-17 (108.077)



CAS Wrench for Knob - 20-8000-020-20 (116.005)



CAS Navitracker™ Pliers -20-8000-070-05 (116.017)



ORTHOsoft Hip 2.2 - CAS Hip Instrument Kit

| Cat. No. | Manufacturer No. | Description | Qty. |
|-----------------------|------------------|--|------|
| KT-8000-020-01 | 150.213 | CAS Hip Instrument Kit | |
| | | Subcomponents | |
| 20-8000-020-02 | 100.033 | CAS Universal Hip Calibration Device | 1 |
| 20-8000-070-01 | 104.034 | CAS Registration Pointer | 1 |
| 20-8000-020-03 | 104.035 | CAS Sharp Pointer Tip | 1 |
| 20-8000-020-04 | 104.040 | CAS COR Digitizer | 1 |
| 20-8000-020-12 | 110.029 | CAS Modular Reference Base | 1 |
| 20-8000-020-13 | 110.030 | CAS Tracker for Modular Reference - Lateral - Size 3 | 1 |
| 20-8000-020-14 | 110.031 | CAS Tracker for Modular Reference - Cranial - Size 3 | 1 |
| 20-8000-020-15 | 110.032 | CAS Tracker for Modular Reference - Size 6 | 1 |
| 20-8000-020-17 | 111.031 | CAS Universal Optical Tracker Fixation | 1 |
| 20-8000-070-02 | 115.006 | CAS Main Case | 1 |
| 20-8000-070-03 | 115.007 | CAS Lid | 1 |
| 20-8000-020-18 | 115.019 | CAS UTHR Lower Insert | 1 |
| 20-8000-020-19 | 115.020 | CAS UTHR Upper Insert | 1 |
| 20-8000-020-23 | 115.02102A | CAS Hip Universal Nameplate | 1 |
| 20-8000-020-20 | 116.005 | CAS Wrench for knob | 1 |
| 20-8000-070-05 | 116.017 | CAS Navitracker™ Pliers | 1 |

ORTHOsoft Hip 2.2 - CAS Bridgeback Option Kit

| Cat. No. | Manufacturer No. | Description | Qty. |
|-----------------------|------------------|----------------------------------|------|
| KT-8000-020-03 | 150.218 | CAS Bridgeback Option Kit | |
| | | Subcomponents | |
| 20-8000-020-10 | 106.011 | CAS Bridgeback Drive Shaft | 1 |
| 20-8000-020-16 | 111.020 | CAS Optical Rotational Tracker | 1 |



ORTHOsoft Hip 2.2 - CAS Precimed Option Kit

| Cat. No. | Manufacturer No. | Description | Qty. |
|-----------------------|------------------|---------------------------------|------|
| KT-8000-020-02 | 150.216 | CAS Precimed Option Kit | |
| Subcomponents | | | |
| 20-8000-020-11 | 106.012 | CAS Precimed 4 legs Drive Shaft | 1 |
| 20-8000-020-16 | 111.020 | CAS Optical Rotational Tracker | 1 |

ORTHOsoft Hip 2.2 - CAS Universal Master Instrument Kit

| Cat. No. | Manufacturer No. | Description | Qty. |
|-----------------------|------------------|---|------|
| KT-8000-010-01 | 150.236 | CAS Universal Master Instrument Kit | |
| Subcomponents | | | |
| 20-8000-010-01 | 100.026 | CAS Calibration Star Holder | 1 |
| 20-8000-070-01 | 104.034 | CAS Registration Pointer | 1 |
| 20-8000-020-04 | 104.040 | CAS COR Digitizer | 1 |
| 20-8000-010-06 | 108.050 | CAS Universal Validation Tool Body | 1 |
| 20-8000-010-09 | 108.056 | CAS Short Posterior Condyles Digitizer | 1 |
| 20-8000-010-17 | 108.077 | CAS Posterior & Distal Condyles Digitizer | 1 |
| 20-8000-010-18 | 108.080 | CAS Spike 7.9mm | 1 |
| 20-8000-010-33 | 110.025 | CAS 2 Pins Reference Femur - TS3 | 1 |
| 20-8000-010-35 | 110.037 | CAS Offset 2 Pins Reference Right Tibial - Size 6 | 1 |
| 20-8000-010-36 | 110.038 | CAS Offset 2 Pins Reference Left Tibia - Size 6 | 1 |
| 20-8000-010-37 | 111.006 | CAS Wing Screw M5x10 | 1 |
| 20-8000-070-02 | 115.006 | CAS Main Case | 1 |
| 20-8000-070-03 | 115.007 | CAS Lid | 1 |
| 20-8000-010-38 | 115.023 | CAS UTKR Lower Insert | 1 |
| 20-8000-010-39 | 115.024 | CAS UTKR Upper Insert | 1 |
| 20-8000-010-51 | 115.02502A | CAS Knee Universal Nameplate | 1 |
| 4812-45 | N/A | Hexagonal Screwdriver 3.5mm | 1 |
| 20-8000-070-05 | 116.017 | CAS <i>Navitracker</i> ™ Pliers | 1 |
| 20-8000-010-45 | 117.002 | CAS Stop Drill 6mm | 1 |
| 20-8000-010-29 | 108.116 | CAS Universal Offset Paddle 1.27mm | 1 |

ORTHOsoft Hip 2.2 - Other Parts

| Cat. No. | Manufacturer No. | Description | Qty. |
|----------------|------------------|---|------|
| 20-8000-000-08 | 201.117 | <i>Navitracker</i> ™ Kit B - Hip | 1 |
| 20-8000-000-09 | 201.118 | <i>Navitracker</i> ™ Kit C - Leg Length & Resurfacing | 1 |
| 20-8000-000-01 | 116.015 | CAS Fix Pin Fluted 3.2D X 150mm | 1 |
| 20-8000-000-02 | 116.018 | CAS Fix Pin Fluted 3.2D X 80mm | 1 |
| 20-8000-000-04 | 116.021 | CAS Fix Pin Fluted 3.2D X 150mm | 12 |
| 20-8000-000-03 | 116.020 | CAS Fix Pin Fluted 3.2D X 80mm | 12 |
| 98-9000-001-01 | | CAS PPU Hip | 1 |
| 00-9000-520-02 | | CAS PPU Surgery Hip Service | 1 |



Caution & Warnings

Caution

Federal (U.S.) law restricts this device to sale by or on the order of a physician.

Warnings

The technique and warnings presented in this guide are intended for trained users.

Note:

Refer to the full User Guide of the application *ORTHOsoft* Hip 2.2 - Universal for all cautions, warnings and detailed user information.

Contact your Zimmer representative or visit us at www.zimmer.com



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