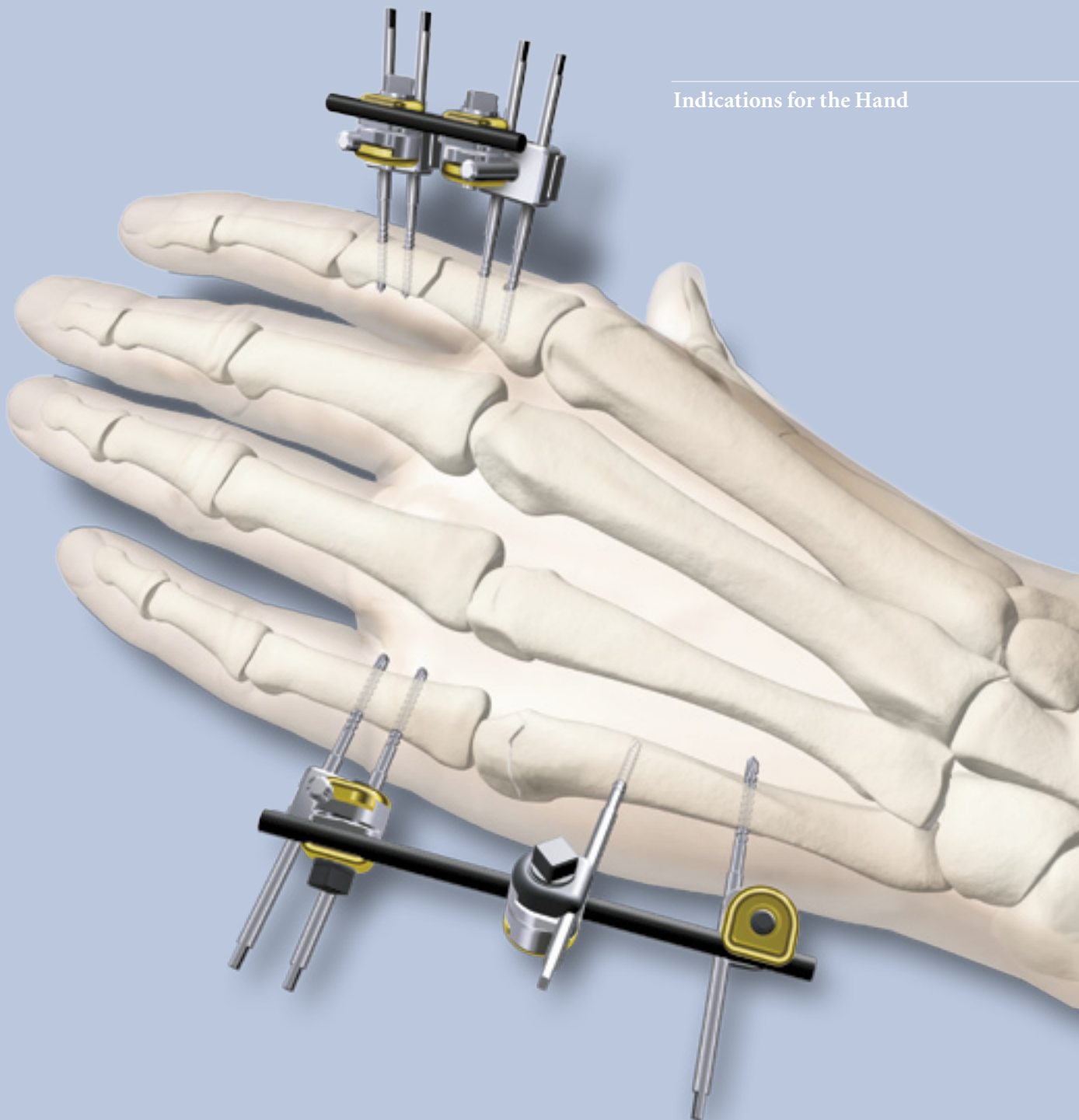


# Hoffmann II Micro External Fixation System

Operative Technique

Indications for the Hand



# Components

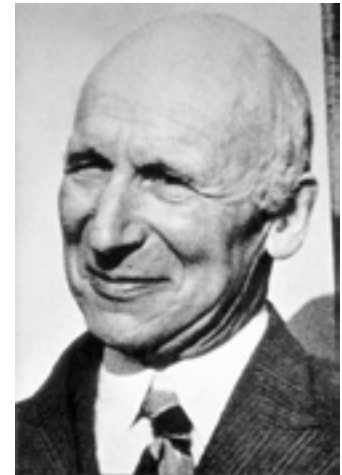


- 1** Hoffmann®II Micro Multi-Pin Clamp
- 2** Hoffmann®II Micro 90° Multi-Pin Clamp
- 3** Hoffmann®II Micro Rod to Rod Coupling
- 4** Hoffmann®II Micro Pin to Rod Coupling
- 5** Hoffmann®II Micro to Hoffmann®II Compact Rod to Rod Coupling
- 6** 3mm Carbon and Stainless Steel Rods
- 7** 2mm and 1.65mm Self-Drilling/Self-Tapping Half-Pins
- 8** 2mm Blunt Half-Pin
- 9** Hoffmann®II Micro Instrumentation

# Introduction

In 1938, Raoul Hoffmann, a Swiss surgeon from Geneva, Switzerland, designed a revolutionary External Fixation System. The basic features of this system were its modular design and the ability to reduce fractures or to make post operative corrections to the alignment of fragments in three planes with the frame in situ. The Original Hoffmann® System underwent considerable design improvements over the years. Then in the late 90's, a group of renowned design surgeons<sup>1</sup> and Stryker engineers developed the innovative Hoffmann II® and Hoffmann® II Compact Systems. These systems signified a giant step forward in the treatment of bone fractures with modular external fixation frames.

Indeed, thanks to the light weight and non bulky components, the Hoffmann®II Systems provide surgeons an unlimited versatility, simplicity, and an unequaled ease of use. The Hoffmann®II Micro System capitalizes on the experience acquired during several decades with the original Hoffmann® System and with the Hoffmann®II Large and Hoffmann®II Compact Systems. It is made of stainless steel and carbon composite materials to provide optimal low profile high resistance features, and it has been designed to answer the growing needs of small bone injuries by ensuring ease of use, versatility and patient comfort.



Raoul Hoffmann

<sup>1</sup> Dr. Gernot Asche, Andy Burgess M.D., Prof. Franz Burny, Mr. Charles M. Court-Brown, Prof. Erkki O. Karaharju, Loren Latta Ph.D., Prof. David Seligson M.D., Dr. Gregory Zych M.D.

# Indications & Contraindications

## Relative Indications

The Hoffmann® II Micro System is indicated for hand fractures. It is particularly suited for the following indications:

- Articular fractures
- Comminuted Fractures
- Severe open fractures (Grade 3)
- Rolando fractures
- Non unions and delayed unions
- Fractures associated with infection
- Acute Corrective Osteotomies
- Bennett's fractures
- Burns and Contractures
- Pathologic fractures
- Small Joint Arthrodesis

## Relative Contraindications

- Patients with a compromised immune system.
- Non compliant patients who would not be able to ensure proper pin care.
- Pre-existing internal fixation that prohibits proper pin placement.
- Bone pathology precluding pin fixation

# Operative Technique

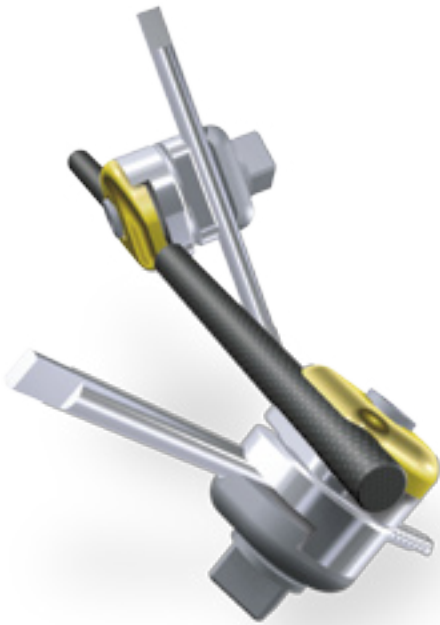
Due to the high versatility of the Hoffmann®II Micro System, an unlimited number of frame configurations can be constructed, thus providing surgeons the ease of use to treat a variety of indications.

This Technical Guide provides step by step surgical techniques for three basic frame assemblies. These assemblies can then be adapted to other indications.



# Operative Technique

## General Half Pin Insertion and Frame Building Guidelines



### Frame Building Guidelines

The Hoffmann® II Micro Multi-Pin Clamp is designed for ease and precision of pin insertion. The Clamp has oval pin slots which allow the Half Pins to be inserted in one plane in a variety of angles.

The Hoffmann® II Micro Pin to Rod Coupling offers independent pin placement, which is needed to address the most complex cases.

Multi-Pin Clamps and Couplings should be placed at least 5mm to 10mm away from the skin to allow for post-operative swelling and proper pin site care.

To reduce forces on the bone, it is recommended to hold the Half Pins with standard surgical pliers while tightening the Clamps and Couplings.

The Hoffmann® II Micro to the Hoffmann® II Compact Rod to Rod Coupling can be used to connect the two systems together, and can be tightened with the 5mm Wrench 3mm/4mm Pin Driver.



### Insertion Guidelines

Two types of Half Pins are offered in the system: Blunt/Self-Tapping and Self-Drilling/Self-Tapping. Pre-drilling is necessary when using Blunt/Self-Tapping Half Pins. It is optional to pre-drill when using Self-Drilling/Self-Tapping Half Pins.

- Use a 1.6mm K-Wire to pre-drill a 2.0mm Half Pin
- Use a 1.2mm K-Wire to pre-drill a 1.65mm Half Pin

Blunt/Self-Tapping Half Pins are offered in 2.0mm thread diameter only. Self-Drilling/Self-Tapping Half Pins are offered in 2.0mm and 1.65mm thread diameters. All Half Pins have a 2.0mm shaft diameter.

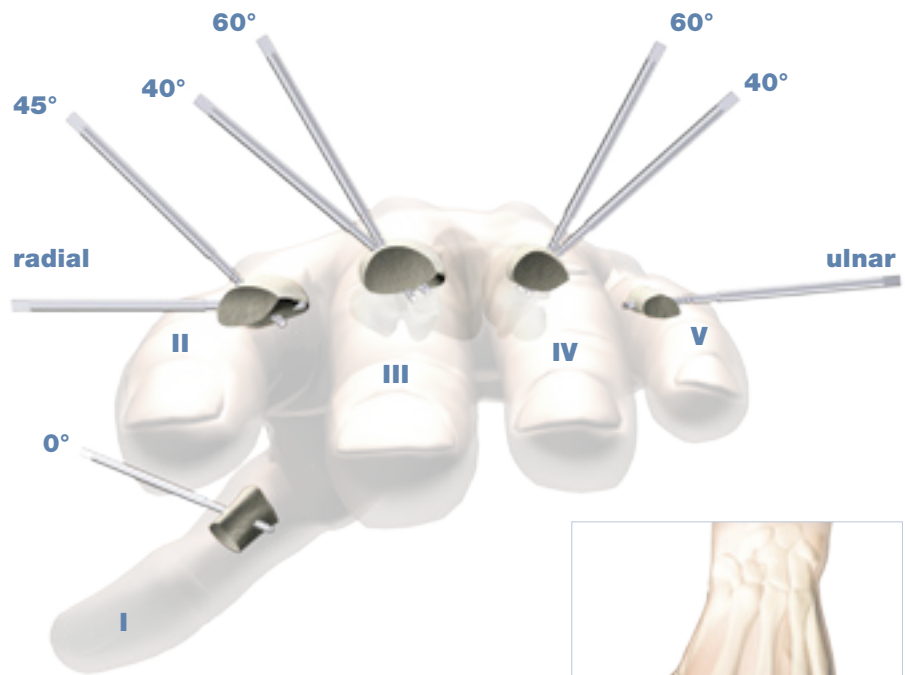
Pay attention to soft tissues. A (mini) open insertion technique is recommended to avoid unnecessary damage to the soft tissues. A Drill/Insertion Guide is provided in the system to facilitate this technique.



# Operative Technique

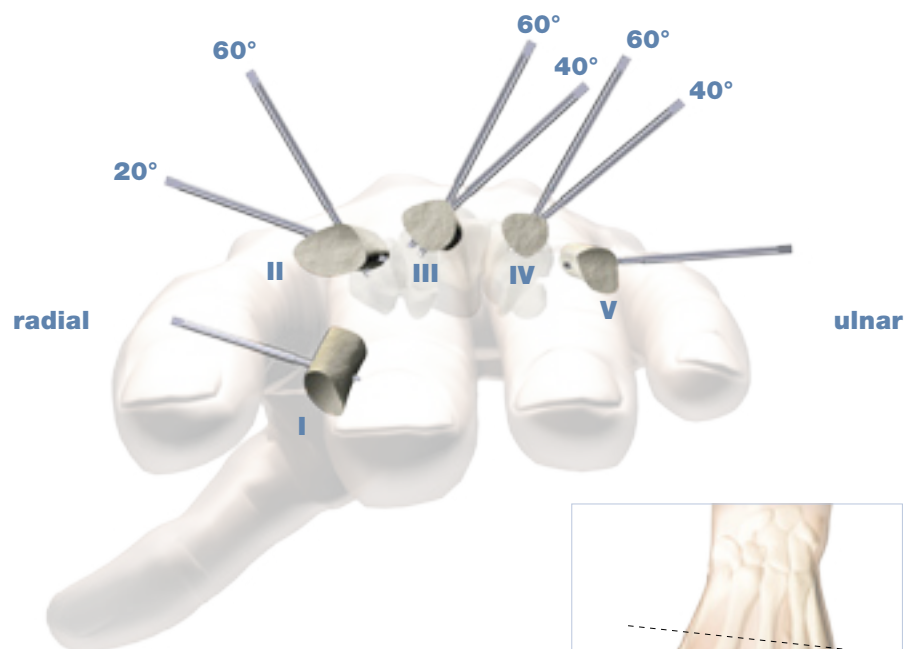
## Placement in the Phalanges

- I** Insert Half Pins from the radial side in the frontal plane.
- II** Insert  $0^{\circ}$  to  $45^{\circ}$  from the frontal plane on the dorsal-radial side.
- III** Insert  $40^{\circ}$  to  $60^{\circ}$  from the frontal plane on the dorsal-radial side.
- IV** Insert  $40^{\circ}$  to  $60^{\circ}$  from the frontal plane on the dorsal-ulnar side.
- V** Insert from the ulnar side in the frontal plane.



## Placement in the Metacarpals

- I** Insert Half Pins from the radial side in the frontal plane.
- II** Insert  $20^{\circ}$  to  $60^{\circ}$  from the frontal plane on the dorsal-radial side.
- III** Insert  $40^{\circ}$  to  $60^{\circ}$  from the frontal plane on the dorsal-ulnar side.
- IV** Insert  $40^{\circ}$  to  $60^{\circ}$  from the frontal plane on the dorsal-ulnar side.
- V** Insert from the ulnar side in the frontal plane.



**Note:**  
**When inserting pins, insure bi-cortical purchase.**

# Operative Technique

## Frame 1

### Mid shaft fracture of the proximal phalanx of the index finger (Digit II).

#### Material used:

- 2 - Multi-Pin Clamps
- 2 - Rod to Rod Couplings
- 1 - Connecting Rod (Carbon or Stainless steel),
- 4 - 2mm Apex® Half-Pins (Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench



**Step 1:** Drill the first proximal hole at least 5mm from the fracture site using the Drill/Pin Insertion Guide and the 1.6mm K-wire. If self-drilling/self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling as described in this step.

**Note:** The drill/ pin insertion angle is 0° to 45° from the frontal plane radially. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.



**Step 2:** Manually insert the Half Pin (blunt or self-drilling/self-tapping) using the 2mm Pin Driver and Drill/Pin Insertion Guide.



# Operative Technique

## Frame 1

**Step 3:** Place one Multi-Pin Clamp over the Half Pin and keep it at the desired distance from the skin.

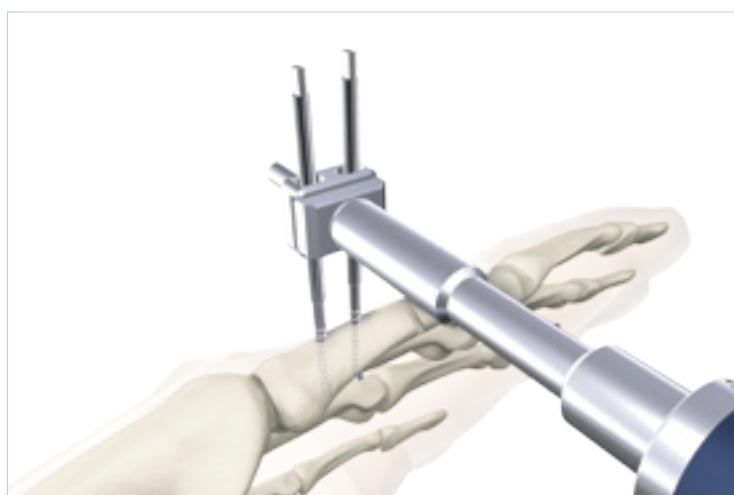
**Step 4:** Using the Multi-Pin Clamp as a guide and the Drill/Pin Insertion Guide to protect soft tissue, drill the second proximal hole with the 1.6mm K-wire. Again, if self-drilling/self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling as described in this step.



**Step 5:** Manually insert the second 2mm Half Pin through the Multi-Pin Clamp using the 2mm Pin Driver and the Drill/Pin Insertion Guide.



**Step 6:** Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



# Operative Technique

## Frame 1



**Step 7:** Build the same Pin/Clamp construct on the distal side of the fracture following steps 1 through 6.

**Note:**  
**Insert the distal Half Pin which is closest to the fracture first.**



**Step 8:** Two Rod to Rod Couplings are “clicked” on the clamp posts. Then, the Connecting Rod (carbon or stainless steel) is “clicked” into the two Rod to Rod Couplings. Reduce the fracture manually.



**Step 9:** While holding the fracture reduction in place, tighten the Rod to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.

# Operative Technique

## Frame 2

### Metaphyseal fracture of the proximal phalanx of the index finger (Digit II).

#### Material used:

- 2 - Multi-Pin Clamps
- 2 - Rod to Rod Couplings
- 1 - Connecting Rod (Carbon or Stainless steel),
- 4 - 2mm Apex® Half-Pins (Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench.



**Step 1:** The proximal Half Pins (blunt or self-drilling/self-tapping) are manually inserted parallel to the joint using the 2mm Pin Driver and Drill/Pin Insertion Guide. Due to the design of the Clamp, the Half Pins can be placed parallel or convergent within the Clamp.

Use the Drill/Pin Insertion Guide and the 1.6mm K-wire to pre-drill if using blunt Half Pins. If self-drilling/self-tapping Half Pins are used, it is possible to insert the Half Pins without pre-drilling.



#### Note:

**The drill/insertion angle is 0° to 45° from the frontal plane radially. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.**

**Step 2:** Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



# Operative Technique

## Frame 2



**Step 3:** Construct a Half Pin/Multi-Pin Clamp assembly distal to the fracture as shown in the figure. Make sure to tighten the Clamp onto the Half Pins.



**Step 4:** Two rod to rod couplings are "clicked" on each of the clamp posts. Then, the Connecting Rod (carbon or stainless steel) is "clicked" into the two Rod to Rod Couplings, and the fracture is reduced.



**Step 5:** Holding the fracture reduction in place, tighten the Rod to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.

# Operative Technique

## Frame 3

**Intra-Articular fracture of the fifth metacarpal with severe soft-tissue damage.**

### Note:

**This frame offers additional freedom of independent pin placement which is dictated by the soft-tissue damage and the fracture. This also gives an option to more easily treat the wounds while the frame is in situ.**

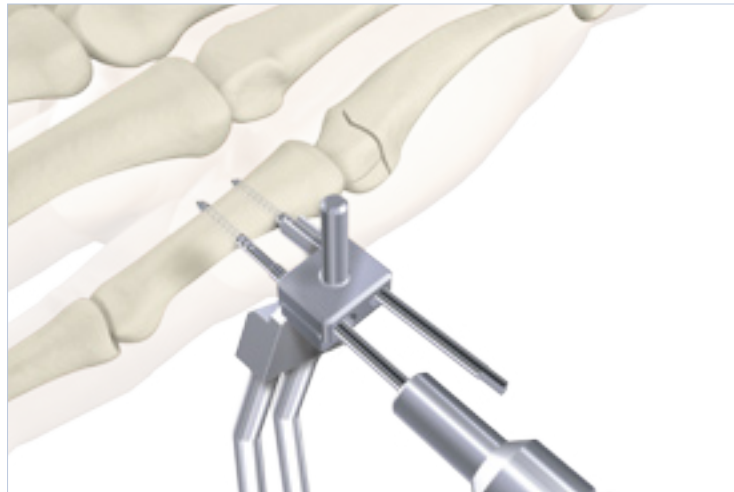
### Material used:

- 1 - Multi-Pin Clamps
- 1 - Rod to Rod Couplings
- 2 - Pin to Rod Couplings
- 1 - Connecting Rod  
(Carbon or Stainless steel),
- 4 - 2mm Apex® Half-Pins  
(Self-Drilling or Blunt),
- 1 - Drill/Pin Insertion Guide,
- 1 - 1.6mm K-Wire,
- 1 - 2mm Pin Driver,
- 1 - 4mm Nut Wrench.

**Step 1:** Manually insert the distal Half Pins (blunt or self-drilling/self-tapping) into the fifth proximal phalanx using the 2mm Pin Driver and the Drill/Pin Insertion Guide. Place the Half Pins and Clamp parallel to the long axis of the bone. Use the Drill/Pin Insertion Guide and the 1.6mm K-wire to pre-drill if using blunt Half Pins. If self-drilling/self-tapping Half Pins are used, it is possible to insert them without pre-drilling.

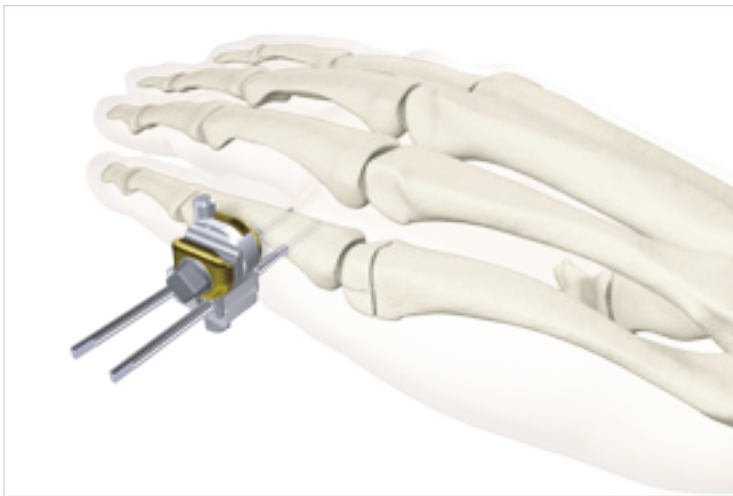
Insert the Half Pins from the ulnar side in the frontal plane. Use image intensification to determine proper pin placement, and ensure bi-cortical purchase.

**Step 2:** Tighten the Multi-Pin Clamp to the Half Pins at the desired position using the 4mm Nut Wrench.



# Operative Technique

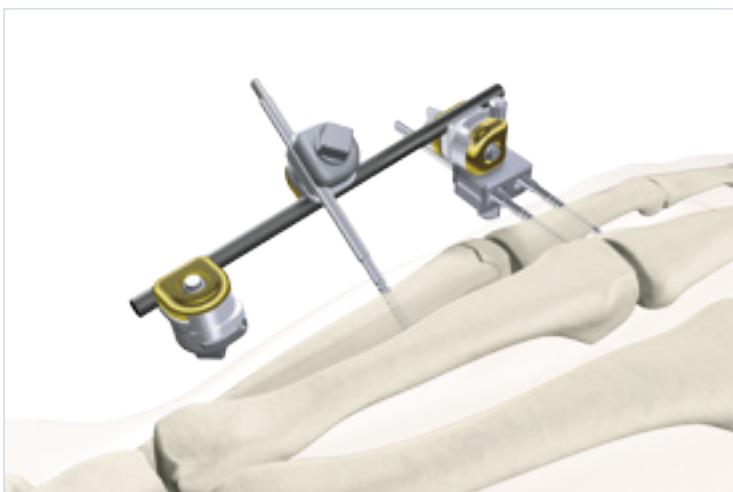
## Frame 3



**Step 3:** Attach a Rod to Rod Coupling to the Clamp.



**Step 4:** Insert one Half Pin in the fifth metacarpal proximal to the fracture respecting the soft-tissue injuries. Attach a Pin to Rod Coupling to the Half Pin. Then, connect a 3mm Connecting Rod (Carbon or Stainless Steel) between the Rod to Rod Coupling and the Pin to Rod Coupling.



**Step 5:** Attach the second Pin to Rod Coupling to the proximal end of the Connecting Rod.

# Operative Technique

## Frame 3

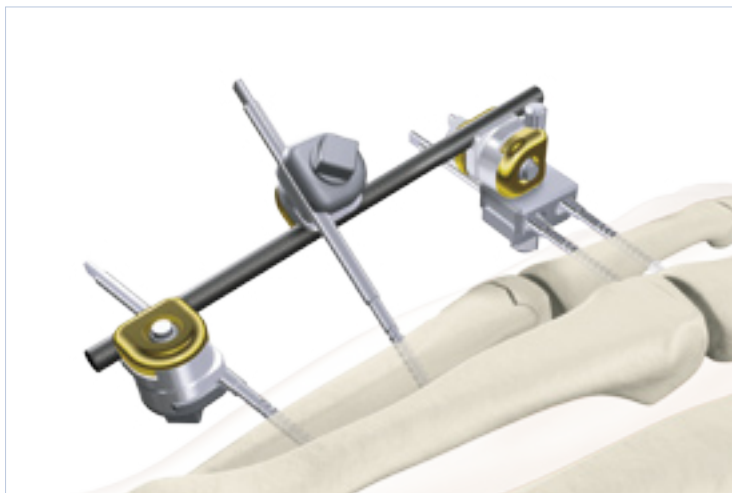
**Step 6:** Insert the Half Pin into the shaft of the metacarpal using the Drill/ Pin Insertion Guide and the Pin to Rod Coupling as guides. Then, manually reduce the fracture.



**Step 7:** While holding the fracture reduction in place, tighten the Rod to Rod Coupling and Pin to Rod Couplings using the 4mm Nut Wrench.



The frame is complete.



# Ordering Information - Implants

## Couplings and Clamps



REF	Description	Diameter
4960-1-010	Rod to Rod Coupling	3mm/3mm



REF	Description	Diameter
4960-1-020	Pin to Rod Coupling	1.65mm–2mm/3mm



REF	Description	Diameter
4960-1-060	Rod to Rod Coupling	5mm/3mm



REF	Description	Diameter
4960-2-020	Multi-Pin Clamp	—



REF	Description	Diameter
4960-2-030	90° Multi-Pin Clamp	—

## Connecting Rods



REF	Description	Diameter	Total Length
5079-6-030	Carbon Connecting Rod	3mm	30mm
5079-6-040	Carbon Connecting Rod	3mm	40mm
5079-6-050	Carbon Connecting Rod	3mm	50mm
5079-6-060	Carbon Connecting Rod	3mm	60mm
5079-6-090	Carbon Connecting Rod	3mm	90mm
5079-6-120	Carbon Connecting Rod	3mm	120mm
5079-6-150	Carbon Connecting Rod	3mm	150mm



5079-5-030	Stainless Steel Connecting Rod	3mm	30mm
5079-5-040	Stainless Steel Connecting Rod	3mm	40mm
5079-5-050	Stainless Steel Connecting Rod	3mm	50mm
5079-5-060	Stainless Steel Connecting Rod	3mm	60mm
5079-5-090	Stainless Steel Connecting Rod	3mm	90mm
5079-5-120	Stainless Steel Connecting Rod	3mm	120mm
5079-5-150	Stainless Steel Connecting Rod	3mm	150mm

### Warning:

Bone Screws referenced in this material are not approved for screw attachment or fixation to the posterior elements (pedicles) of the cervical, thoracic or lumbar spine.



# Ordering Information - Implants

## 2mm Self Drilling/Self Trapping Apex® Half-Pins



REF	Shaft Diameter	Total Length	Thread Length
5080-2-012	2mm	45mm	12mm
5080-2-020	2mm	45mm	20mm

## 1.65mm Self Drilling/Self Trapping Apex® Half-Pins



REF	Thread/Shaft Diameter	Total Length	Thread Length
5080-1-612	1.65/2mm	45mm	12mm
5080-1-620	1.65/2mm	45mm	20mm

## 2mm Blunt Apex® Half-Pins



REF	Shaft Diameter	Total Length	Thread Length
5065-3-615	2mm	36mm	15mm
5065-4-520	2mm	45mm	20mm

## K-Wires



REF	Description	Diameter	Total Length
390142	K-Wire	1.0mm	150mm
390152	K-Wire	1.2mm	150mm
390162	K-Wire	1.4mm	150mm
390164	K-Wire	1.6mm	150mm

# Ordering Information - Instruments



**REF**

4960-9-040

**Description**

Drill/Pin Insertion Guide

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**REF**

4960-9-030

**Description**

4mm Nut Wrench

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**REF**

4960-9-020

**Description**

2mm/1.65mm Pin Driver

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**REF**

4940-9-030

**Description**

5mm Wrench/3mm-4mm Pin Driver

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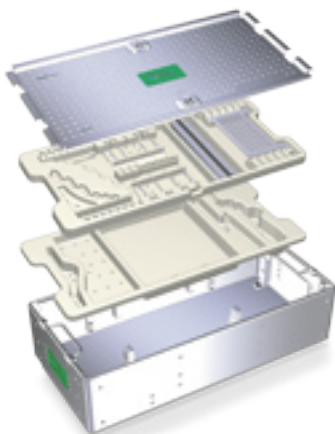
**REF**

5084-4-044

**Description**

4mm Spanner Wrench

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**REF**

4960-9-900

**Description**

Sterilization Tray

# Notes

