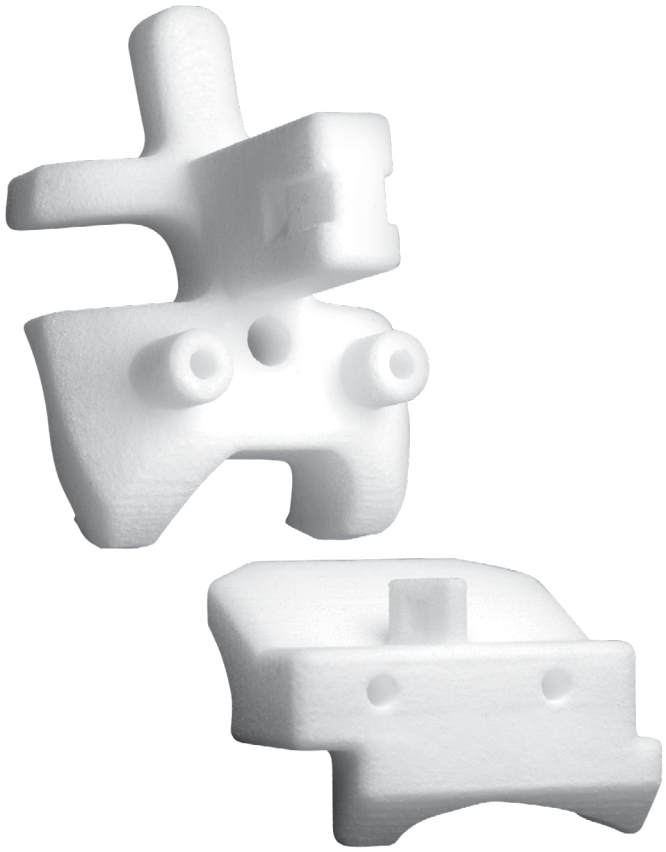
stryker

Prophecy®
Surgical Planning for Total Ankle Replacement

Lower extremity CT scan protocol



Prophecy Surgical Planning

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Prophecy Surgical Planning ankle CT scan protocol

This protocol can be utilized with Prophecy® Surgical Planning for Inbone®, Infinity®, and Invision®. These reports and guides are patient-specific tools for total ankle replacement surgery. Adherence to this lower extremity CT protocol of the ankle, with knee, is critical for success. In every case, please follow these instructions:

Patient position

- The foot of interest should be positioned in neutral (90°) to the leg. **Figure 1**
- Do not allow patient movement between or during scans.
- If you are using the HiRise weight-bearing CT, please refer to **page 8** for patient positioning

If this is not possible due to a patient's condition, such as severe contracture, ensure the CT scan contains slices through the ball of the foot (see bottom of next page).

Note

- If a contra-lateral implant is present, bend the contra-lateral limb out of the field of view of the ankle to be scanned.

Scanning instructions

Helical, axial, and cone beam CT modes are acceptable.

Bone or standard algorithms are acceptable.

No contrast agent is to be used.

- All scan groups' edges should stay aligned. See dashed lines, next page.
  - Maintain a single coordinate system for both the knee and foot scan.
  - Maintain a consistent field of view and pixel size for both the knee and foot scan.
  - Adjusting the width of both knee and foot groups together to span the required anatomy of both groups is appropriate.
  - One single scan from the bottom of the foot through the knee is also acceptable.
- In-plane pixel size (resolution) must be less than 0.8mm.

  Example: a field of view of ~28 cm is ideal for a 512x512 matrix in order to keep the pixel size small. The field of view must be less than 40 cm.
- Include full knee-to-foot scout images (coronal and sagittal) when submitting CT files to the Prophecy Portal.

Note

- Do not scan at higher slice spacing and reconstruct to smaller increments.
- Only the raw axial images are needed; coronal and sagittal reconstructions are not necessary.
- Images must be provided in uncompressed dicom format.

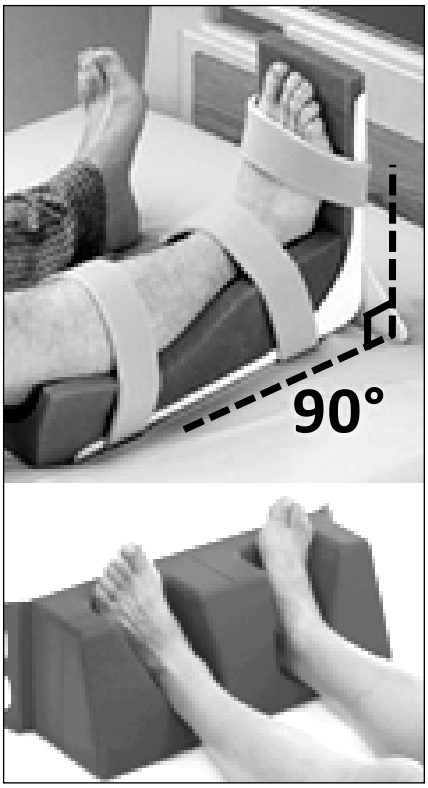


Figure 1
Examples of neutral ankle positioning devices (not provided). Any radiolucent object can be used to prop the bottom of the foot at 90°, such as a box.

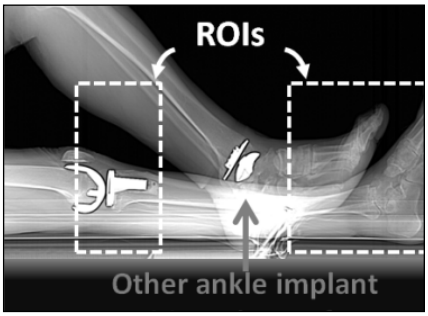


Figure 2
Bending the other limb to position the other ankle implant away from the ankle of interest. This minimizes image artifact in the ankle region of interest.

If the ankle of interest has existing hardware it can be scanned with the same parameters as listed here.

Optional: additional X-rays

It is highly recommended that additional x-ray studies be submitted to the Prophecy Portal for analysis for Prophecy pre-op navigation. Useful additional studies include:

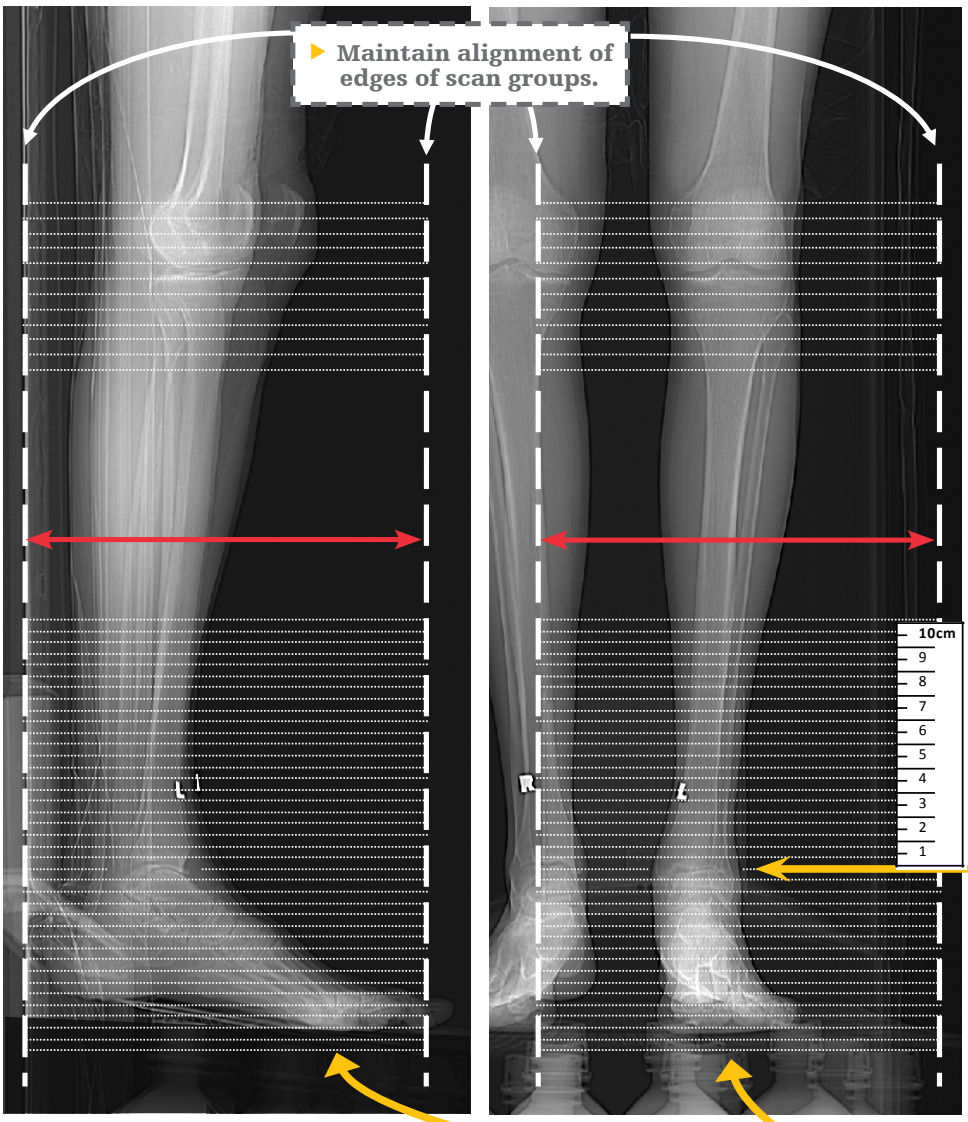
- Weight-bearing Ankle X-ray Series: Lateral, AP, Mortise, Saltzman (hindfoot alignment)
- Weight-Bearing Foot X-ray Series: Lateral and Dorsoplantar
- Stress x-rays/talar tilt x-rays of the medial deltoid and/or lateral ligaments.

Prophecy Surgical Planning ankle CT scan protocol

This "ankle" protocol involves a section at the knee. Figure 3

Required

- ❑ Provide full Knee-to-Foot CT "scout" images (coronal and sagittal).
- ❑ Scan both the Foot-&-Ankle and Knee sections at the same time.
- ❑ Refer to additional requirements on previous page.
- ❑ Refer to typical errors and FAQs on next pages.



Required

- ❑ Scan 5cm proximal, and 5cm distal to the knee joint line.
- ❑ Slice increment: 5mm (or smaller).
- ❑ Field Of View:
  Typical: ~28cm.
  Max: 40cm.

Required

- ❑ Ankle and foot scan slice increment: 1.25mm (or smaller).
- ❑ Scan >10cm above the joint line measure this, see note below.
- ❑ Scan past the ball of the foot, and get the toes.

"Joint Line"

- ❑ Position the foot at 90° with a positioning device or heavy box.

Figure 3

NOTE

- ❑ Measure (or calculate) to get >10cm above the joint line.

Examples: 80 slices @ 1.25mm or 100 slices @ 1.0mm or 160 slices @ 0.625mm above the joint line.

NOTE

- ❑ It's better to "airball" the last slices than to not get enough.

Common scan protocol errors

The most common protocol errors resulting in failed scans are shown below:

Region missing from scan

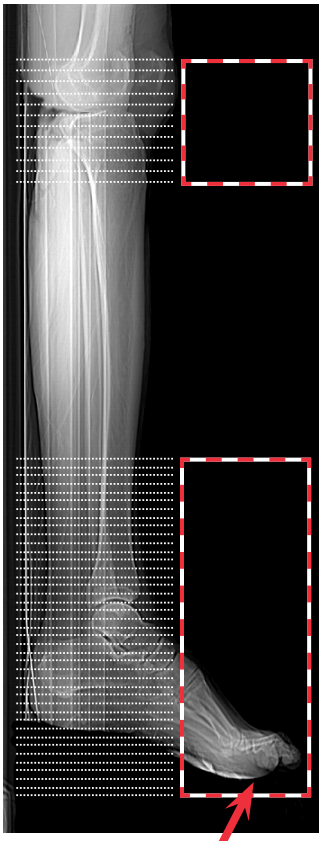


Figure 4
☒ Failure to scan the entire foot.

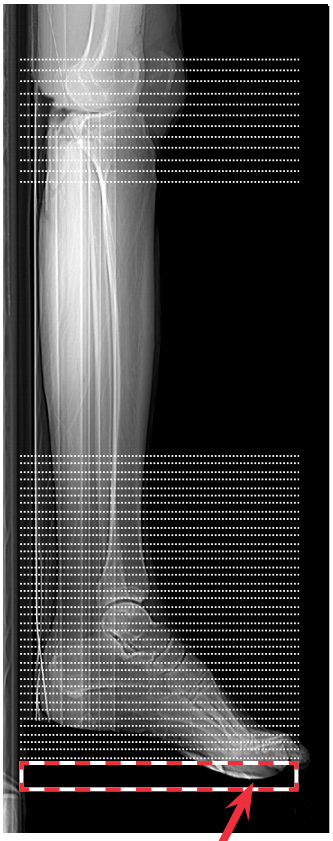


Figure 5
☒ Failure to scan the entire foot.

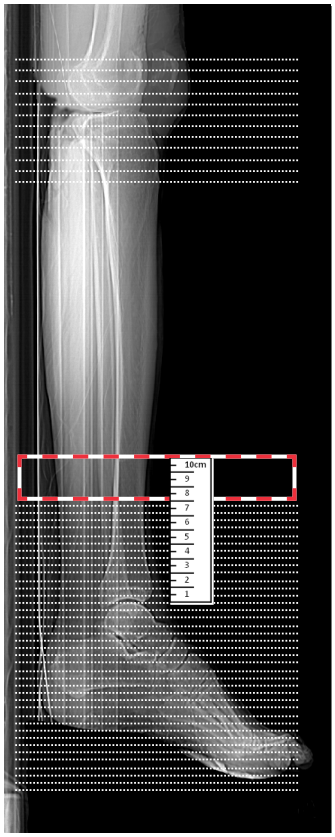


Figure 6
☒ Failure to scan at least 10cm above the ankle

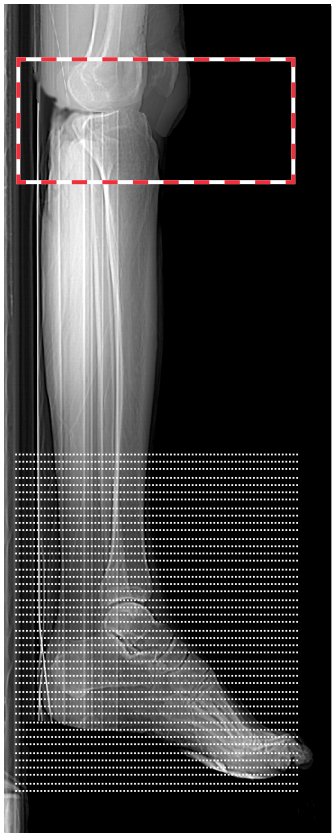


Figure 7
☒ Scan of the knee was not performed simultaneously with the ankle.

CT imaging examples

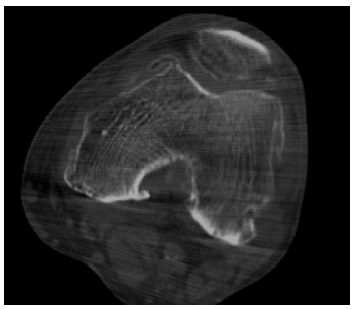


Figure 8
Unacceptable CT imaging
☒ Blurry, poor contrast.

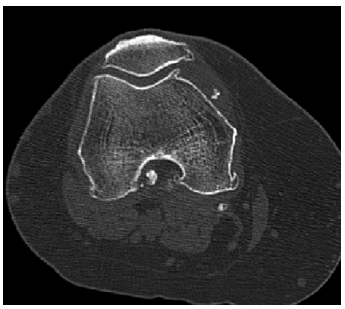


Figure 9
Satisfactory CT imaging
☑ Clear, sharp, distinct boundaries between bone and soft tissue.

Frequently asked questions

Q. "I can't put in a 1.25mm slice. I can only do a 1mm increment. Is that ok?"

A. Slices thinner than our specified slice thickness are acceptable; however, using larger slices will result in the scan being rejected for Prophecy processing.

Q. "What type of CT acquisition can be used?"

A. Axial, helical, and cone beam CT modes are acceptable.

Q. "Is it really necessary to scan 10cm above the ankle joint?"

A. Yes. At least 10cm of the tibia shaft, measured from the ankle joint line, is required.

Q. "Do I need to scan the knee for an ankle surgery?"

A. Yes. The knee scan is required to obtain the complete axis of the lower extremity. Information based on the entire tibia is used to plan the ankle procedure.

Q. "How should the patient be positioned?"

A. Excluding Weight-Bearing CT, patients are typically supine for the scan, but it does not matter as long as the patient's ankle is in neutral dorsiflexion.

Submitting the scan

Rapid Electronic Scan Transfer

If you would like to upload the CT scan and have an account, please navigate to **https://prophecyportal.wright.com**.

If you do NOT have an account, please email **prophecy@stryker.com** or call **901-290-5884** to request access.
We will send you instructions for registering and uploading.

** upload times may vary based on connection speed.

Scan submission is typically done by first putting the DICOM files from the CT Scanner computer onto a CD, then putting the CD into a typical office computer for uploading. Therefore, ensure the CD contains the Axial CT slices and full-length scout images.

FAQ: Can I mail the CD of the CT scan?

A. This method is not preferred.

If uploading the scans directly from the scanning facility is not possible, please contact the local Stryker medical sales rep to do so. If the sales rep contact information is not known, call the number below.

Contact for Assistance

Prophecy Operations
Phone: 901.290.5884

HiRise Weight-Bearing CT

Prophecy Surgical Planning Guides are patient specific instruments designed to improve Total Ankle Replacement (TAR) results. Engineers at Stryker and CurveBeam AI have determined the necessary scanning parameters, which are described in this document.

Preparation

MFOV (unilateral) and LFOV (bilateral) options are available with Knee-Gap-Foot procedure. MFOV is preferred unless it's not possible due to patient anatomy. Patient should be in shorts - no socks or jewelry. The required regions of anatomy are depicted in **figure 10.**

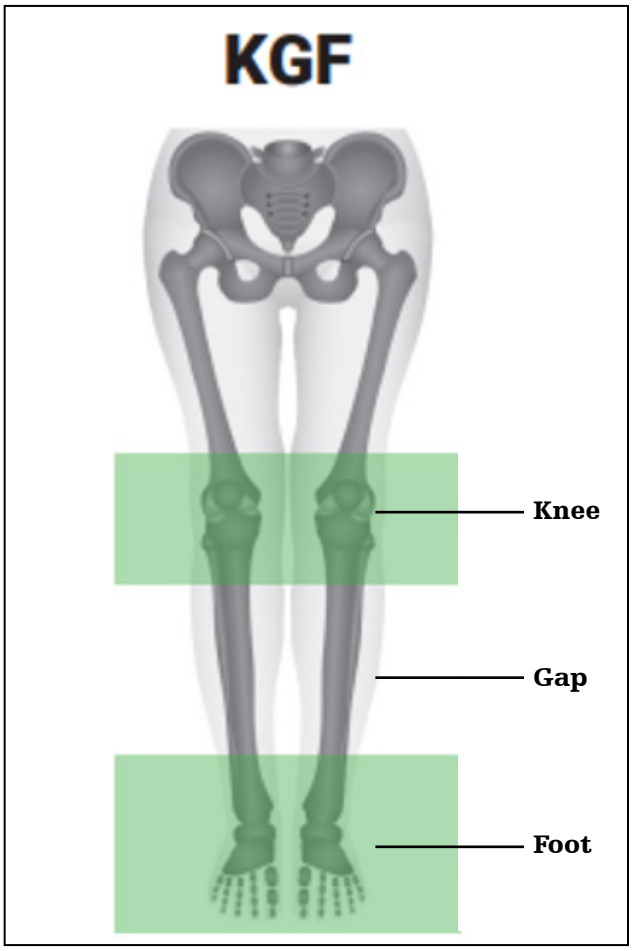


Figure 10

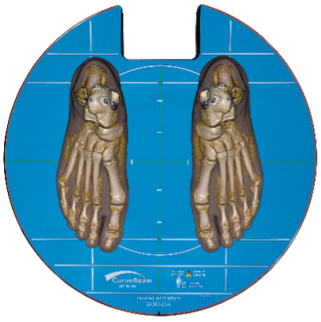
Procedure Selection and Patient Positioning

On the Patient Tab, select the **"CT STRYKER PROPHECY ANKLE"**

On the Protocol Tab, select the **"CT STRYKER PROPHECY LFOV"** or **"CT STRYKER PROPHECY MFOV" Figure 11**

Scan requirements and DICOM output

- Scans with patient movement will need to be repeated.
- DICOM Output:
  - » Send axial stack only of SV (Super Volume)
  - » Images should be 0.5mm - 0.9mm slice thickness and 0 slice spacing
  - » Use VOI tool in DICOM Volume Creation to create reformat. Yellow rectangle should include knee, ankle, and foot of surgical side in single yellow box.
- Make sure files are not compressed or zipped prior to uploading



LFOV positioning

MFOV positioning (surgical side centered)

Figure 11

Contact for assistance

CurveBeam Technical Support
Phone: 267.483.8081, Option 1 (USA)
Email: techsupport@curvebeam.com

Stryker Prophecy
Prophecy: 901.290.5884
Email: prophecy@stryker.com

Foot & Ankle

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