

DISTAL FEMUR OSTEOTOMY PLATE

Surgical Technique

peditst



The Pediatric Distal Femur Osteotomy Plates are developed for pediatric patients, provide a safe bone fixation and useful treatment of distal (supracondylar) femoral osteotomies, and allow for immediate weight-bearing.

Plates are designed for Distal Femoral Extension Osteotomy.

Compared to other plates, it allows more than 30° correction in extension osteotomy.

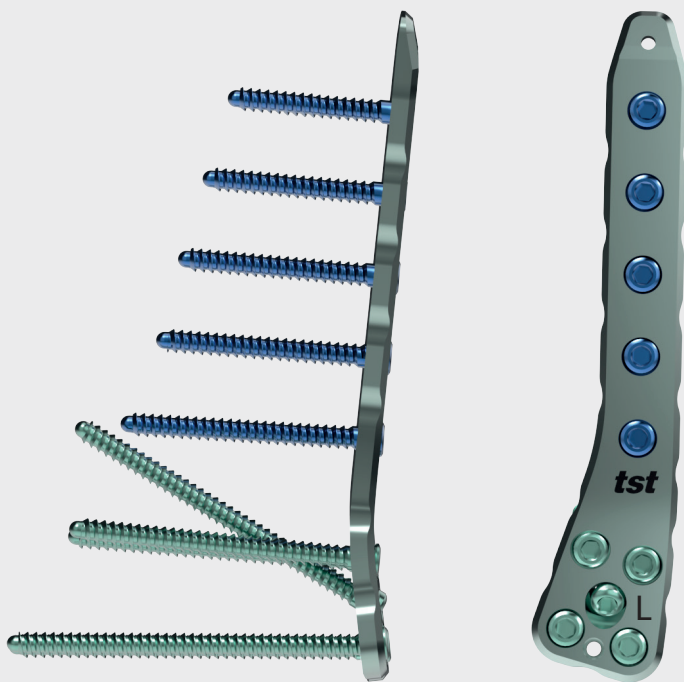
The plate is contoured such that distal locking screws will be at 100° to the midline of the shaft if the plate is fitted on the surface of the bone.

An oblique screw can be inserted through the central hole on the distal part of the plate to cross the osteotomy line and fix the proximal segment to the distal. The compression screw should reach the proximal segment without any contact with the other screws.

Plate Profile: Thickness; 3.5 mm, Width: 12.0 mm, Distance of holes: 12.0 mm.

Ø 3.5 mm Cortex and Ø 4.0 mm Cancellous Screws are used with the plates.

There are six different sizes of the plates according to the right and left anatomy and as short, medium, long.



Indications

The plate is intended for use in infants up to 9 years. Fixed flexion contracture of the knee in neurological conditions. Deformity correction in the distal femur.

Goal of surgery;

- Restore full knee extension
- Correct coronal plane malalignment
- Correct axial plane malalignment



Surgical Technique

Preoperative Planning

Determine the extent of the distal femoral extension desired.

Assess coronal and axial malalignment

Consider adjuvant procedures; Hamstring lengthening, patella tendon shortening/advancement

Patient Positioning and Approach

The operation is performed with the patient supine on a radiolucent table for the x-ray.

The whole leg is prepared up to the inguinal region.

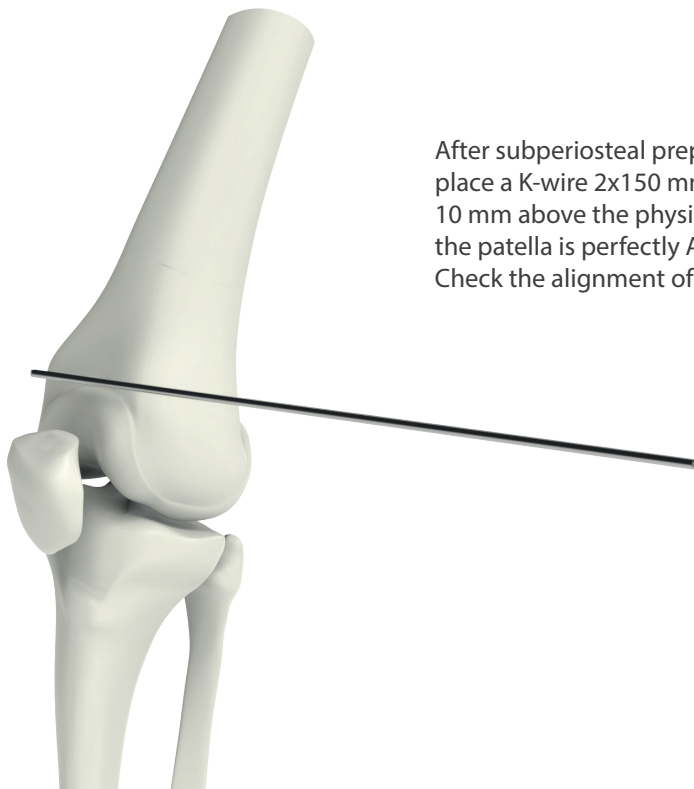
The knee must be in maximal extension

A standard lateral approach to the distal femur reflecting the vastus lateralis anteriorly should be used.

Circumferential subperiosteal dissection at site of wedge resection.

Dissect as far distal as possible without injuring the physis.

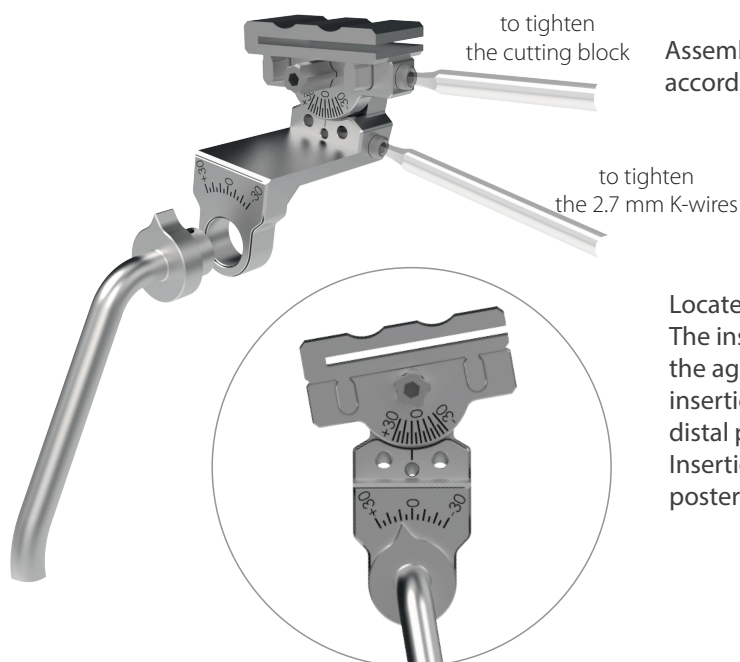
Locate the frontal plane of the distal femur.



After subperiosteal preparation of the distal femur, place a K-wire 2x150 mm extra-periosteally over the front of the femur 10 mm above the physis, or by rotating the leg under scopy control until the patella is perfectly Anterior and in the midline. Check the alignment of the K-wire in the frontal plane.

Guide for orientation of plate and osteotomy,

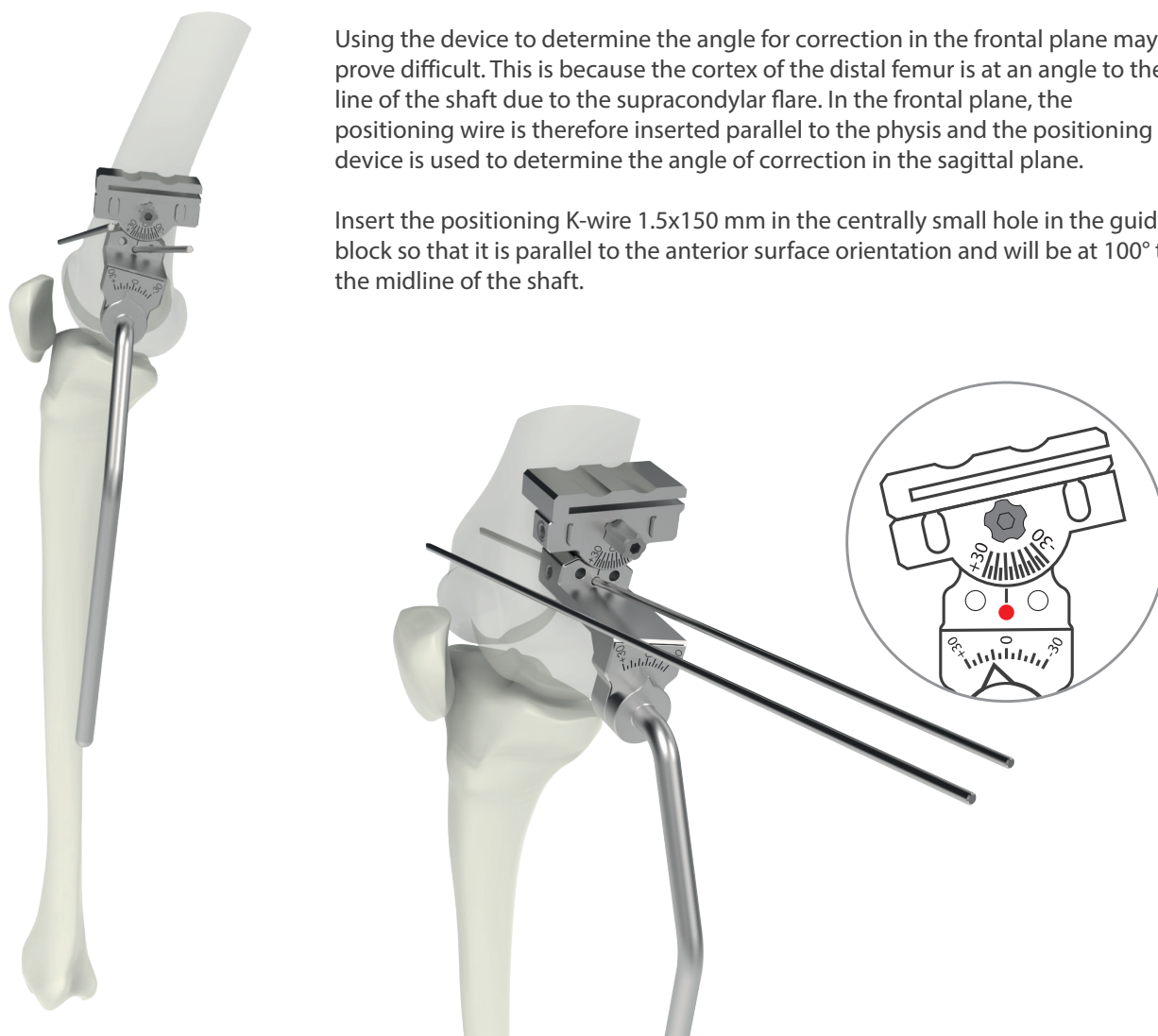
Assemble the positioning device and the cutting block accordingly. (Figure is setting for 10°)



Locate the distal femoral growth plate under scopy control. The insertion point for the positioning K-wire depends on the age and size of the patient. For the 3.5 mm plate insertion is 15 mm and the 4.5 mm plate 20 mm above the distal physis. Insertion point must be a bit more proximal and more posteriorly in an extension osteotomy.

Using the device to determine the angle for correction in the frontal plane may prove difficult. This is because the cortex of the distal femur is at an angle to the line of the shaft due to the supracondylar flare. In the frontal plane, the positioning wire is therefore inserted parallel to the physis and the positioning device is used to determine the angle of correction in the sagittal plane.

Insert the positioning K-wire 1.5x150 mm in the centrally small hole in the guiding block so that it is parallel to the anterior surface orientation and will be at 100° to the midline of the shaft.



When the block is rotated for the correction in the sagittal plane there will be space for the main K-wires 2.7x200 mm that correspond to the screws.

Insert K-wires 2.7 x 200 mm for distal two holes of the plate through the block holes.

Rotate the positioning device to placing in line with the tibial axis. This can be done by calculation. The marks on the guide block should point to correction degree.

At this step remove the anterior orientation K-wire.



Osteotomy

The osteotomy should be at least 2.0-2.5 mm proximal to the K-wires for the 3.5 mm plate and 2.5-3.0 mm for the 4.5 mm plate. Make a mark with the saw.

In the proximal fragment, a K-wire should be inserted before osteotomy. The reference K-wire provides assessment of rotation.

If no rotational correction is planned, then marking the femur with the saw.

All operations (wedge size and shape, shortening, etc.) should be determined by pre-operative planning. Opening wedge osteotomy can be used in deformity correction.

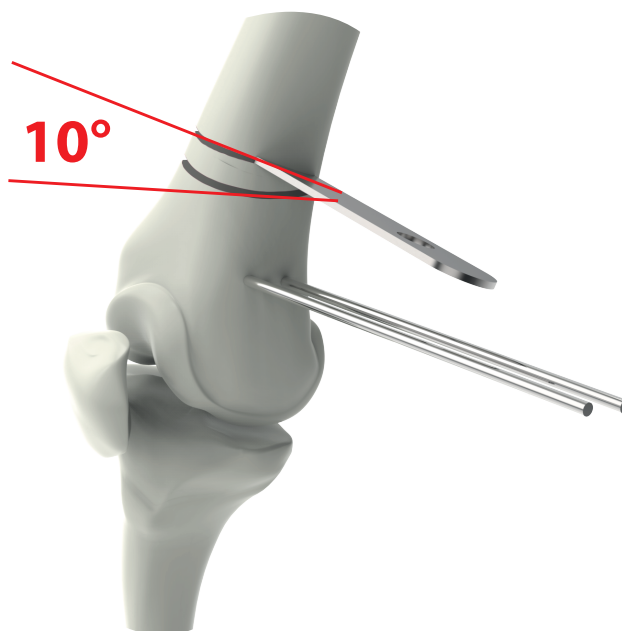
The first cutting is made through the cutting block. The first cutting should be parallel to the physis and sufficiently proximal to allow the third and fourth screws in distal other holes.

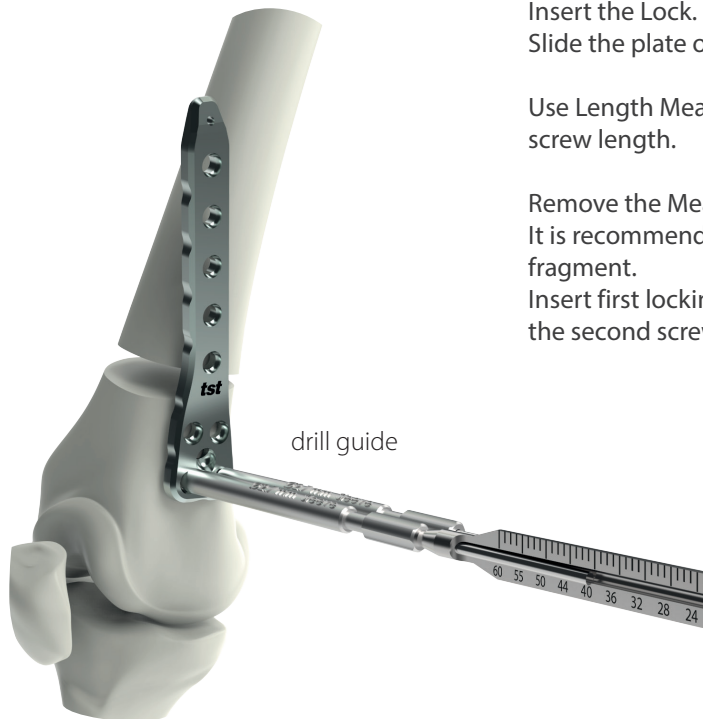
For the right femur the marks on the cutting block should point to the (-) planned correction degree.

For the left femur the marks on the cutting block should point to the (+) planned correction degree.

In the proximal fragment, the second cutting should be made freehand at a right angle to the line of the shaft in all planes.

Remove the wedge





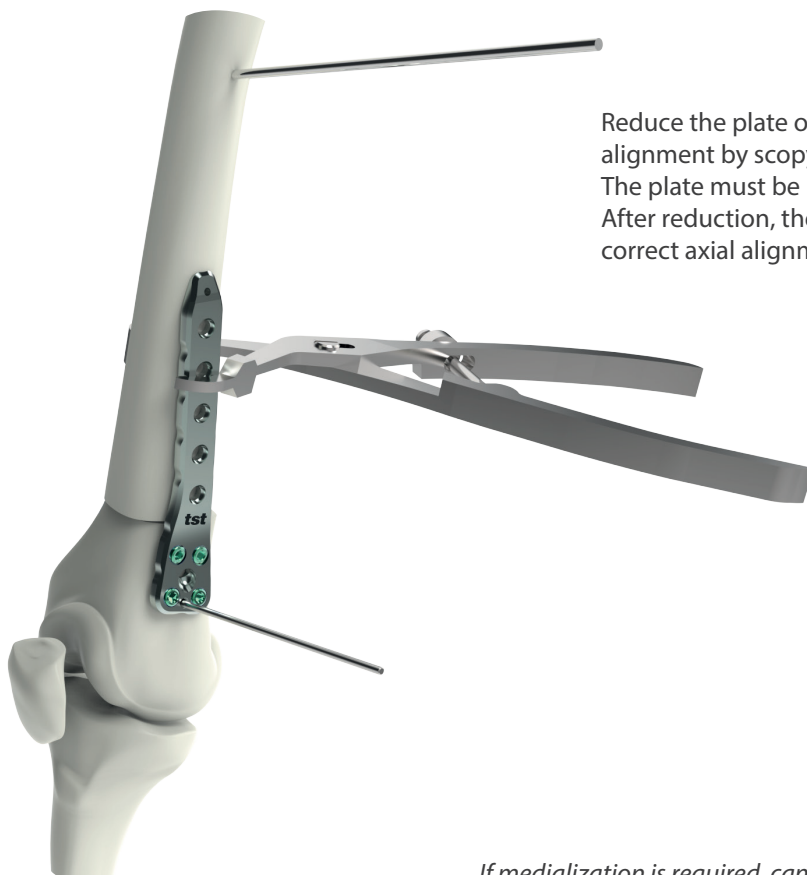
Insert the Lock. drill guides 2.7x80 mm into plate distal two holes. Slide the plate over the K-wires 2.7x200 mm.

Use Length Measurement Device over the K-wire to determine proper screw length.

Remove the Measurement device, guide, and K-wire 2.7x200 mm. It is recommended to use 4.0 mm Cancellous screws in the distal fragment.

Insert first locking screw manually using the screwdriver. Then insert the second screw as previously described for the first one.

Attach the drill guides 2.7 mm to the third hole and drill through both cortices. Determine the screw length with the Depth gauge. The same procedure is repeated for the fourth distal hole.



Reduce the plate onto the femoral shaft and check the alignment by scopy control.

The plate must be parallel to the shaft in the sagittal plane. After reduction, the reference K-wires can be used to achieve correct axial alignment.

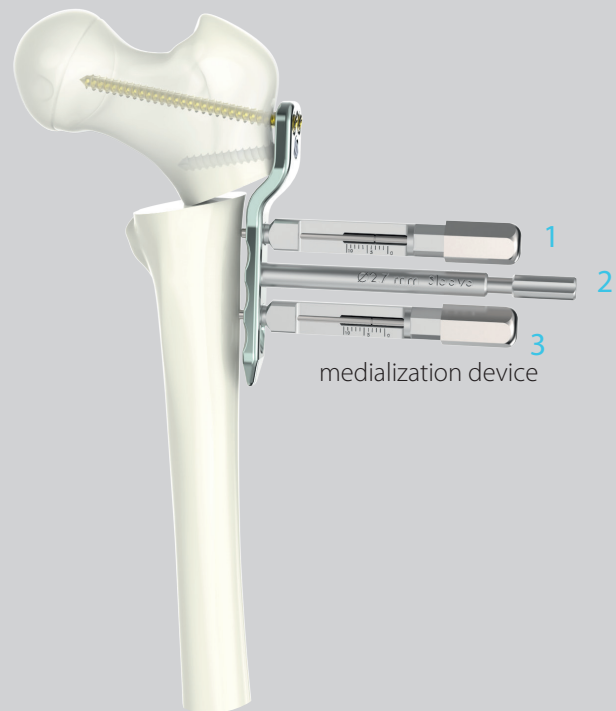
If medialization is required, can be used the Medialization devices in the set.

Medialization

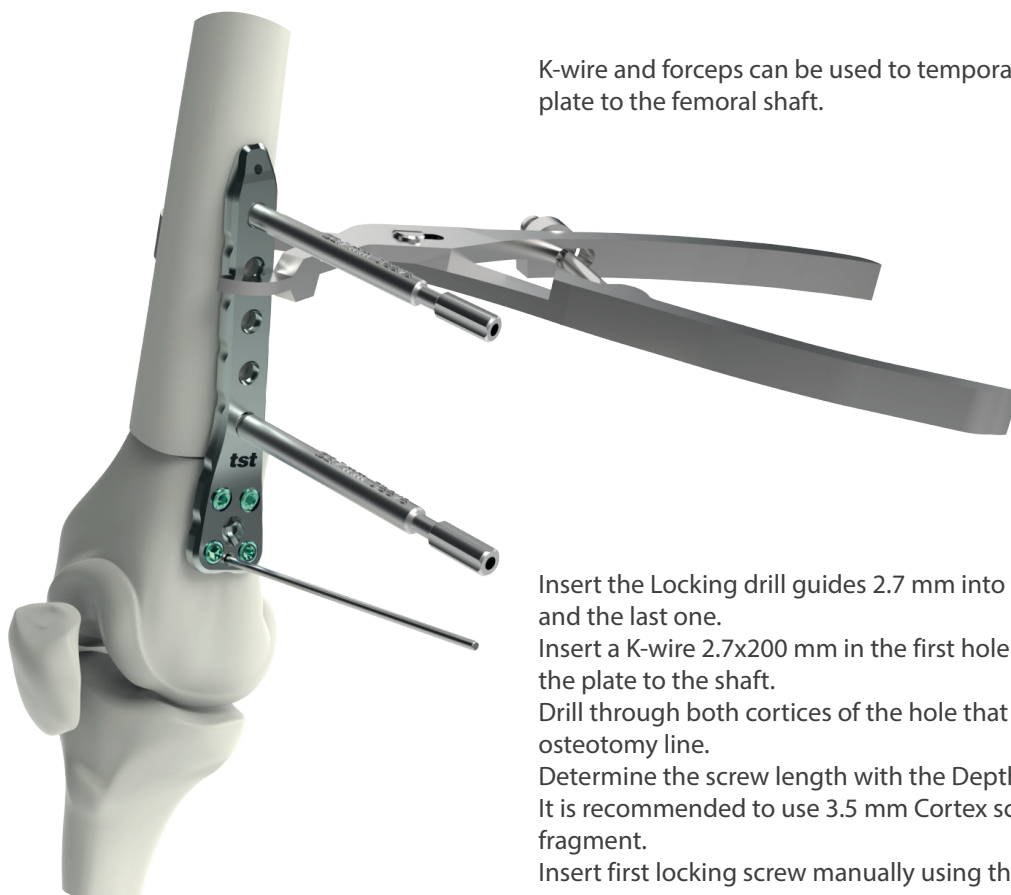
TST pediatric deformity plates are designed to allow medialization. Desired medialization distance is adjusted on the Medialization Devices, and these instruments are attached in the way that their threaded tips will be placed into the 1st and 3rd locking holes of the plate.

The threaded tipped 2.7 mm Drill Sleeve Guide is attached into the other remaining 2nd hole, and pre-drilling process is carried out with the 2.7 mm drill bit. Then the Drill Sleeve is removed and the length of the screw to be used is determined with the Depth Gauge, and the 3.5 mm Self-Tapping Locking Cortical Screw in appropriate length is placed into this hole.

At this stage, the Medialization Device in the 1st hole is removed first and instead of this, 2.7 mm Threaded Tip Drill Sleeve Guide is attached; and pre-drilling process is carried out with the 2.7 mm drill bit. Then the Drill Sleeve is removed and the length of the screw to be used is determined with the Depth Gauge, and the 3.5 mm Self-Tapping Locking Cortical Screw in appropriate length is placed into this hole.



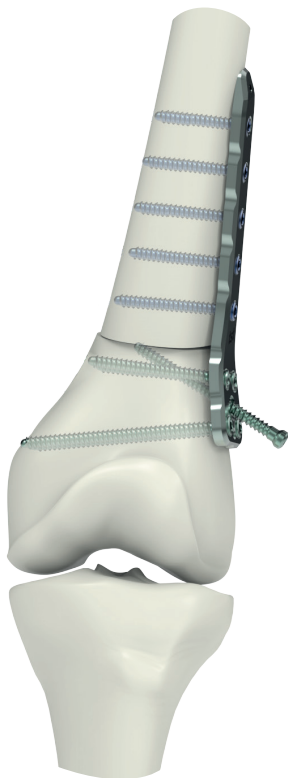
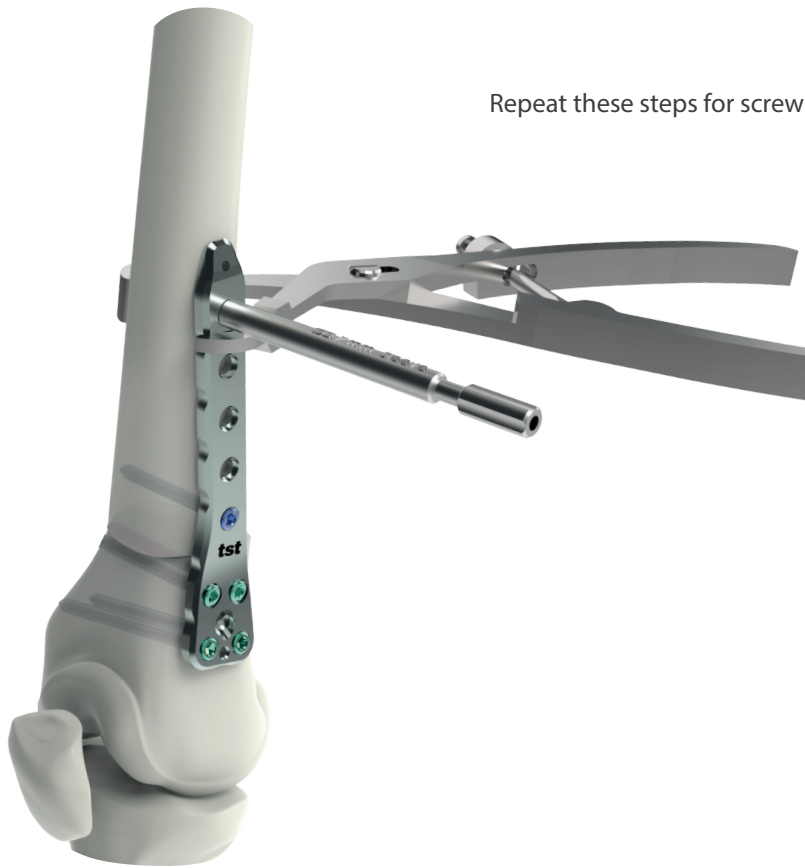
Sample of Medialization Device Using



K-wire and forceps can be used to temporarily fixing of the plate to the femoral shaft.

Insert the Locking drill guides 2.7 mm into the shaft holes 1 and the last one.
 Insert a K-wire 2.7x200 mm in the first hole to temporarily fix the plate to the shaft.
 Drill through both cortices of the hole that is near the osteotomy line.
 Determine the screw length with the Depth gauge.
 It is recommended to use 3.5 mm Cortex screws in the distal fragment.
 Insert first locking screw manually using the screwdriver.

Repeat these steps for screw insertion in holes 1, 2, and others.



Note; An oblique screw can be inserted through the central hole on the distal part of the plate to cross the osteotomy line and fix the proximal segment to the distal.

