INBONE® II
Total Ankle System
Surgical Pocket Guide
Step 1: Anterior Incision (pressurize tourniquet)

Step 2: Align Foot in Foot Holder

1. Align tibia parallel to the floor using achilles and calf support
2. AP view – align ‘gun sights’ of AP rods
3. Forefoot blocks – Mortise view – Coban foot/calf
4. Heel cups - pin heel with 2.4 pins and pin driver
5. Move ML plate to translate AP rods on talus
6. Move U-Bracket to rotate AP rods to center of tibia
7. Lateral view – align ‘gun sights’ of ML rods
8. Move AP plate to translate ML rods on talus
9. Move Plantar/Dorsiflex foot plate to rotate ML rods to center of tibia
10. Lock down neutral stop screw
11. Double-check AP view

Black bold copy: required tools
Gray copy: fluoro checks
Step 3: Drill Primary Reference Hole

1. Mark bottom of foot through **primary bushing** with ink on end of **trocars**
2. With **scalpel** incise bottom of heel
3. Reinsert cannula/trocars thru primary cannula nut and engage calcaneus; tighten bushing
4. With **6mm drill**, peck drill through calcaneus into talus and check with fluoro
5. Check drill alignment with AP rods before drilling into tibia
6. Drill approximately 5-6cm into the tibial canal
7. Leave the drill bit in place
Step 4: Bony Cuts

1. Select and secure appropriate saw guide size to anterior fixture
2. Install anterior fixture on foot holder, close to foot
3. In lateral view, align distal saw blade to the talus
4. Switch to AP view, and align AP rods
5. Align saw guide to drill bit
6. Determine final saw guide size (just inside malleoli)
7. In lateral view, insert 2.4 pins and cut flush to saw guide
8. Pull 6mm drill back and drill anti-rotation hole
9. Make proximal, distal, and then side cuts
10. Remove anterior fixture
Step 5: Remove Bone

1. Check cuts with feeler gauge or saw blade
2. Complete cuts freehand if necessary
3. 60° angle cut on tibia, bone removal and clean up

*Rep can bring in implants during this step*

Step 6: Ream the Tibia

1. Replace drill bit with reamer drive rod - clean threads
2. Select and attach reamer tip to drive rod with appropriate clip
3. Ream depth to approximately 6cm by referencing scale on shaft
4. Retract reamer without reversing!
5. Unscrew and remove reamer tip with appropriate wrench
6. Replace reamer drive rod with strike rod
Step 7: Trial for Tibial Tray AP Size

1. Insert appropriate size Tibial Tray AP Sizer into the resected joint space.

2. The Strike Rod should be used to fully seat the Sizer into the tibial resection.

3. Check a lateral fluoroscopic image to ensure proper anterior/posterior fit.

Use the Tibial Tray AP Sizer to check the tibial cut surfaces and ensure that no bone fragments will impede proper positioning of the Tibial Tray.
Step 8: Install Tibial Stems

1. Screw the first two tibial stem segments together with wrench and x-driver
2. Place wrench on distal stem piece and insert in tibia
3. Replace strike rod with x-driver
4. With clip insert next stem piece and torque together
5. When assembling stem base, align Morse Taper release hole anteriorly, and leave distal wrench in place

Step 9: Install Tibial Tray

1. Replace x-driver with strike rod
2. Align tibial tray / remove holding tool
3. With wrench in place, strike tray to set Morse Taper
4. Verify in AP that taper is set
5. Apply bone cement to tibial tray*
6. Remove wrench and push tray into tibia using strike rod
7. Remove tools - check both AP and ML views

*The INBONE™ Total Ankle is intended for cemented use only
STEP 9.5: Trial Reduction/Talar Positioning

1. Remove foot from Foot Holder
2. Install Poly Insert Trial and Talar Dome Trial
3. Take ankle through passive ROM to determine proper positioning on Talar Dome Trial
4. Fluoro check AP and lateral views
5. Install two 1.4mm K-wires through Talar Dome Trial
6. Use 4mm Anterior Peg Drill to drill through the medial and lateral opening in the Talar Dome Trial
7. Remove Poly Insert Trial and install one 2.4mm Steinmann Pin through the center of Talar Dome Trial
8. Remove two 1.4mm K-wires
9. Remove Talar Dome Trial
10. Use appropriate size Talar Stem Reamer to ream over 2.4mm Steinmann Pin
Step 10: Install Talar Stem and Talar Dome

1. Insert talar stem in talar dome and insert assembly into talar stem seating block
2. Use talar dome strike tool to set Morse Taper
3. Attach holding tool to dome
4. Insert tibial tray protector in tray
5. Insert talar dome assembly into joint space angling the stem towards the reamed talar hole and plantar flexing foot
6. Apply bone cement to the bottom of the talar dome*
7. Remove tibial tray protector and with dome strike tool, impact the dome flush to the talar surface
8. Check lateral view fluoro for flush fit

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Step 11: Install Poly Insert

1. With poly insert trial, for desired poly thickness
2. Assemble insertion tool, threaded insert, jack screw and plunger
3. Insert sized poly with slot facing towards plunger
4. Thread attachment screw to tibial tray, slide poly insertion tool over attachment screw, and secure with attachment nut
5. Turn jack screw and advance poly
6. Keep perpendicular by applying hand pressure on the insertion tool distally
7. Ensure that the poly is flush to tibial tray and seat with poly impact tool
8. Visually check for fully seated poly
9. Check fluoro in both AP and lateral views
## Prosthesis Sizes

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**Stem Component Specifications**

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**Tibial Stem Construct Specifications**

- Units: mm
- Size 2 and 3
- Size 4 - 6
## Product Specification

### INBONE® Tibial Component

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Product Specification

INBONE® Sulcus Talar Component

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FINAL AP VIEW CHECK

- Prior to drilling, align the ‘gun sights’ of the AP rods to verify rod position on the talus/tibia has not changed.

*Be sure all adjustment knobs have been locked down before drilling*
PECK DRILLING

- Pull AP rods down to the calcaneus
- Peck drill slowly, periodically checking fluoro to confirm the 6mm drill is not skiving medially
CHECK TALAR CUT – LATERAL VIEW

- Insert a saw blade into the distal slot of cutting guide to verify amount of talus to be resected
- Make proximal/distal adjustments as needed
- Save a final AP image for placement of gutter pins
SECURE SAW GUIDE WITH PINS

- Use 2.4mm Steinman pins to secure cutting block to tibia and talus
- Use previously saved image to determine correct placement for medial and lateral gutter pins
VERIFY SIZE & ALIGN SAW GUIDE

- Align 'gun sights' of AP rods
- Align saw guide to 6mm drill
DRILL ANTI-ROTATION NOTCH

- Drill bi-cortical

*Be sure to pull the 6mm drill out of the way for this step!*
JOINT SPACE CUTS

Be sure to the 6mm drill is out of the way of the talar cut
REAM TIBIA

*Do not reverse reamer!*
TRIAL FOR TIBIAL TRAY AP SIZE

- Check ML view to determine the optimum AP size Tibial Tray (standard or long).
ASSEMBLE TIBIAL STEM COMPONENTS

Morse taper release hole on base stem piece must be left facing anteriorly
ASSEMBLE TIBIAL TRAY

- With wrench in place, use a mallet to seat Morse taper connection
- Verify taper connection through hole in the base piece - hole should appear as a partial circle
- Apply bone cement to top and side walls of tibial tray
TRIAL REDUCTION/TALAR POSITIONING

- Install Poly Insert Trial and Talar Dome Trial
- Take ankle through passive ROM to determine proper positioning on Talar Dome Trial
TEMPORARILY PIN TALAR DOME TRIAL

- Install two 1.4mm k-wires through Talar Dome Trial
- Remove Poly Insert Trial
- Install one 2.4mm Stienmann Pin through the center of Talar Dome Trial
PREPARE TALUS

- Use 4mm Anterior Peg Drill to drill through the medial and lateral opening in the Talar Dome Trial
- Remove 1.4mm K-wires
- Remove Talar Dome Trial
- Use appropriate size Talar Stem Reamer to ream over 2.4mm Steinmann Pin
INSTALL TALAR DOME

- Apply bone cement to bottom surface of talar dome
INBONE® TOTAL ANKLE PROCEDURE SURGICAL PEARLS

TECHNIQUE TIPS AND SOLUTIONS TO COMMON PROBLEMS

The first part of this section will cover technique tips for the standard degenerative ankle with no deformities (STRAIGHT ANKLE). Later sections will address correctable deformities. The following is in order of the INBONE® Total Ankle surgical technique.

STRAIGHT ANKLE

1. SAVING TOURNIQUET TIME. Especially for first cases, tourniquet time can be saved by packing the wound and wrapping Esmark around the ankle, after prepping the ankle joint. Here the tourniquet may be turned down while placing the foot in the foot holder, aligning the foot, and drilling through the bottom of the foot. Just before attaching the anterior fixture, the Esmark may be removed and the tourniquet turned back up.

2. WELL LEG HOLDER. By placing the well leg in a sling or arm-board off the table, this will allow the foot holder to stay centered on the operating table.

3. PINNING THE HEEL CUPS. If the pins are “binding” and are difficult to get place in the heel cups, insert the pins by hand to ensure angle and then attach the pin driver.

4. ALIGNMENT OF THE GUIDE RODS. When aligning the guide rods initially do not waste fluoro time trying to get the tips horizontal, as long as the tips are centered alignment will be accurate. Getting the tips horizontally aligned in the AP plane is however recommended when positioning the Saw Guide.

5. ALIGNMENT OF THE GUIDE RODS. A small ruler placed against the fluoro screen, can be helpful in determining proper centering.

6. LOCATION OF AP GUIDE RODS. If you have to make a judgment call on alignment rod location in the AP view, it is better to be a bit more lateral on the talus. If the drill bit should skive it tends to skive medial.

7. LOCATION OF ML GUIDE RODS. If you have to make a judgment call on alignment rod location in the lateral view, it is better to be a bit more anterior. This should help minimize any posterior overhang of the talar dome.

8. THUMB SCREW. Be sure to lock down the plantar stop thumb screw to maintain ankle position when moving in to plantar flexion later in the surgery.

9. BOTTOM FOOT INCISION. The incision may seem medial – this is normal.

10. CANNULA. Make sure that the cannula is on the calcaneus to prevent soft tissue or medical plantar nerve irritation.
11. **INITIAL PECK DRILLING.** Some surgeons will start peck drilling with the drill in reverse as to further prevent skiving.

12. **ADJUSTING SAW GUIDE FIXTURE.** Try to position the saw guide as close to the joint as soft tissue will allow. This will provide more accurate implant sizing and reduce saw excursion.

13. **ADJUSTING SAW GUIDE FIXTURE.** After initial positioning of the saw guide to the joint, check a lateral view using a free saw blade to verify the location of the talar cut. Once position is confirmed, with saw blade left in place to maintain proximal-distal positioning, move to AP view and continue aligning the saw guide to the 6mm drill.

14. **ANTI-ROTATION NOTCH DRILL.** If the drill is not going through the bone, there is a good chance that the 6mm drill is still in the tibia! Back the drill out.

15. **SAW CUTTING.** When cutting through the cortical wall, the approach should be light-handed, especially on the distal talar cut. A heavy handed approach may cause the blade to skive.

16. **SAW CUTTING.** In the event that the saw blade does not reach the posterior cortical bone, remove the saw guide, leave the pins in the bone and use a reciprocating saw to finish cuts.

17. **BONE REMOVAL.** Use an osteotome or saw at a 60 degree angle to remove anterior portion of the tibia. Then using the talar pins remove the talus. To reach the posterior side of the tibia, a right angle curette and Kocher may be used.

18. **TIBIAL REAMING.** To prevent cross threading the reamer tip on the reamer drive rod, be sure to clean the threaded tip of the reamer drive rod when it is visible in the joint space. Also, attach the reamer tip to the drive rod by hand (not under power).

19. **TIBIAL REAMING.** If reamer is accidentally reversed and reamer tip is left in tibia canal, the T-handle drive rod can be used to reattach and pull the reamer tip out. If the reamer tip continues to move up the tibia, place a Steinmann pin across and above the reamer tip to prevent it from moving. This is also a good technique if the trial stem piece or the real stems pieces are lost up the tibia.

20. **INSTALLING TIBIAL TRAY.** If the wrench is not in the right orientation, the tibial tray will not seat in the Morse taper of the base stem piece! Once the tray is seated in the Morse taper, the tibial tray holding tool can be reinserted to help guide the orientation of the tray as it is being tapped into place.

21. **INSTALLING TIBIAL TRAY.** Always double check that the Morse taper connection has been made, by checking an AP view. The release hole in the base stem piece should appear partially blocked.
22. **TALAR PIN.** If there is concern about violating the subtalar joint with the talar pin, install the pin under fluoro (lateral view).

23. **POLY INSERTION.** While inserting the poly the reaction forces will try to raise the tibia and push the insertion tool proximally. Keep hand pressure on top of the insertion tool while pulling toward the toes. Watch to make sure the poly is going over the dome. If the tibia is raising up, push down on the poly insertion tool and tibia at the same time until the poly moves over the talar dome.

24. **POLY REMOVAL.** The simplest method for removing an installed poly insert is to drill two threaded k-wires into the anterior face of the poly, then grab the two k-wires with a set of pliers, pull down, and out.

25. **CLOSING.** Do not overlook surgical closure of the small incision on the bottom of the foot.

**VARUS/VALGUS ANKLE**

1. **ALIGNMENT.** Alignment can be achieved in three ways.

   A. **Foot Holder Method.** Initially align the foot in the normal way. When making the AP alignment, align the rods to the top of the talus and perpendicular to the talus, regardless of where the rods align to the tibia. When drilling from the bottom of the foot, only drill to the top of the talus and stop. Re-insert guide rods and reposition the foot and guide rods to the center of the tibia thereby correcting the varus/valgus deformity.

   B. **The Laminar Spreading Method.** This method is like the method above but uses small laminar spreaders to position the foot in the proper location. This has the advantage of not needing an assistant to hold the correction in place, but can have the disadvantage of distracting the joint too much.

   C. **Joystick Method.** Drill two Steinmann pins on either side of the talus to use as holding tools or joysticks. By grabbing the pins, maneuver the talus in the proper position. Align the guides rods to the center of the talus and tibia. An assistant will need to hold the Steinmann pins in place while making the alignment changes and while drilling through the bottom of the foot.

**VARUS/VALGUS CALCANEUS**

1. **ALIGNMENT.** Find Mortise view, coban forefoot and tibia, then use the heel cups to shift calcaneus. Pin the heel cups only when the desired position is achieved.

**SUBLUXED FOOT**

1. **ALIGNMENT.** The alignment will be the same for the AP view, but when looking at the Lateral view the tibia may be misaligned. The Achilles Support may be used here to position the tibia in line to the center of the talus.