Smith+Nephew

TOTAL WRIST FUSION
System

Surgical Technique

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Nota Bene
The following technique is for informational and educational purposes only. It is not intended to serve as medical advice. It is the responsibility of treating physicians to determine and utilize the appropriate products and techniques according to their own clinical judgment for each of their patients. For more information on the product, including its indications for use, contraindications, and product safety information, please refer to the product's label and the Instructions for Use packaged with the product.

Introduction

Description

The TOTAL WRIST FUSION System is designed to provide fixation during total wrist arthrodesis. The system incorporates a combination of Surfix® locking holes and dynamic compression holes intended to provide optimal balance of compression and stability..

Preoperative Considerations

The surgeon should discuss with the patient the alternative treatment options and expectations from surgery. Radiographs are helpful to determine which joints are pathologic and must be eliminated. Discussing the patient's goals while taking into account the condition of the soft tissues and bones, the surgeon can determine the best approach and implant to use. Prophylactic antibiotics are recommended. Fluoroscopic image intensification is suggested to aid in ideal placement of the implant and positioning of the carpus relative to the radius.

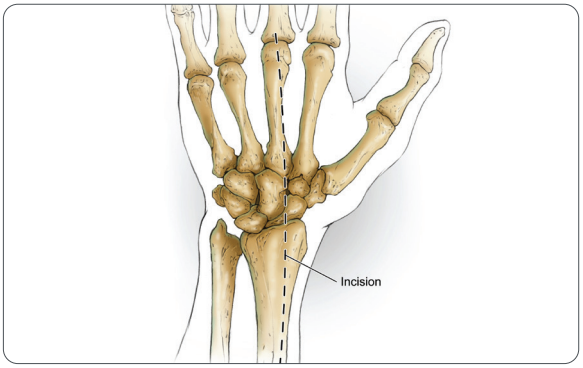


Figure 1-1

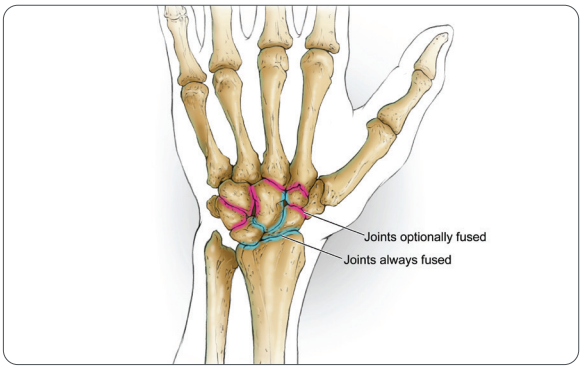


Figure 2-1

Step 1 ▪ Surgical Approach

1-1 The patient is placed supine on the operating table with the upper extremity extended and pronated to provide access to the dorsum of the wrist. A dorsal longitudinal incision is made over the radius extending approximately from 3cm proximal to Lister's tubercle to the neck of the 3rd metacarpal. (Figure 1-1)

The 3rd dorsal compartment is opened and the EPL tendon is retracted radially. Lister's tubercle is removed with a rongeur, and cancellous autograft can be harvested. The 2nd and 4th extensor compartments are dissected off the radius subperiosteally and the interval between the tendons of the 2nd and 3rd dorsal compartments and the 4th dorsal compartment is utilized to expose the dorsal capsule. The capsule is incised longitudinally exposing the dorsal wrist. The 3rd metacarpal periosteum is elevated to facilitate plate placement.

Step 2 ▪ Bone Preparation

2-1 Remove any remaining cartilage from the articulations to be fused. Figure 2-1 illustrates joints that should always be fused during a radiocarpal arthrodesis as well as joints that can optionally be fused based on surgeon preference. A small osteotome can be used to denude the carpals. Fenestrate the subchondral bone with a K-wire or decorticate it with a small burr. Irrigate thoroughly and suction dry. Reduce the carpals on the radius.

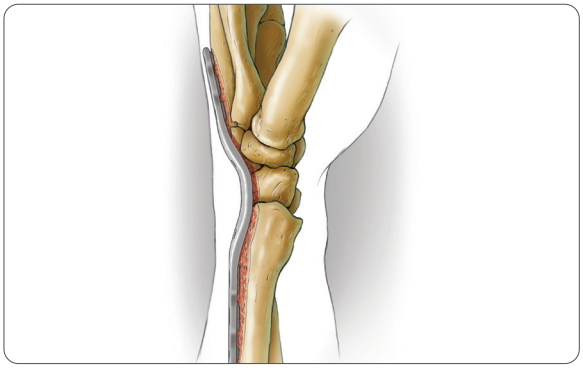


Figure 3-1

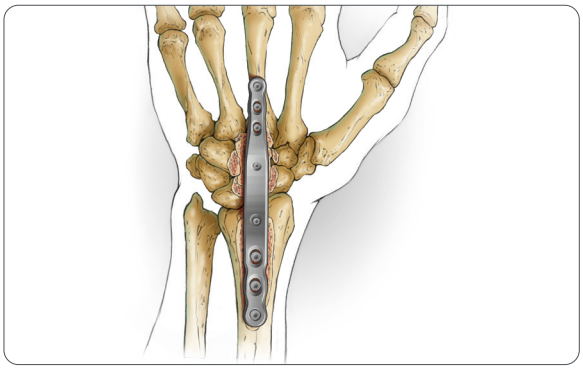


Figure 3-1

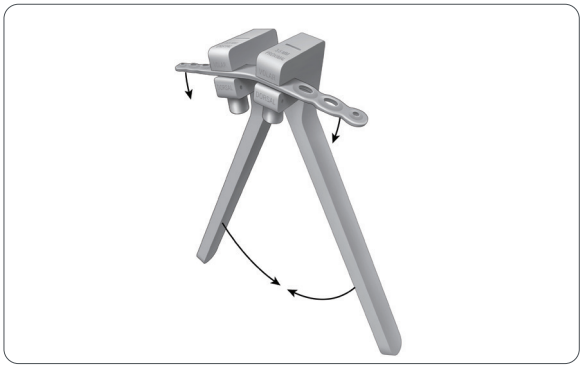


Figure 3-2

Step 3 ▪ Plate Implantation

3-1 The TOTAL WRIST FUSION Plate should be fixed to the third metacarpal and then to the radius. All surfaces to be included in the fusion should be decorticated prior to plate placement. Appropriate screws (2.7mm distal screws and 3.5mm proximal screws) should be placed in the order recommended. Screw holes are numbered in the order of placement. Order of screw placement may depend on patient anatomy and surgeon preference.

Recommended screw sequence for the straight plate:

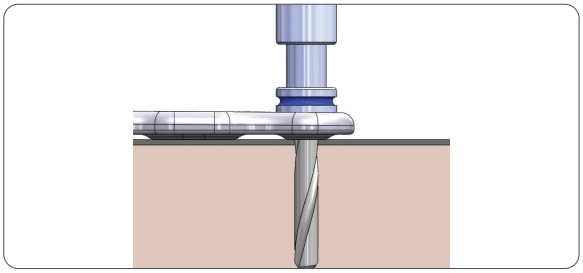
Recommended screw sequence for the standard or short bend plates:

Bending Plates (optional)

3-2 The straight plate can be bent in up to 35 degrees of extension using the supplied plate benders. Plate benders are threaded into holes 1 and 8. Fully tighten thumb screws on the plate benders. Ensure that the dorsal surface of the plate is adjacent to the “Dorsal” mark on the plate benders.

The plate can only be bent one time. Bent plates should not be placed back in the implant set.

Note: Pre-contoured plates should not be bent.



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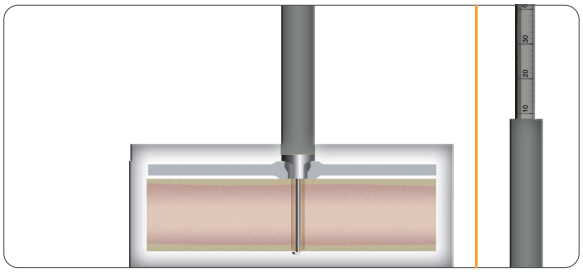

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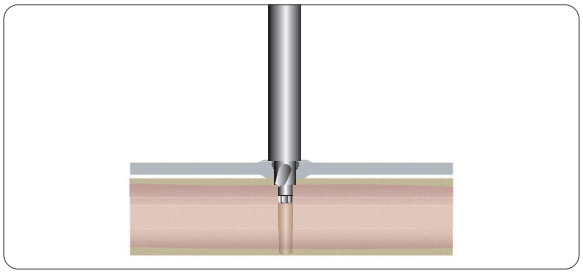

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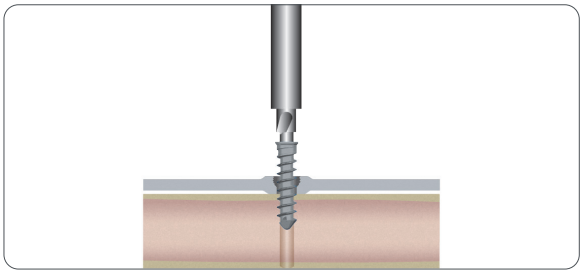

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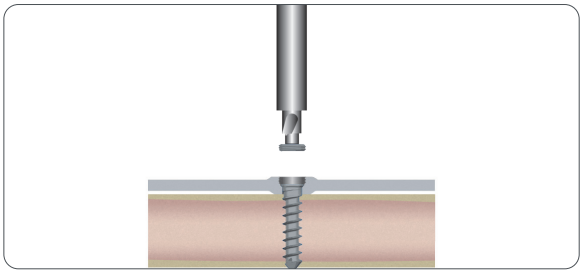

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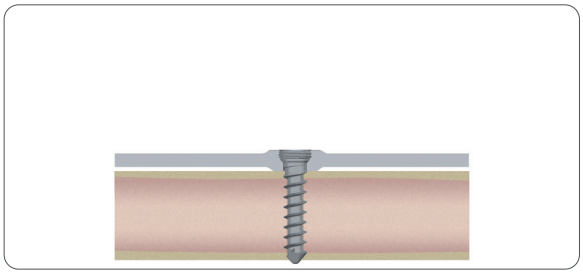
Step 4 ▪ Screw Preparation

2.7mm Surfix Screw Insertion

1. Prepare holes with the 2.0mm drill (303400) through the drill guide (303405).
2. Remove drill guide and measure the necessary screw length using the depth gauge (303407).
3. Chamfer the drill hole with the Star screwdriver (303408). Ensure that the threaded hole is not damaged when performing the chamfering.
4. Using the Star screwdriver, insert the screw into the prepared hole until the plate is at the desired position relative to the bone. The screw should be fully seated in the plate. Clean the threaded hole before and after introducing the screw. Maintain coaxiality between the screw and the threaded hole.
5. Assemble the lock-screw to the screwdriver. The lock-screw should be inserted after each screw, before preparation and insertion of the subsequent screw. This prevents potential damage to the thread.
6. Locking: Fully seat the lock-screw with the screwdriver. The lock-screw should be flush with the top of the plate when it is fully inserted.

Warning: Surfix locking screws must be inserted only into locking holes. The above steps should be completed for each screw before starting preparation of the subsequent screw(s). If not, the axes of the screw and the prepared hole may be misaligned.



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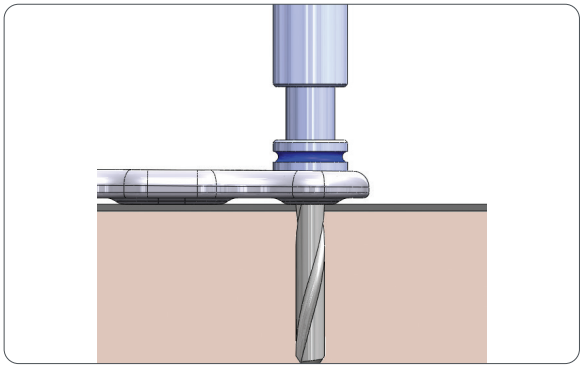

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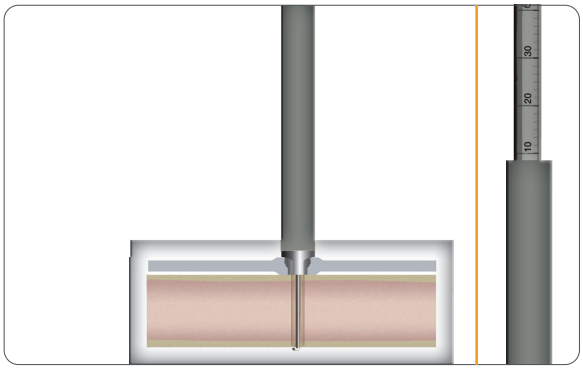

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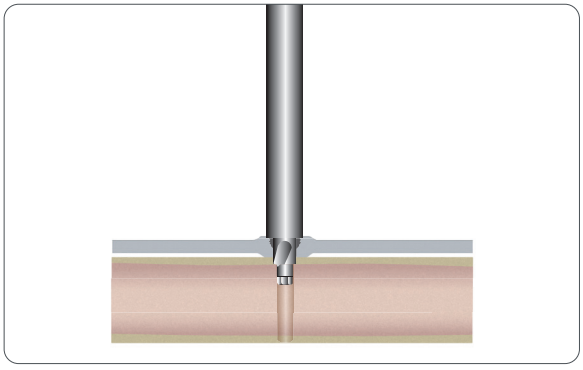
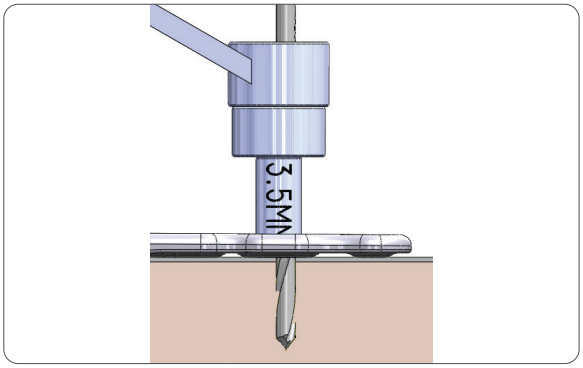


3

3.5mm Surfix Screw Insertion

1. Prepare holes with the 2.7mm drill (303402) through the drill guide (303406).
2. Remove drill guide and measure the necessary screw length using the depth gauge (303407).
3. Chamfer the drill hole with the 2.0mm Hex screwdriver (303410). Ensure that the threaded hole is not damaged when performing the chamfering.
4. Using the 2.0mm Hex screwdriver, insert the screw into the prepared hole until the plate is at the desired position relative to the bone. The screw should be fully seated in the plate. Clean the threaded hole before and after introducing the screw. Maintain coaxiality between the screw and the threaded hole.
5. Assemble the lock-screw to the screwdriver. The lock-screw should be inserted after each screw, before preparation and insertion of the subsequent screw. This prevents potential damage to the thread.
6. Locking: Fully seat the lock-screw with the screwdriver. The lock-screw should be flush with the top of the plate when it is fully inserted.

Warning: Surfix locking screws must be inserted only into locking holes. The above steps should be completed for each screw before starting preparation of the subsequent screw(s). If not, the axes of the screw and the prepared hole may be misaligned.



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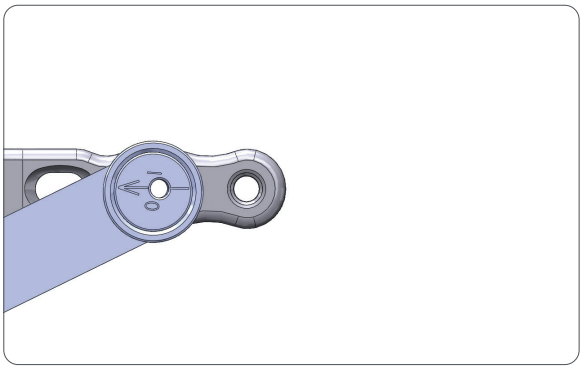

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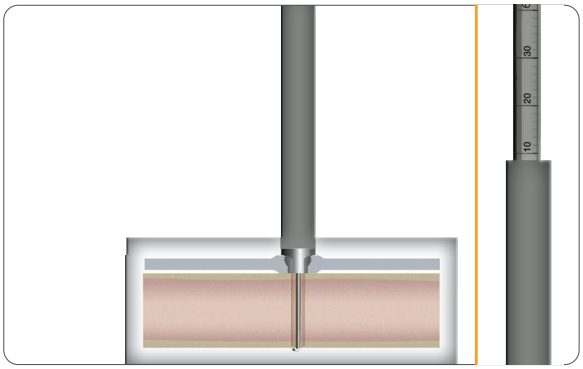

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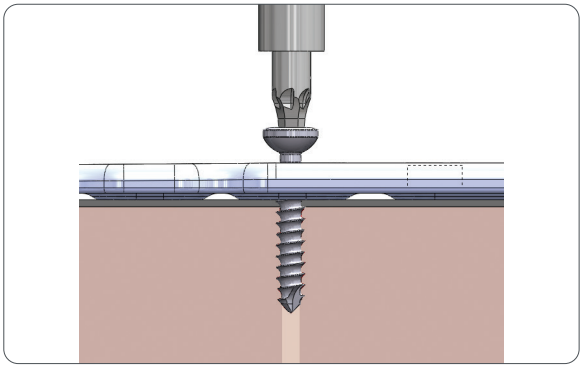


3

Step 4 ▪ Screw Preparation *(continued)*

2.7mm Cortical Screw Insertion

1. Prepare holes with the 2.0mm drill (303400) through the drill guide (303403).
    a. If compression is desired, use the eccentric end of the drill guide with the arrow pointing in the direction of compression.
2. Measure the necessary screw length using the depth gauge (303407).
3. Using the 2.5mm Hex screwdriver (303409), insert the screw into the prepared hole until the plate is at the desired position relative to the bone. The screw should be fully seated in the plate.

3.5mm Cortical Screw Insertion

1. Prepare holes with the 2.5mm drill (303401) through the drill guide (303404).
    a. If compression is desired, use the eccentric end of the drill guide with the arrow pointing in the direction of compression.
2. Measure the necessary screw length using the depth gauge (303407).
3. Using the 2.5mm Hex screwdriver (303409), insert the screw into the prepared hole until the plate is at the desired position relative to the bone. The screw should be fully seated in the plate.

Warning: Cortical screws should be flush with the surface of the plate except when used in compression. Hand tighten all screws. All screw holes should be filled in every case.

Hole Type	Color Code	Drill Bit	Driver
2.7mm Surfix Screw	Black	2.0mm	Star Driver
2.7mm Cortical Screw	Yellow	2.0mm	2.5mm Hex
3.5mm Surfix Screw	Blue	2.7mm	2.0mm Hex
3.5mm Cortical Screw	Green	2.5mm	2.5mm Hex

Step 5 ▪ Surgical Closure

5-1 Pack bone graft into the interstices of the radiocarpal and mid-carpal joints. The capsule is closed with absorbable suture. The extensor retinaculum is repaired and the skin is closed. The EPL tendon may be transposed dorsally based on surgeon preference. Local anesthetic is instilled for post-operative pain management.

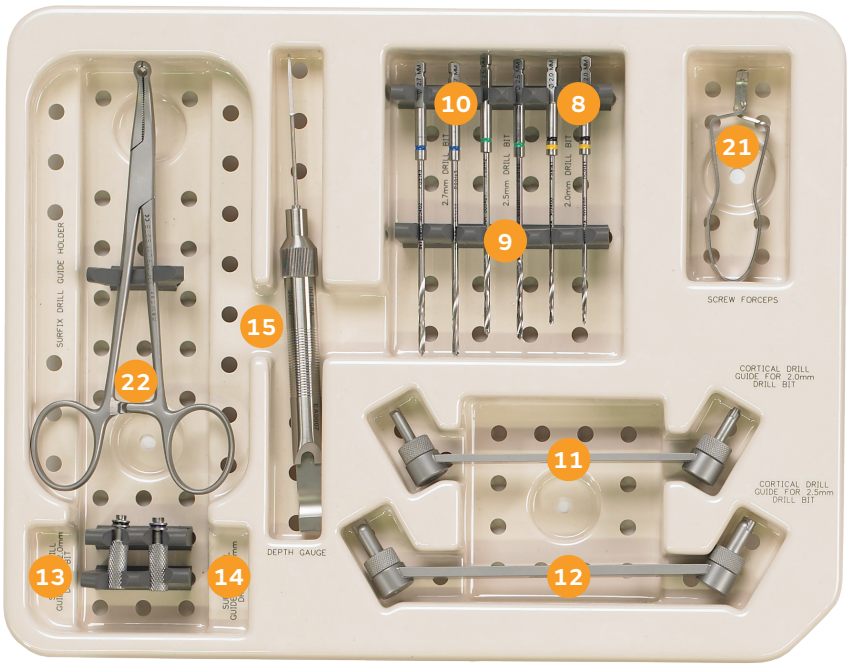
Step 6 ▪ Postoperative Care

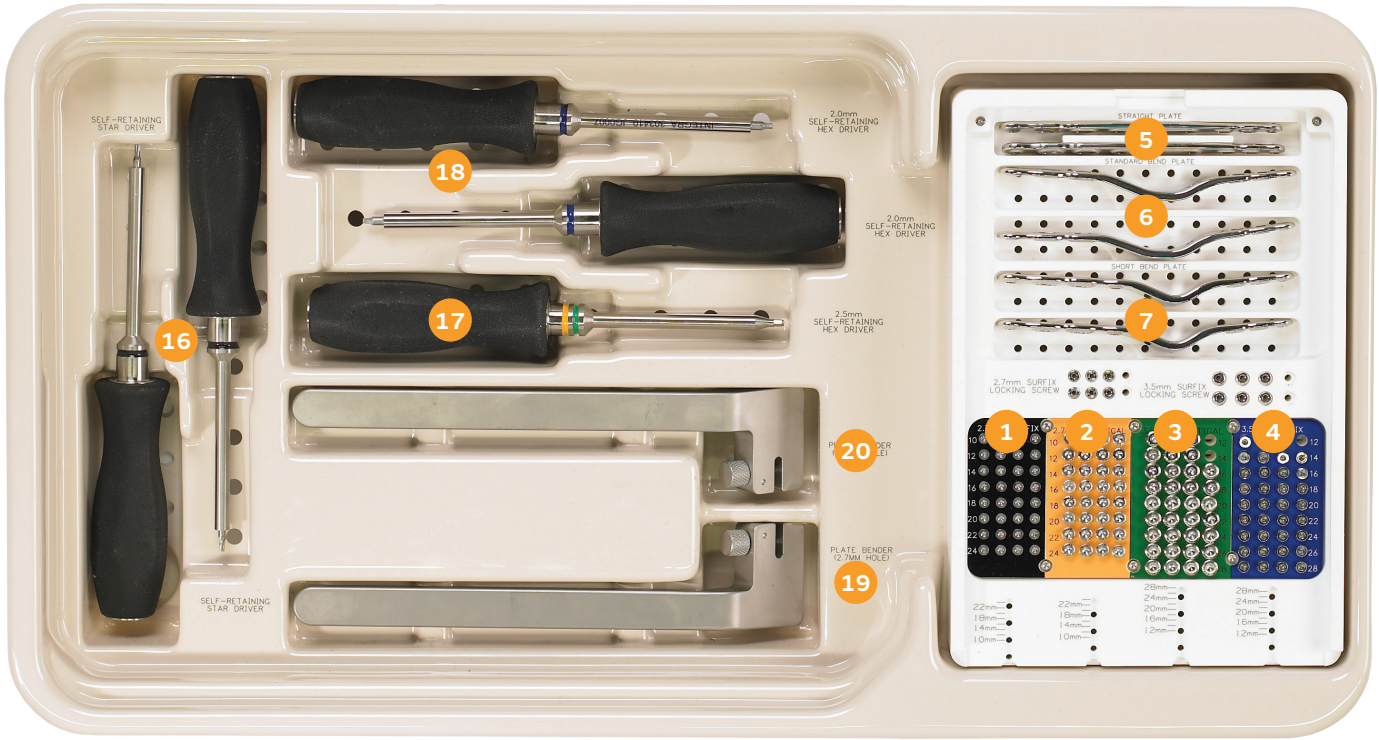
6-1 After the initial period of approximately 2 weeks, the sutures are removed. Therapy is encouraged to maximize range of motion of the remaining joints. Protected activities are maintained until there is evidence of osseous union.

TOTAL WRIST FUSION System - Instrument Tray

7-1

1. 2.7mm Surfix Screws
2. 2.7mm Cortical Screws
3. 3.5mm Cortical Screws
4. 3.5mm Surfix Screws
5. Straight Plate
6. Standard Bend Plate
7. Short Bend Plate
8. 2.0mm Drill Bit
9. 2.5mm Drill Bit
10. 2.7mm Drill Bit
11. Double-Ended Cortical Drill Guide for 2.0mm Drill Bit
12. Double-Ended Cortical Drill Guide for 2.5mm Drill Bit
13. 2.7mm Threaded Surfix® Drill Guide for 2.0mm Drill Bit
14. 3.5mm Threaded Surfix® Drill Guide for 2.7mm Drill Bit
15. Depth gauge
16. Self-Retaining Star Driver
17. 2.5mm Self-Retaining Hex Driver
18. 2.0mm Self-Retaining Hex Driver
19. Plate Bender - 2.7mm hole
20. Plate Bender - 3.5mm hole
21. Screw Forceps
22. Surfix® drill guide holder





Straight Plate - 303100

Drill Guides

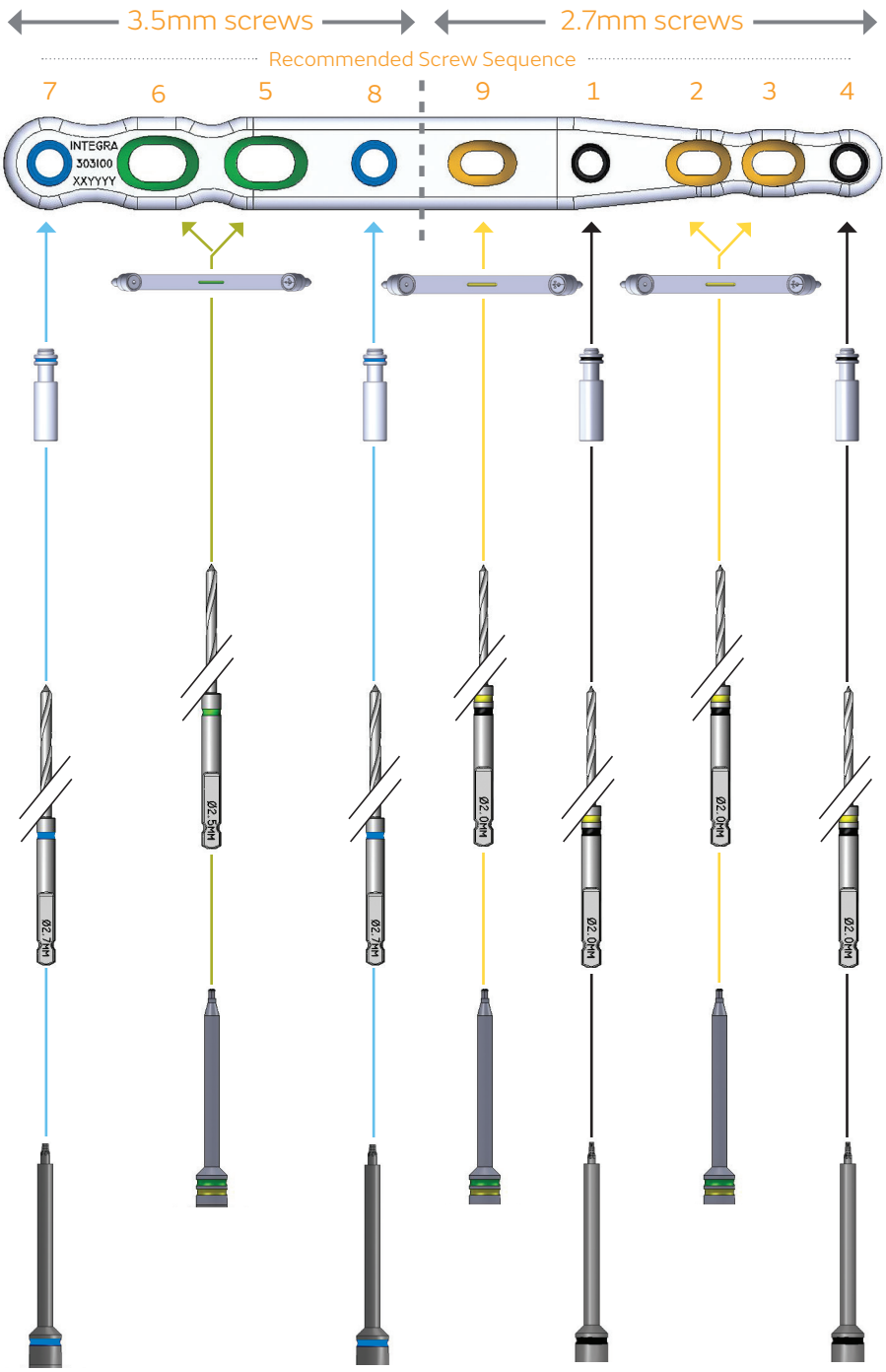
- 303403 – 2.7mm Cortical
- 303404 – 3.5mm Cortical
- 303405 – 2.7mm Surfix
- 303406 – 3.5mm Surfix

Drill Bits

- 303400 – 2.0mm
- 303401 – 2.5mm
- 303400 – 2.0mm
- 303402 – 2.7mm

Drivers

- 303409 – 2.5mm Hex
- 303409 – 2.5mm Hex
- 303408 – Star Driver
- 303410 – 2.0mm Hex



Standard Bend Plate –303101, Short Bend Plate –303102

Drill Guides

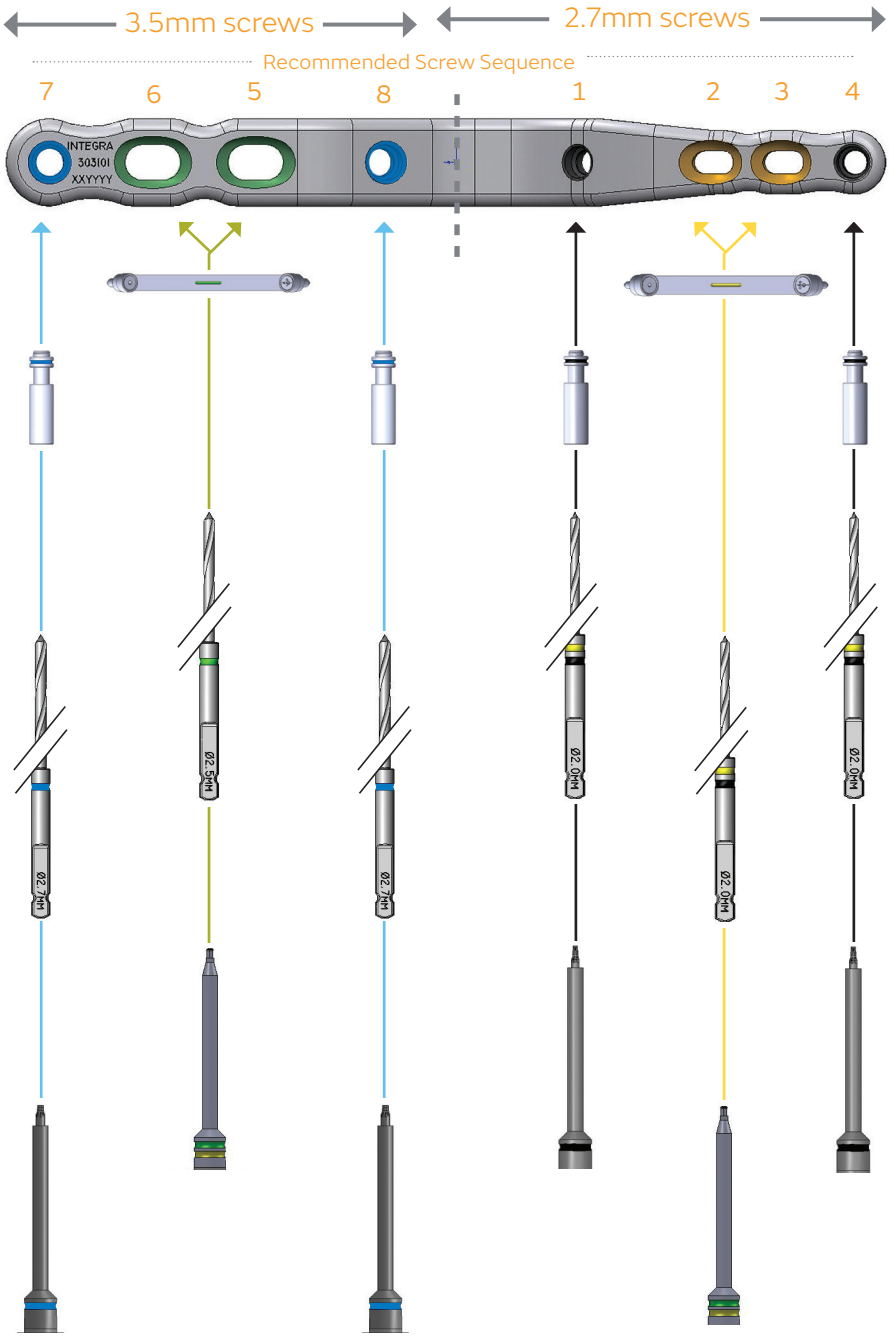
- 303403 – 2.7mm Cortical
- 303404 – 3.5mm Cortical
- 303405 – 2.7mm Surfix
- 303406 – 3.5mm Surfix

Drill Bits

- 303400 – 2.0mm
- 303401 – 2.5mm
- 303400 – 2.0mm
- 303402 – 2.7mm

Drivers

- 303409 – 2.5mm Hex
- 303409 – 2.5mm Hex
- 303408 – Star Driver
- 303410 – 2.0mm Hex



Implants - Cortical Screws (Non-Sterile)

Reference	Description
303210	2.7mm Cortical Screw 10mm
303212	2.7mm Cortical Screw 12mm
303214	2.7mm Cortical Screw 14mm
303216	2.7mm Cortical Screw 16mm
303218	2.7mm Cortical Screw 18mm
303220	2.7mm Cortical Screw 20mm
303222	2.7mm Cortical Screw 22mm
303224	2.7mm Cortical Screw 24mm
303312	3.5mm Cortical Screw 12mm
303314	3.5mm Cortical Screw 14mm
303316	3.5mm Cortical Screw 16mm
303318	3.5mm Cortical Screw 18mm
303320	3.5mm Cortical Screw 20mm
303322	3.5mm Cortical Screw 22mm
303324	3.5mm Cortical Screw 24mm
303326	3.5mm Cortical Screw 26mm
303328	3.5mm Cortical Screw 28mm

Implants - Surfix Screws (Non-Sterile)

Reference	Description
286210ND	2.7mm Surfix Screw 10mm
286212ND	2.7mm Surfix Screw 12mm
286214ND	2.7mm Surfix Screw 14mm
286216ND	2.7mm Surfix Screw 16mm
286218ND	2.7mm Surfix Screw 18mm
286220ND	2.7mm Surfix Screw 20mm
286222ND	2.7mm Surfix Screw 22mm
286224ND	2.7mm Surfix Screw 24mm
186200ND	2.7mm Surfix Lock-Screw
286312ND	3.5mm Surfix Screw 12mm
286314ND	3.5mm Surfix Screw 14mm
286316ND	3.5mm Surfix Screw 16mm
286318ND	3.5mm Surfix Screw 18mm
286320ND	3.5mm Surfix Screw 20mm
286322ND	3.5mm Surfix Screw 22mm
286324ND	3.5mm Surfix Screw 24mm
286326ND	3.5mm Surfix Screw 26mm
286328ND	3.5mm Surfix Screw 28mm
186300ND	3.5mm Surfix Lock-Screw

Implants - Plates (Non-Sterile)

Catalog Number	Description
303100	Straight Plate
303101	Standard Bend Plate
303102	Short Bend Plate

Instruments

Catalog Number	Description
303400	2.0mm Drill Bit
303401	2.5mm Drill Bit
303402	2.7mm Drill Bit
303403	Double-Ended Cortical Drill Guide for 2.0mm Drill Bit
303404	Double-Ended Cortical Drill Guide for 2.5mm Drill Bit
303405	2.7mm Threaded Surfix® Drill Guide for 2.0mm Drill Bit
303406	3.5mm Threaded Surfix® Drill Guide for 2.7mm Drill Bit
303407	Depth gauge
303408	Self-Retaining Star Driver
303409	2.5mm Self-Retaining Hex Driver
303410	2.0mm Self-Retaining Hex Driver
303411	Plate Bender – 2.7mm hole
303412	Plate Bender – 3.5mm hole
600731	Screw Forceps
339003ND	Surfix® Drill Guide Holder

Tray

Catalog Number	Description
303500	Instrument Case complete – US
303501	Base
303504	Lid
303502	Insert
303503	Screw Caddy

Notes

Surgical Technique
Smith+Nephew does not provide medical advice and does not recommend this or any other surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and using the appropriate techniques for implanting the device in each patient.

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