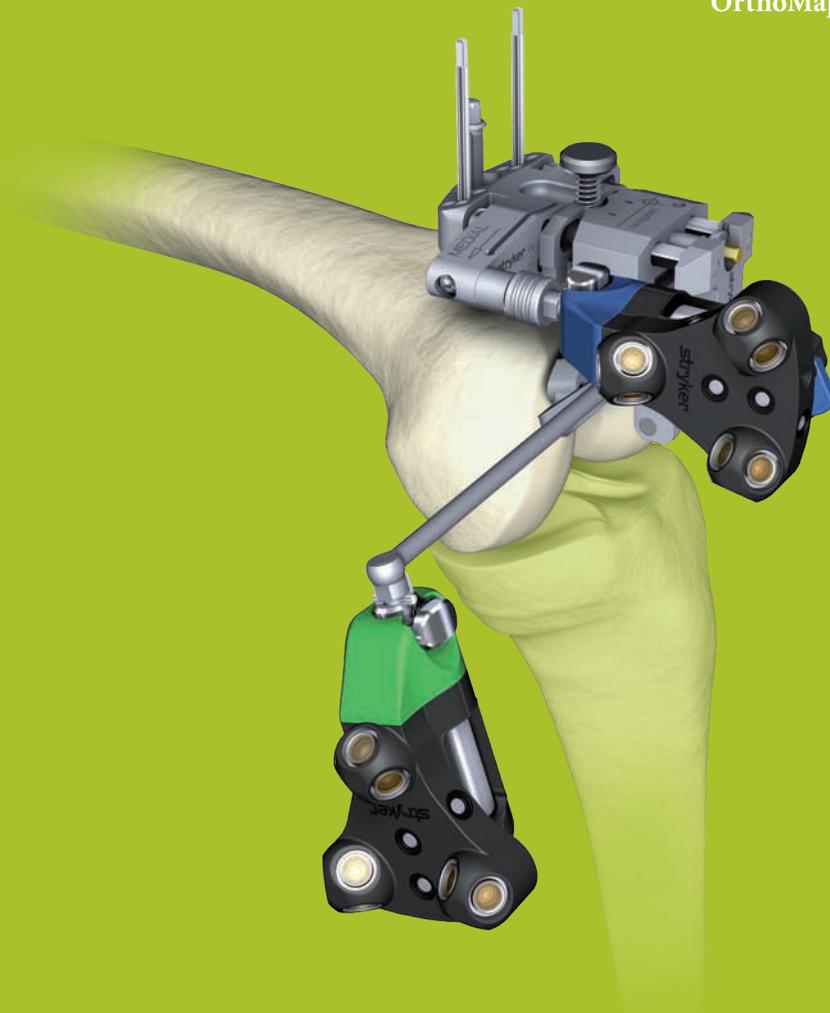


OrthoMap® Express Knee

Product Guide

OrthoMap Express Knee Navigation Software 2.0



1 Introduction



Introduction

The Stryker OrthoMap Express Knee Navigation System is providing surgeons with a simplified solution helping to make navigated total knee replacements an easier procedure to incorporate in the everyday OR environment.

The Stryker OrthoMap Express Knee Navigation System allows a less invasive and rapid registration process that does not require any separate anchoring devices for patient tracker fixation.

Instead, the Stryker innovative Dedicated Mini Jig is being used, designed for ease of use, to reduce the number of instruments and for accurate distal femur and proximal tibia cut alignment. Femoral rotation alignment and cut verification is further supported.

Stryker OrthoMap Express Knee Navigation: The less invasive, simplified solution to help improve surgical performance and clinical outcome of knee replacement surgery.

Important Information

Only trained medical personnel must use the Stryker Navigation System. As with any technical guide, the surgeon should consider the particular condition of the patient and perform the necessary adjustments if required. Safety and caution should always be utilized before proceeding. For the required safety information and contraindications, please refer to OrthoMap Express Knee Navigation

Version 2.0 Safety Information, supplied with the software package, and to the Instructions For Use, supplied with the system components. For a detailed description of the software features and procedures, and for a comprehensive definition of the computed mechanical axes and resection levels, refer to the online User Manual for the OrthoMap Express Knee Navigation Version 2.0

For information related to the use of conventional instrumentation, please refer to the operative techniques and the user documentation supplied with each company's conventional instrumentation.

Table of Contents

Product Guide

2 Configure Workflow	4
3 Set User Preferences	5
4 Set Up System and Software	6
5 Prepare Patient	7
6 Register Femur	8
7 Resect Distal Femur	10
8 Verify Distal Femoral Cut	11
9 Register Tibia	12
10 Resect Proximal Tibia	14
11 Verify Proximal Tibial Cut	15

Appendix

12 Additional Options	16
13 Reference System	20
14 Part List	22

2 Configure Workflow

3 Set User Preferences

4 Set Up System and Software

5 Prepare Patient

6 Register Femur

7 Resect Distal Femur

8 Verify Distal Femoral Cut

9 Register Tibia

10 Resect Proximal Tibia

11 Verify Proximal Tibial Cut

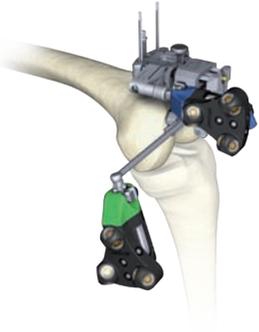
12 Advanced Features

13 Reference System

14 Part List

2 Configure Workflow

Prepare femur first



Navigate distal cut



Verify distal cut

Prepare tibia first



Verify proximal cut



Navigate proximal cut

Workflow

The Stryker OrthoMap Express Knee Navigation System provides a complete workflow for femoral and tibial cut navigation and verification.

It also enables the surgeon to configure the workflow options as needed.

These workflow options can be set in the "User Preferences" dialogue.

3 Set User Preferences

Set User Preferences

The “User Preferences” dialog enables the configuration of the software.

For each user, the preferences are individually stored and loaded at program start according to the login name.

Individual login names can be set up by authorized personnel.

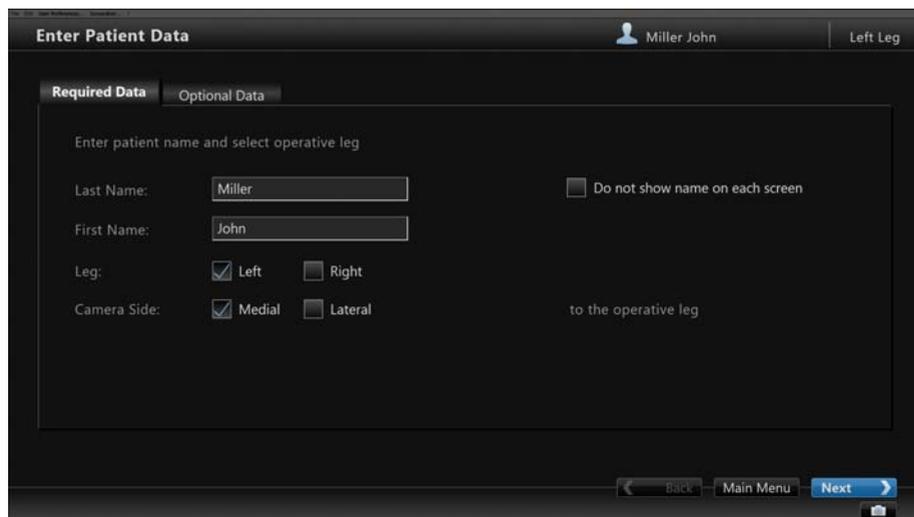
The “User Preferences” enables the following configurations:

- Display of usage information on screen.
- Configuration of the workflow and determination of femoral rotation and AP distance.
- Establishment of the preferred implant position as target for the bone resections.

To access the “User Preferences” dialog, select the “User Preferences” button of the upper windows menu bar.



4 Set Up System and Software



Note:

The system set up can be completed by the OR support staff prior to operation.

Set Up System and Start Software

To ensure instrument visibility, place the system opposite of the surgeon. Turn on the system and start the software.

Enter Patient Data

Select the “Enter Patient Data” screen and enter the patient’s first and last name. Indicate the leg side undergoing treatment.

If required indicate the camera side.

Prepare Navigated Instruments

Load sterile batteries into the navigated instruments.

One sterile battery will be needed for each navigated instrument used.

Initialize Navigated Instruments

When establishing communication between the navigated instruments and camera, make sure the “System Set Up” screen is active.

Initialize the navigated instruments by pointing the LEDs towards the camera. Press and hold the SELECT button on the navigated instrument for two to three seconds.

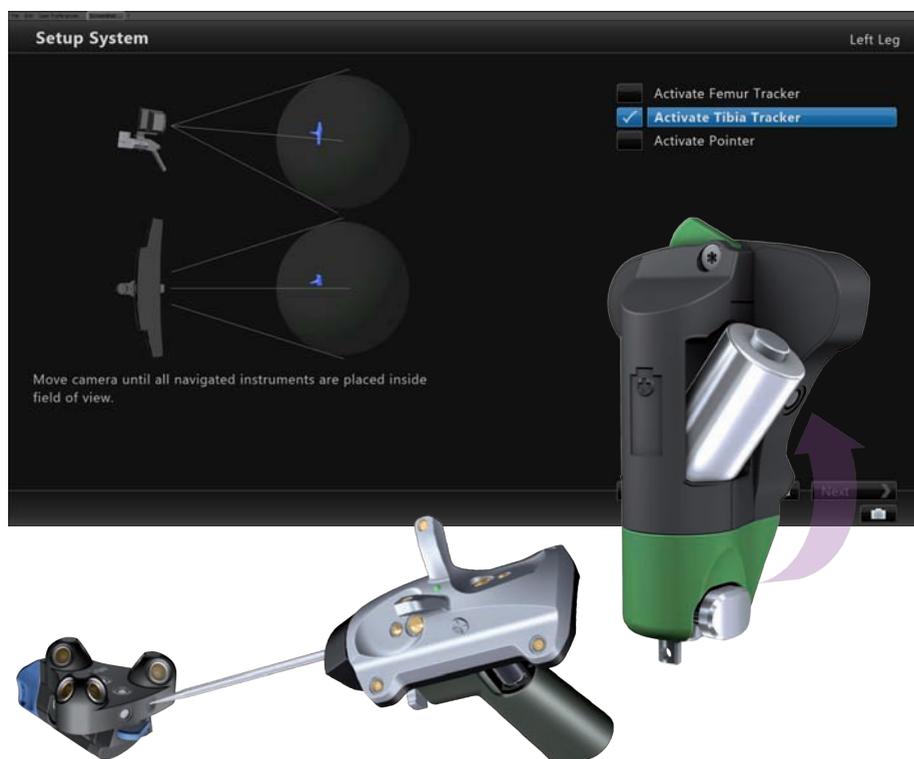
Navigated instrument initialization is confirmed by an audible alert and a checkmark in front of the software’s button.

Upon pointer initialization the “Validate Pointer” pop up window appears.

Validate Pointer

With pointer validation, the calibration of the pointer tip is checked.

Touch the center of any one of the tracker’s validation discs with the pointer tip. Press and hold the pointer’s SELECT button for two to three seconds to confirm.



5 Prepare Patient

Incision

All standard techniques for exposing the knee joint can be applied.

Fixation Plate Attachment

Before mounting the Dedicated Mini Jig and femoral patient tracker (green) onto the distal femur, a Fixation Plate has to be attached.

For use with the right or left knee, two Fixation Plates are available. When affixing the Fixation Plate to the femur, select the plate with the rod facing towards the camera.

The Fixation Plate can be positioned anterior to the transepicondylar line. Ensure that the distal condyles are accessible for digitization.

Always use four pins for fixation.

Mount Femoral Tracker

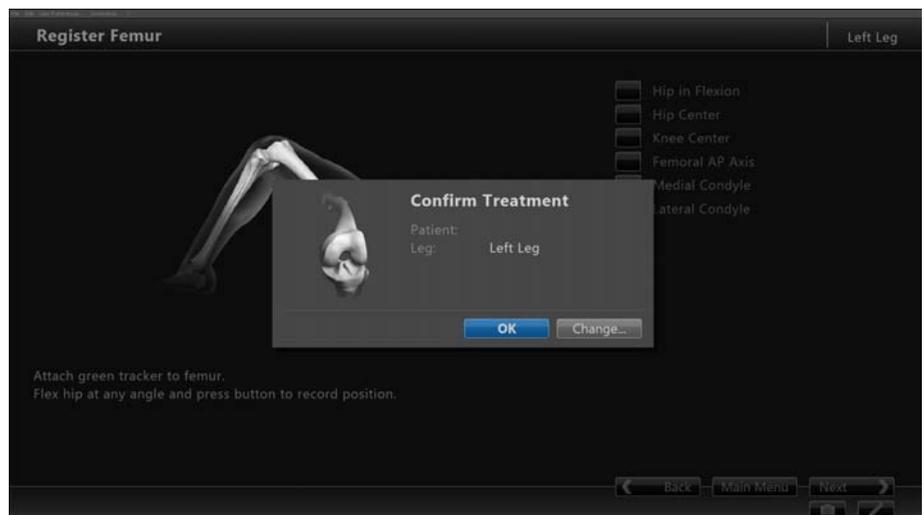
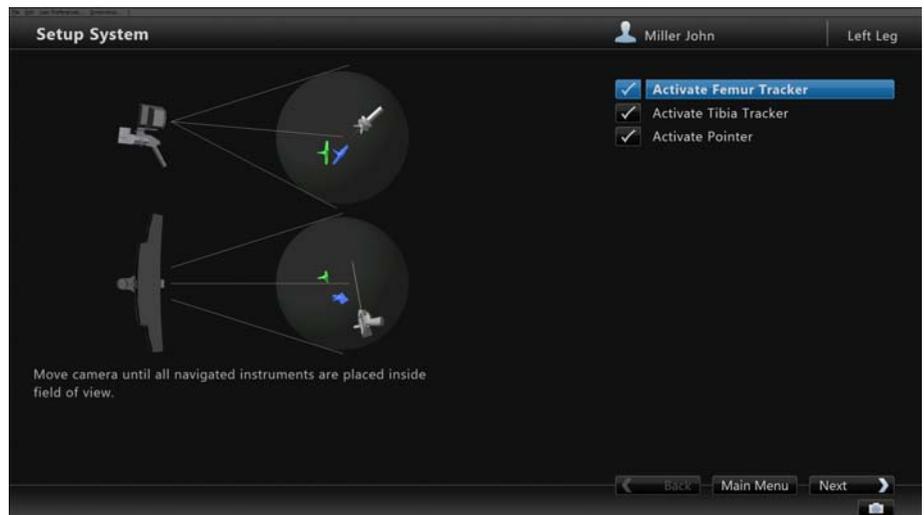
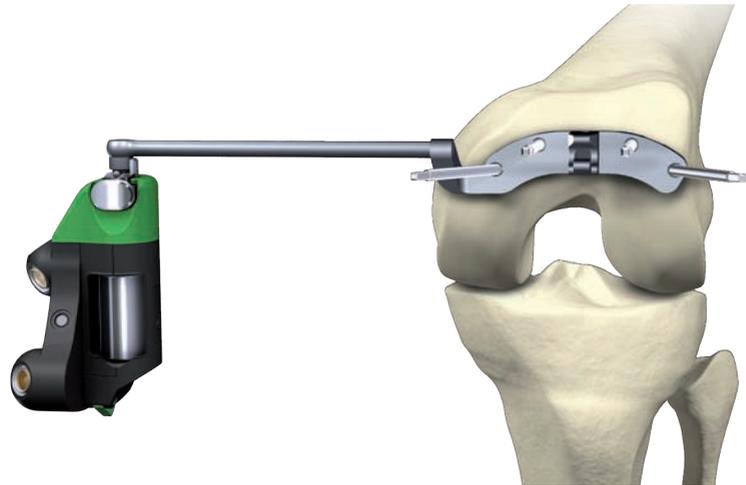
Mount the femoral tracker to the fixation plate. Ensure the LEDs of the tracker face the camera.

Position the Camera

Before starting with patient registration (landmark digitization), it is recommended to bring the camera in line with the knee joint such that the femoral tracker is centered in the working space.

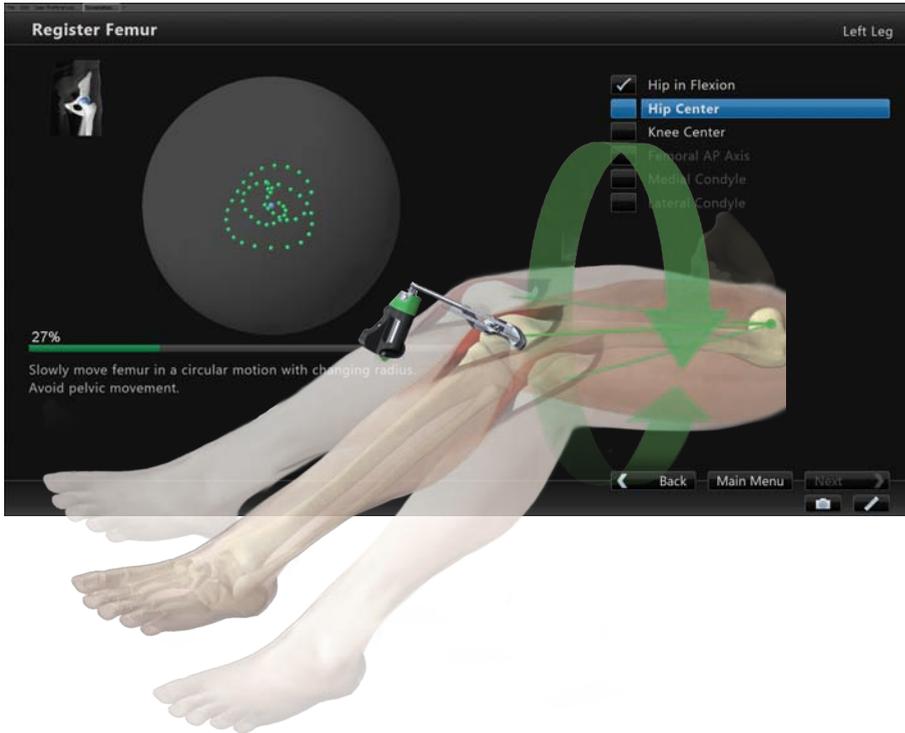
Confirm Treatment Side

Prior to femur registration, confirm the treatment side by pressing the select button of any navigated instrument that is visible to the camera.



6 Register Femur

6 Register Femur



During registration, the position of anatomical landmarks and axes are digitized to establish the reference for instrument alignment.

Hip in Flexion

Flex hip at any angle and press the femoral tracker's SELECT button to record (not illustrated).

Hip Center

Slowly circumduct the hip with a changing radius. During rotation avoid pelvic movement.

When a sufficient number of points are recorded, the software will automatically stop recording.

Note:

Avoid moving the camera or the OR table during motion analysis. Camera or OR table movement will either compromise the calculation of the hip center or cause the software to reject the calculation.

Note:

In case of pelvic movement, have an assistant stabilize the pelvis and repeat digitization.

Knee Center

Place pointer tip at the center of the trochlear sulcus anterior toward the distal end of the femoral shaft and press the pointer's SELECT button to record.



6 Register Femur

Femoral AP Axis

Align the pointer axis with the most posterior point of the trochlea and the most anterior point of the intercondylar fossa (Whiteside's line). Press the pointer's SELECT button to record.



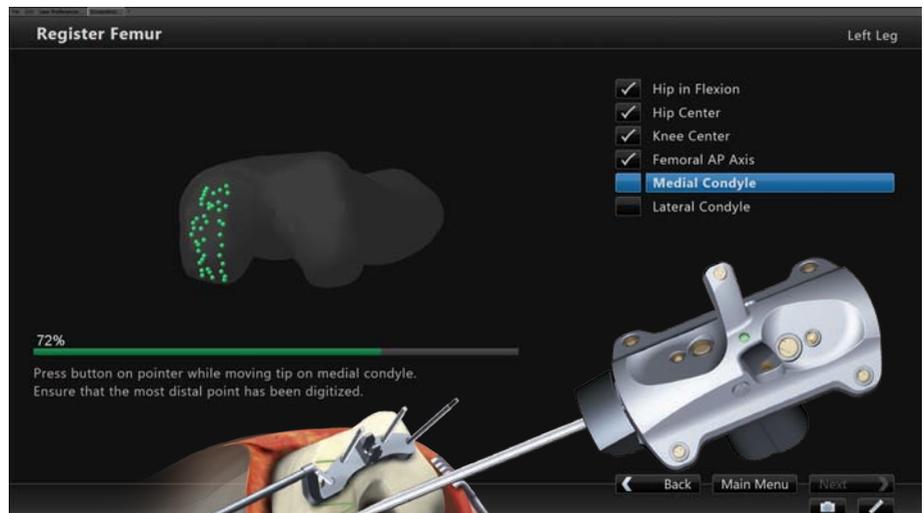
Medial Condyle

Place pointer's tip on the medial condyle and begin digitizing by pressing the pointer's SELECT button. While holding the SELECT button move the tip over the surface of the medial condyle.

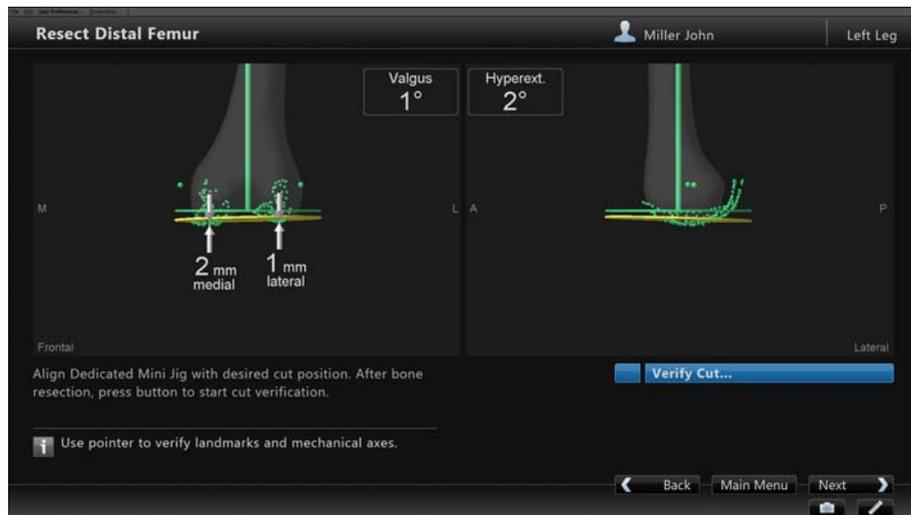
During digitization, ensure the most distal aspect of the condyle is included, and the pointer does not leave the surface of the bone.

Lateral Condyle

For lateral condyle digitization, follow the instructions for medial condyle digitization (not illustrated).



7 Resect Distal Femur



Resect Distal Femur

Assemble the Dedicated Mini Jig and attach the tibial tracker (blue) to the tracker interface.

The assembly can be mounted to the Fixation Plate. Make sure the cutting block is mounted in slight hyperextension and close to the bone to ensure a sufficient adjustment range.

On the screen, the yellow disc depicts the actual cutting guide position. Additionally, the varus/valgus, flexion/extension alignment, and medial and lateral resection depth are numerically displayed.

The position of the cutting guide can be adjusted by turning the adjustment screws of the Dedicated Mini Jig.

The cutting guide can be secured by pins. For additional stability, the cannulated wheels allow driving in cross pins. Ensure the cross pins are perpendicular to the bone.

Note:

After each pin insertion, the alignment of the cutting guide can be checked. Perform minor adjustments as needed.

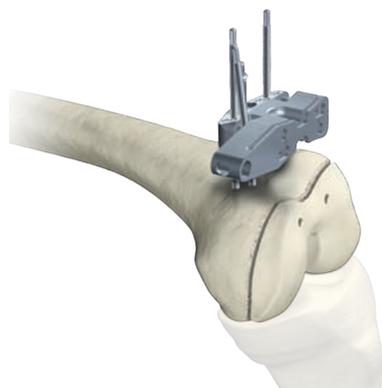
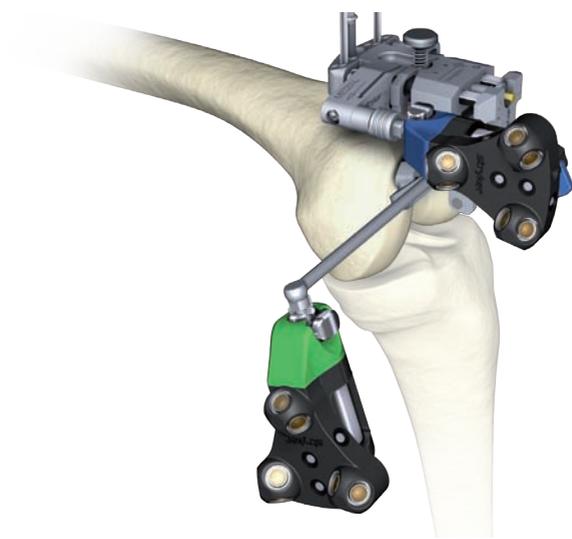
Before making the cut, perform the following steps:

1. Remove the pins from the Fixation Plate.
2. Detach the adjustment component and Fixation Plate together.
3. Remove the tracker and tracker adapter from the cutting guide and make the cut.

Note:

The Stryker OrthoMap Express Knee Navigation software supports posterior referencing only.

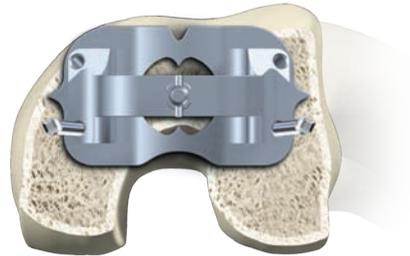
7 Resect Distal Femur



8 Verify Distal Femoral Cut

Distal Femoral Cut Verification

For distal femoral cut verification, the Resection Plane Probe can be positioned on the distal femoral cut. Align the probe with the knee center, the AP axis and the transepicondylar line.



The Resection Plane Probe can be fixated with two pins. If the resection plane probe is unstable, additional pins can be added.

Note:

Ensure the Resection Plane Probe is stable and sitting flush against the cut.

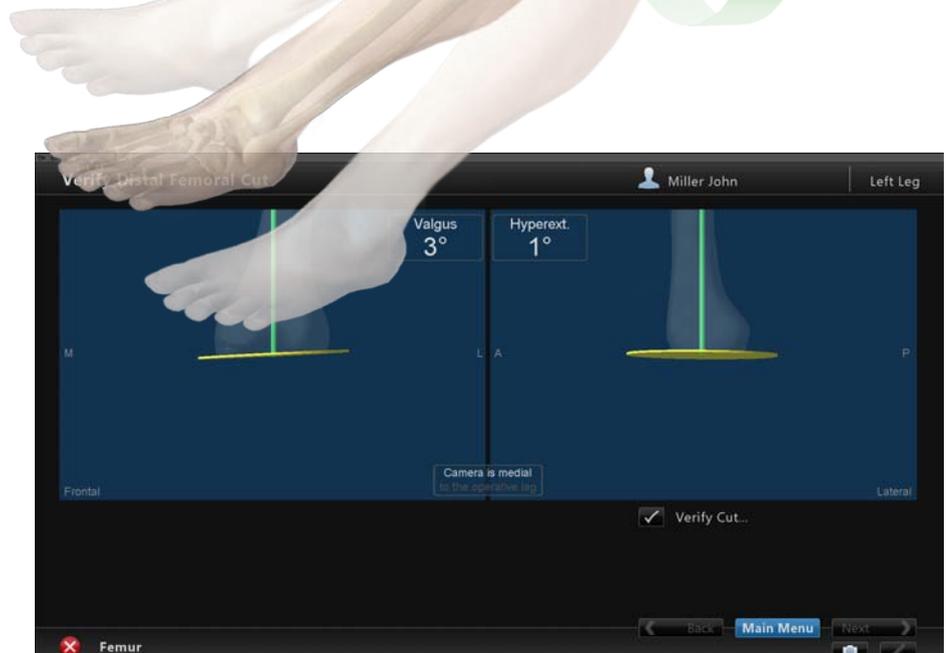
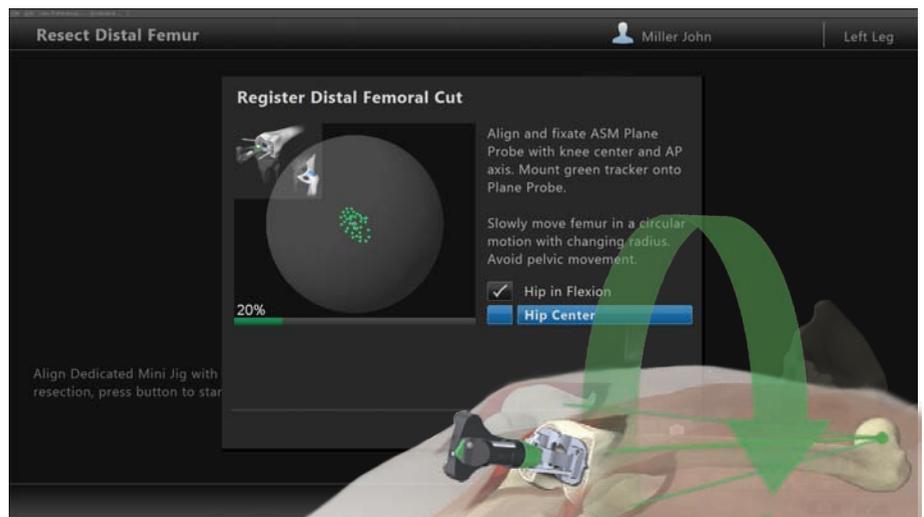
Attach the femoral tracker (green) to the Resection Plane Probe.

Highlight and select “Verify Cut ...” to activate the verification dialog.

First flex hip at any angle and press femoral tracker’s SELECT button to record “Hip in Flexion” (not illustrated).

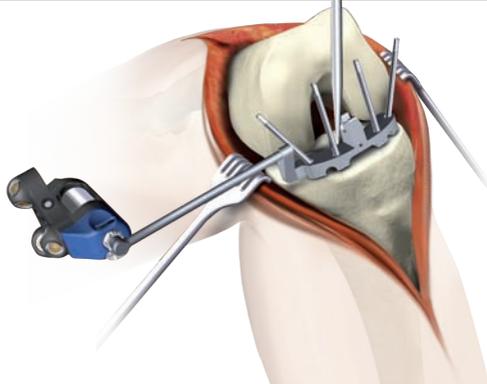
Next, slowly circumduct the hip with changing radius to digitize the hip center.

Upon completion of hip center digitization, the alignment of the distal femur cut is displayed.



8 Verify Distal Femoral Cut

9 Register Tibia



Fixation Plate Attachment

Before tibia registration, a Fixation Plate has to be attached to the tibia.

Select the fixation plate with the rod facing towards the camera.

The Fixation Plate can be positioned parallel to the rim and on the anterior portion of the tibia plateau, ensuring the most recessed parts of the compartments are accessible.

For fixation, always use four pins.

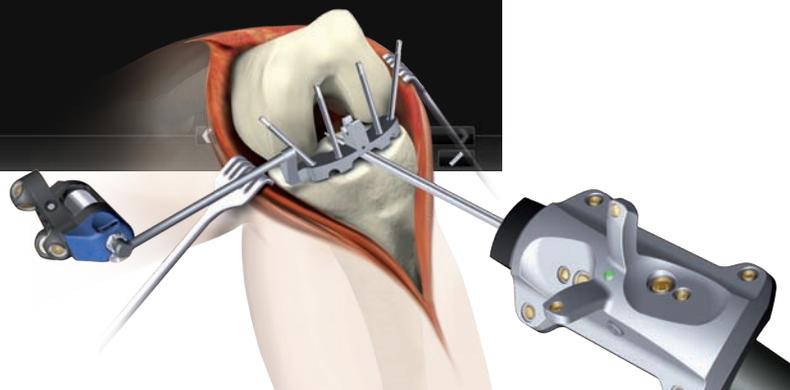
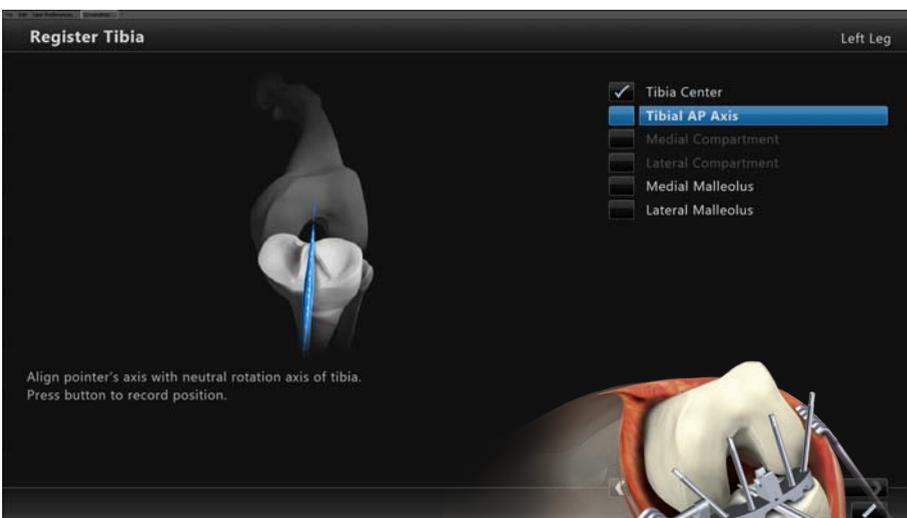
Upon proper fixation, mount the tibial tracker (blue) to the fixation plate. Ensure that LEDs of the tracker face the camera.

Tibia Center

Place pointer's tip on the middle of the interspinous sulcus anteriorly near the anterior aspect of the ACL attachment. Press the pointer's SELECT button to record.

Tibial AP Axis

Align pointer axis with the midpoint of the posterior cruciate ligament and the medial third of the tibial tuberosity. Press the pointer's SELECT button to record.



9 Register Tibia

Medial Compartment

Place pointer's tip on the medial compartment and begin digitizing by pressing the pointer's SELECT button. While holding the SELECT button, move the tip over the surface of the medial compartment.

Ensure the lowest aspect of the plateau is included. Avoid digitizing below the lowest anatomical point to avoid a false survey reading.

Lateral Compartment

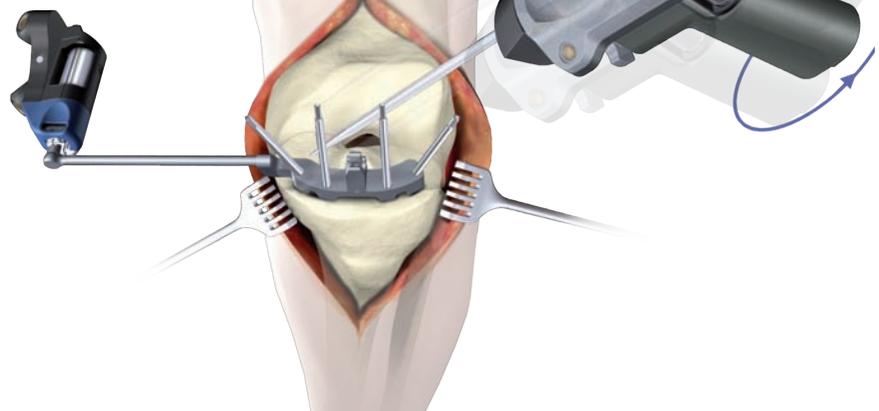
For lateral compartment digitization, follow the instruction for medial compartment digitization (not illustrated).

Medial Malleolus

Place pointer's tip on the most prominent aspect of the medial malleolus and press the pointer's SELECT button to record.

Lateral Malleolus

Place pointer's tip on the most prominent aspect of the lateral malleolus and press the pointer's SELECT button to record (not illustrated).



10 Resect Proximal Tibia



Resect Proximal Tibia

Assemble the Dedicated Mini Jig and attach the femoral tracker to the tracker interface.

The assembly can be mounted to the Fixation Plate. Ensure the cutting block is in slight anterior slope and close to the bone to ensure a sufficient adjustment range.

On the screen, the yellow disc depicts the actual cutting guide position. Additionally, the varus/valgus alignment, slope, and medial and lateral resection depth are numerically displayed.

The position of the cutting guide can be adjusted by turning the adjustment screws of the Dedicated Mini Jig.

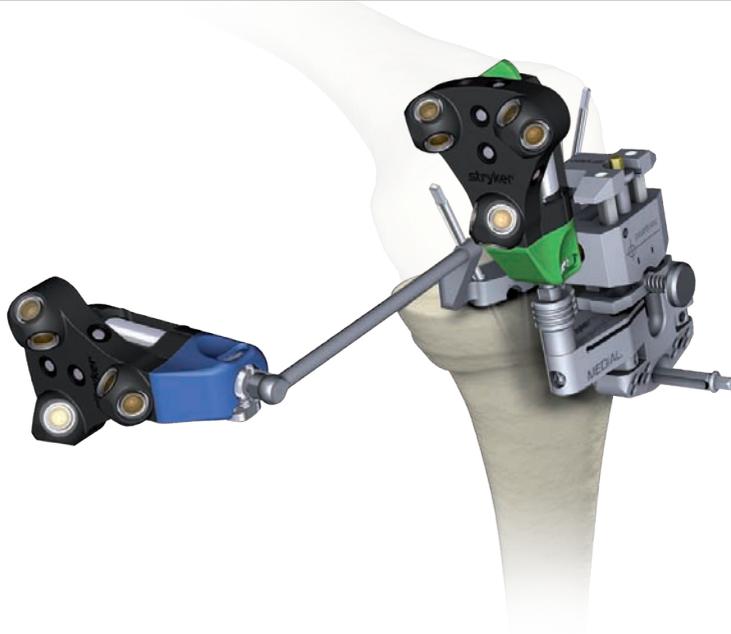
The cutting guide can be secured by pins. For additional stability, the cannulated wheels allow driving in cross pins. Ensure that the cross pins are perpendicular to the bone.

Note:

After each pin insertion, the alignment can be checked. Perform minor adjustments as needed.

Before making the cut, perform the following steps:

1. Remove the pins from the fixation plate.
2. Detach the adjustment component and fixation plate together.
3. Remove the tracker and tracker adapter from the cutting guide and make the cut.



11 Verify Proximal Tibial Cut

Proximal Tibial Cut Verification

For proximal tibial cut verification, position the Resection Plane Probe on the proximal tibial cut aligned with the tibia center and the AP axis.

The Resection Plane Probe can be fixated with two pins. If the resection plane probe is unstable, additional pins can be added.

Note:

Ensure the Resection Plane Probe is stable and sitting flush against the cut.

Attach the tibial tracker (blue) to the Resection Plane Probe.

Highlight and select “Verify Cut ...” to activate the verification dialog.

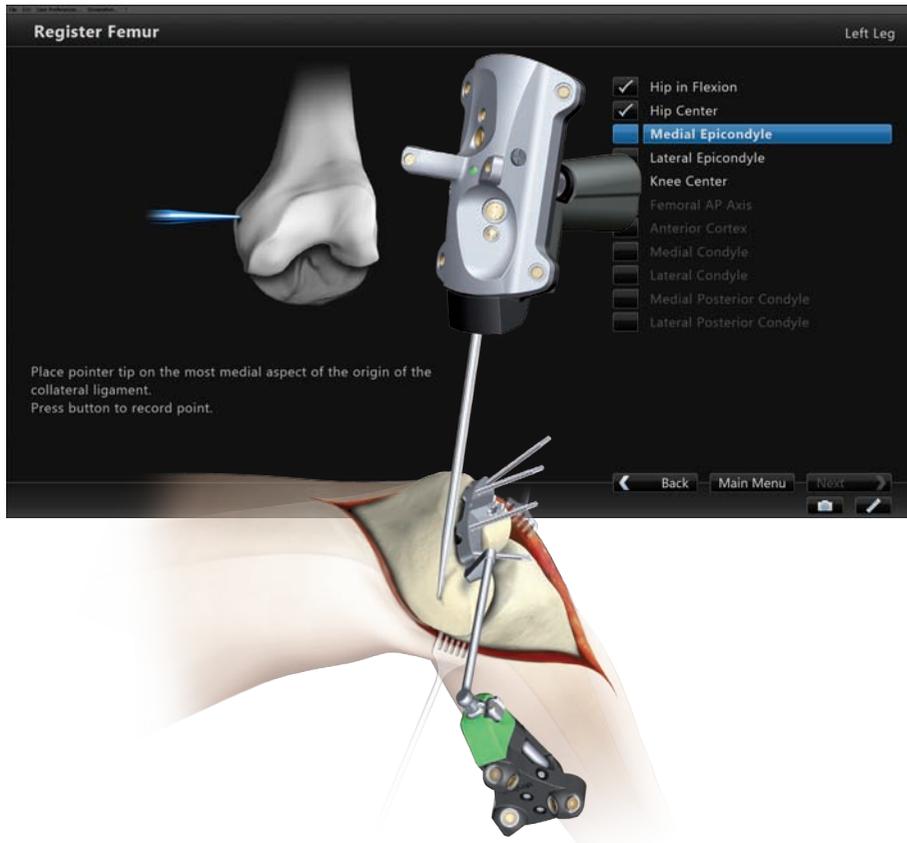
First, digitize the medial malleolus, followed by the lateral malleolus.

Upon completion of landmark digitization, the alignment of the proximal tibia cut is displayed.



11 Verify Proximal Tibial Cut

12 Additional Options



Femoral Rotation

The OrthoMap Express Knee Navigation software includes the option to navigate femoral rotation.

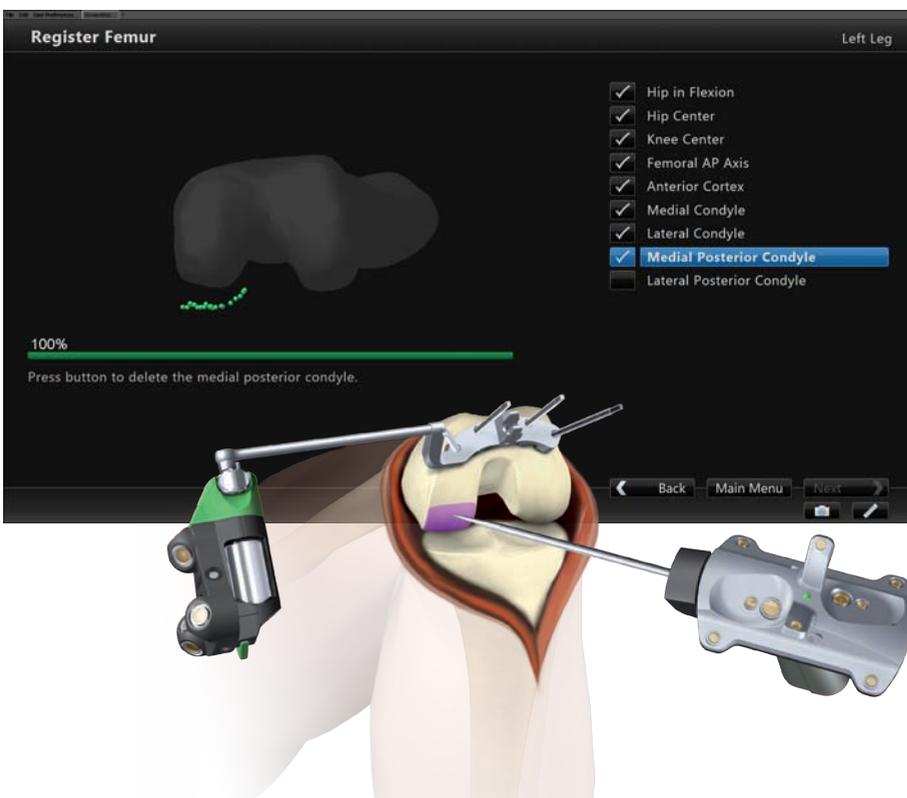
Navigation of femoral rotation requires the digitization of the following additional landmarks to establish the transepicondylar and posterior condylar reference axes.

Medial Epicondyle

Place pointer's tip on the midpoint of the sulcus of the medial epicondyle and press the pointer's SELECT button to record.

Lateral Epicondyle

Place pointer's tip on the most lateral aspect of the origin of the lateral collateral ligament and press the pointer's SELECT button to record (not illustrated).



Medial Posterior Condyle

Place pointer's tip on medial posterior condyle and begin digitizing by pressing pointer's SELECT button. While holding the SELECT button, move the tip over the surface of the medial posterior condyle.

During digitization, ensure the most posterior aspect of the medial posterior condyle is included and the pointer does not leave the surface of the bone.

Lateral Posterior Condyle

For lateral posterior condyle digitization, follow the instruction for medial posterior condyle digitization (not illustrated).

12 Additional Options

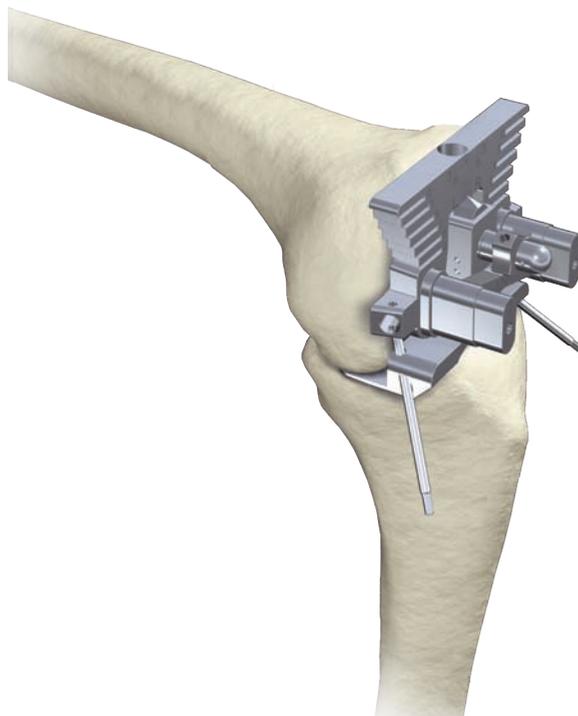
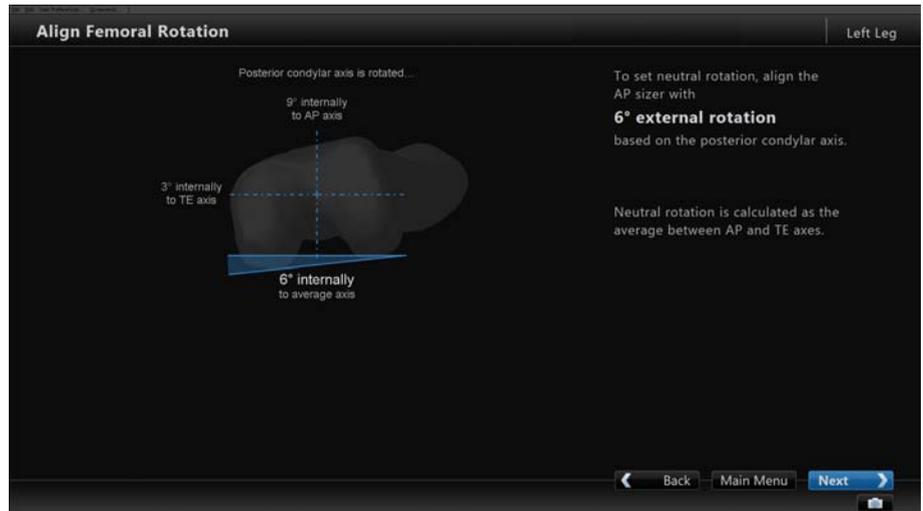
Align Femoral Rotation

For femoral rotation, the software calculates the angle between the digitized posterior condylar line and the femoral rotation axis.

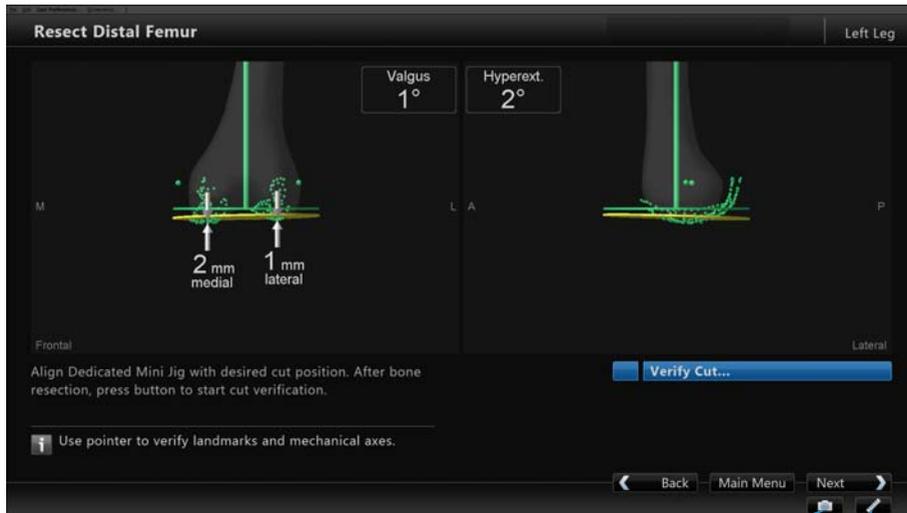
To adjust femoral rotation, an AP sizer is positioned flush against the distal femur cut. Make sure the feet of the AP sizer sit properly against the posterior condyles.

The AP sizer can be set to the degree of rotation recommended by the software, resulting in an anterior and posterior cut parallel to the digitized femoral rotation axis.

Note:
Navigation of femoral rotation requires an adjustable AP sizer.



12 Additional Options



Screenshot

The screenshot feature allows intra-operative navigation screenshots. The screenshots can be used to illustrate lectures, research papers, articles or promotion materials.

The screenshots are stored as .png files on hard drive:

D:\ASMKNeeData\patients\...

Ruler

A component of all navigation screens is a universal measurement tool enabling the surgeon to perform and document required measurements.

Select the Ruler button to activate the dialog and digitize two measurement points.

The overall distance, medial-lateral, anterior-posterior, and proximal-distal distances can be obtained.



Report

The report is created automatically upon saving the patient file. It compiles all relevant surgery data including the verified positions of the cut planes.

The report is saved in .rtf format on hard drive:

D:\ASMKNeeData\patients\...



12 Additional Options

AP Distance

As part of the “User Preferences” dialog, the calculation and display of the femoral AP distance can be selected.

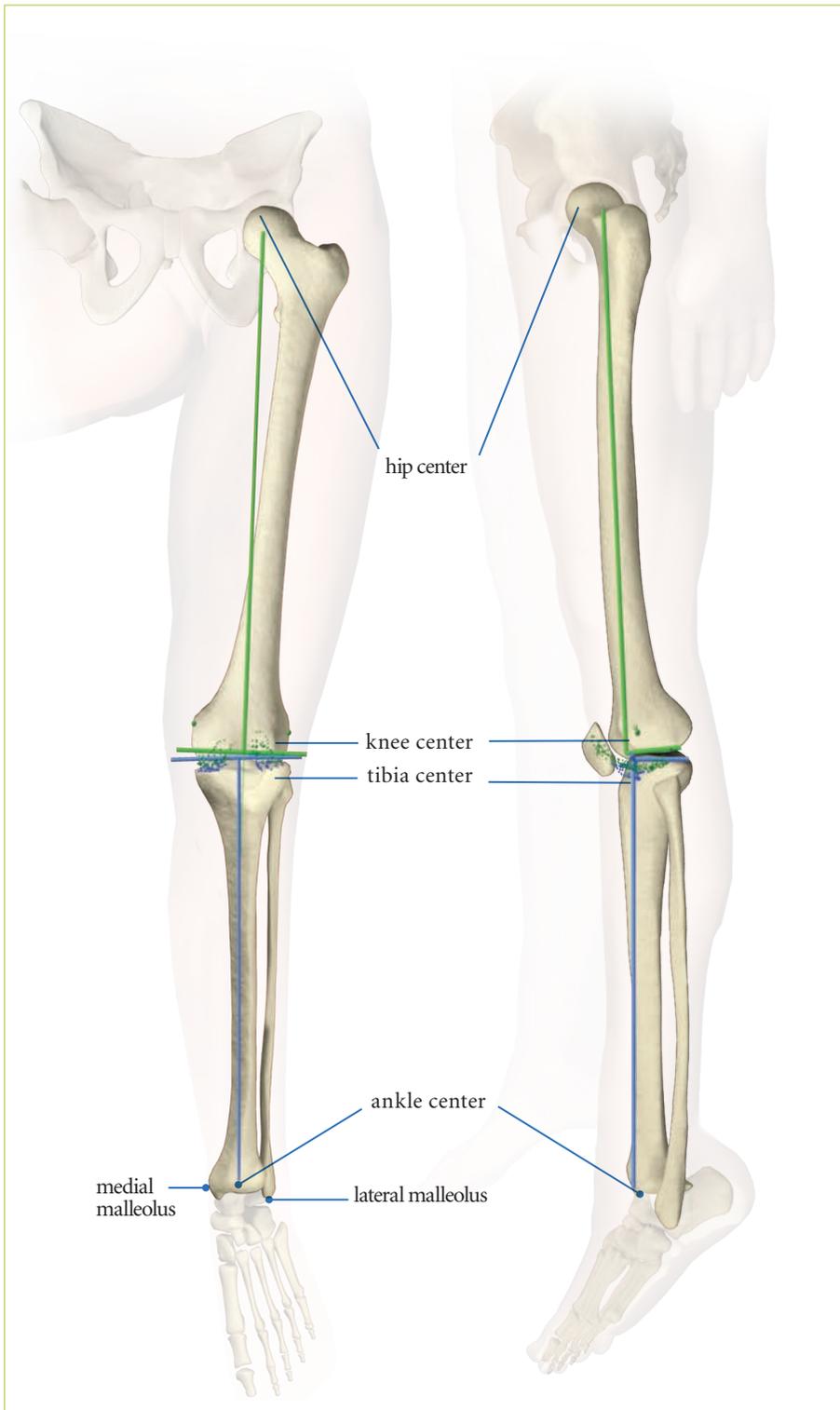
AP distance calculation requires the digitization of the posterior condyles and the anterior cortex.

For AP distance calculation, the most posterior point of the digitized posterior condyles and the most anterior point of the anterior cortex are selected.

The AP distance is displayed in the “Resect Distal Femur” dialog.



13 Reference System



Upon completion of registration, the reference system is established.

The digitized reference landmarks and axes are used to assess cutting guide alignment and to calculate AP size rotation.

Femoral Reference for Varus/Valgus, Flexion/ Extension or Slope

With Stryker OrthoMap Express Knee Navigation software, the femoral reference for varus/valgus and flexion/extension is the mechanical femur axis defined by the digitized:

- Hip center
- Knee center

The tibial reference for varus/valgus and slope is the mechanical tibia axis defined by the digitized:

- Tibia center
- Calculated ankle center

The ankle center is calculated by dividing the digitized transmalleolar axis according to the ratio of 56% lateral to 44% medial.

Note:

With OrthoMap Express Knee Navigation software, the anatomical axis of the femur and tibia is not taken into consideration.

13 Reference System

Femoral Rotation

The AP Sizer rotation recommended by the software corresponds with and compensates for the angle between the posterior condylar line and the femoral rotation axis.

The femoral rotation axis is defined by averaging the digitized:

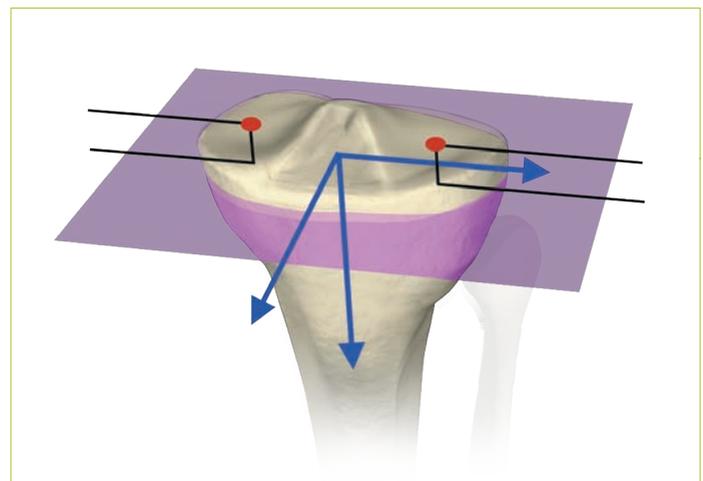
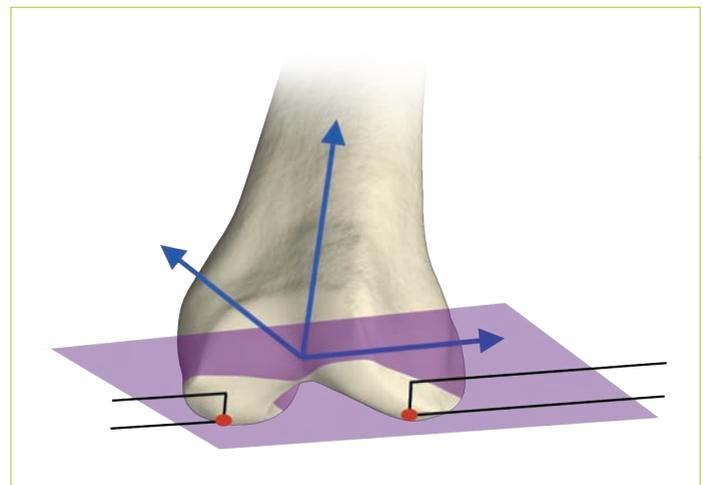
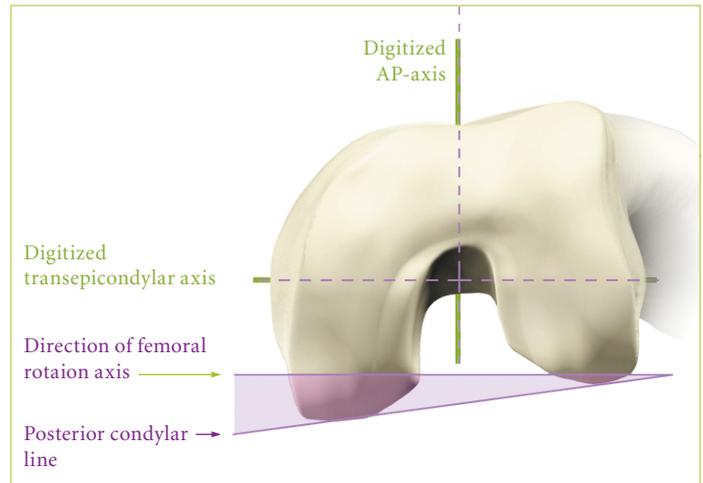
- Transepicondylar line (medial and lateral epicondyle)
- Femoral AP axis

Reference for Resection Level

Reference for the distal femur resection level is the most distal point of the digitized condyle.

Reference for the proximal tibia resection level is the most distal point of the digitized compartment.

The system calculates the length of the perpendicular from the most distal point to the resection plane when measuring the resection level.



14 Part List

Anchoring Devices	
	PINABALL Pin
	Headless Pins
Navigation Hardware	
	Universal Joint Screwdriver
	Screwdriver
	Fixation Plate - Ext. A
	Fixation Plate - Ext. B
	Plane Probe
Accessories	
	Instrument Battery

14 Part List

Software	
OrthoMap Express Knee Navigation	
Navigation Platform	
Navigation System II - Cart	
Stryker NAV3	
Navigated Tools	
Ortho Grip Knee Pointer	
nGenius Tibia/ Pelvis Tracker	
nGenius Femur Tracker	
nGenius Universal Tracker (optional)	
Dedicated Mini Jig	
Adjustment Component	
Mini Fixation Plate	
Mini Cutting Guide	
Tracker Adapter	



Reconstructive

Hips

Knees

Trauma & Extremities

Joint Preservation

Orthobiologics

Medical & Surgical

Power Tools & Surgical Accessories

Image Guided Navigation

Endoscopy & Arthroscopy

Integrated Communications

Beds, Stretchers & EMS

Sustainability Solutions

Neurotechnology & Spine

Cranio-maxillofacial

Interventional Spine

Neurosurgical, Spine & ENT

Neurovascular

Spinal Implants

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