

WINQUIST 4

**Xtract-All<sup>®</sup> NA L**

Universal IM Nail Extraction System

# SURGICAL TECHNIQUE GUIDE



**SHUKLA MEDICAL<sup>®</sup>**

Universal Orthopedic Extraction Technologies

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Extraction Instruments

## Intended Use

The Xtract-All® Nail (Winquist 4) Universal IM Nail Extraction System is intended for use during revision procedures for the removal of intramedullary (IM) nail implant hardware manufactured by a wide range of orthopedic companies.

Instrumentation from Shukla Medical is recommended for use only within the intended design, and only by licensed healthcare professionals. Any uses other than those indicated may cause adverse results to the instrumentation or to the patient.

## Indications for Use

The Xtract-All® Nail (Winquist 4) Universal IM Nail Extraction System is indicated for use during any revision procedure in which an IM nail must be removed.

This system may be used to remove broken IM nails provided the broken portion of the nail is accessible using the included instrumentation.

## Additional Recommendations

The Xtract-All® Nail (Winquist 4) Universal IM Nail Extraction System is recommended for use in conjunction with the Xtract-All® Maxi Large Bone Screw Removal System and the Xtract-All® Screw Universal Broken & Stripped Screw Extraction System.

## Preoperative

- Appropriate x-rays and surgical notes may be used to identify manufacturer, brand, location, & condition of implanted hardware. Use the X-Ray Search Engine™ (page 7) for the most up-to-date compatibility information.
- The surgeon should be familiar with general principles of revision surgery and techniques for removal of implants.
- The instrumentation should be inspected for visible wear prior to use (see *Reusable Instrument Inspection Manual*, FCD-17089). Do not use the product if damage is suspected.
- Only recommended cleaning and sterilization guidelines should be used.

## Operative

- The surgeon should be cautious with limb position change and/or excessive force exertion while extracting implants using the instrumentation provided in the tray.

## Storage

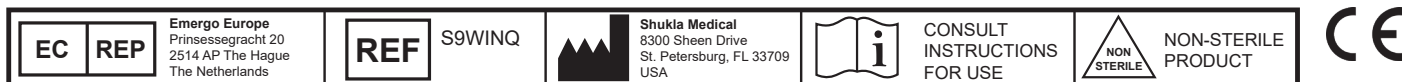
- It is recommended to store all Shukla Medical instrumentation in a clean, dry environment. Under 50% relative humidity;  $\leq 75^{\circ}\text{F}/24^{\circ}\text{C}$ .
- Proper handling and storage of the instrumentation is mandatory. Long-term use of this system may produce stresses and cause weakness, which could become a focal point for failure.

# CLEANING & STERILIZATION

For detailed sterilization instructions, please refer to industry standards ANSI/AAMI ST79:2012 & A1:2012 and ANSI/AAMI ST8:2001.

All Shukla Medical surgical instruments require manual cleaning with a neutral pH cleanser. Open and disassemble all instruments, making sure to remove all contamination during cleaning. Instruments must be reassembled prior to sterilization. Machine washing is not recommended. Maintenance and care using an autoclaveable lubricant on movable parts is required to preserve the life of the instrument. For more cleaning, inspection, maintenance, and care tips, contact Shukla Medical directly.

For detailed cleaning and sterilization instructions, please visit [www.ShuklaMedical.com/Sterilization](http://www.ShuklaMedical.com/Sterilization)

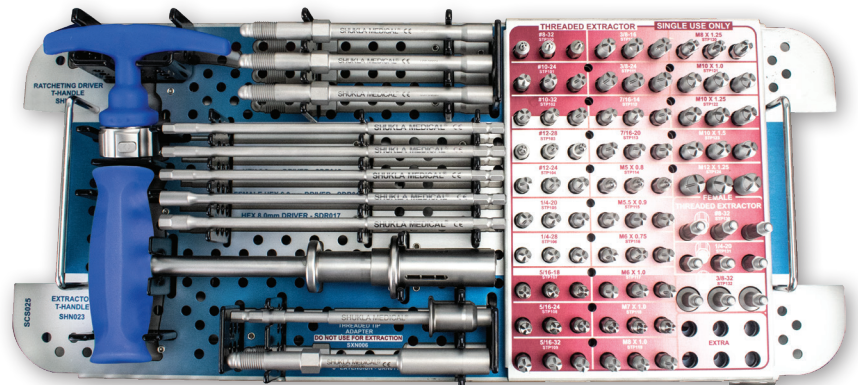




# Winquist 4 Xtract-All® Nail Universal IM Nail Extraction System

## S9WINQ Xtract-All® Nail Winquist 4 Universal IM Nail Extraction System

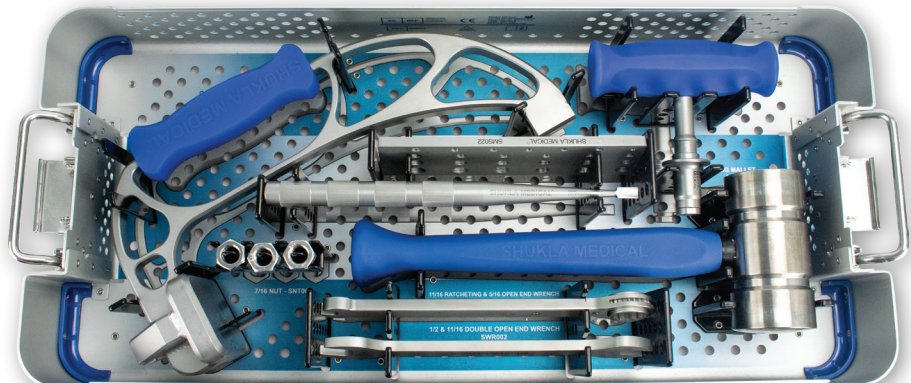
Part #	Description	Qty	Part #	Description	Qty	Part #	Description	Qty
<b>S9WINQ</b>	<b>Case 1 • Level 1</b>		<b>S9WINQ</b>	<b>Case 1 • Level 2</b>		<b>S9WINQ</b>	<b>Case 2</b>	
SHN022	Ratcheting T-Handle	1	SXT033	Small Hook	2	SBD008	C-Frame	1
SHN023	Extractor T-Handle	1	SXT034	Large Hook	2	SHN019	C-Frame Modular T-Handle	1
SXT019	Extractor Body	3	<b>SXT043</b>	Solid IM Nail Extractor (6.0mm-8.0mm)	2	SMT002	Big Mallet	1
SXN011	6" Extension	1	<b>SXT044</b>	Solid IM Nail Extractor (8.0mm-10mm)	2	SMS022	Thread Sizing Board	1
SXN006	Threaded Tip Adapter	1	<b>SXT045</b>	Solid IM Nail Extractor (10mm-12.5mm)	2	SOS027	Bone Chisel	1
<b>STP100</b>	8-32 Threaded Extractor	3	<b>SXT046</b>	Solid IM Nail Extractor (12mm-15mm)	2	SWR002	1/2" & 11/16" Double Open End Wrench	2
STP101	10-24 Threaded Extractor	3	<b>SXT047</b>	Solid IM Nail Extractor (15mm-18mm)	2	SWR007	11/16" Ratcheting & 5/16" Open End Wrench	1
STP102	10-32 Threaded Extractor	3	<b>SXT048</b>	Small Conical Extractor (4.0mm-8.0mm)	2	SNT001	7/16" Nut	3
STP103	12-28 Threaded Extractor	3	<b>SXT049</b>	Medium Conical Extractor (8.0mm-12mm)	2	*Extractor tips (STP100-STP132), Solid Extractors (SXT043-SXT047), and Conical Extractors (SXT048-SXT050) are single-use only and must be discarded after use		
STP104	12-24 Threaded Extractor	3	<b>SXT050</b>	Large Conical Extractor (12mm-16mm)	2			
STP105	1/4-20 Threaded Extractor	3						
STP106	14-28 Threaded Extractor	3						
STP107	5/16-18 Threaded Extractor	3						
STP108	5/16-24 Threaded Extractor	3						
STP109	5/16-32 Threaded Extractor	3						
STP110	3/8-16 Threaded Extractor	3						
STP111	3/8-24 Threaded Extractor	3						
STP112	7/16-14 Threaded Extractor	3						
STP113	7/16-20 Threaded Extractor	3						
STP114	M5 x 0.8 Threaded Extractor	3						
STP115	M5.5 x 0.9 Threaded Extractor	3						
STP116	M6 x 0.75 Threaded Extractor	3						
STP117	M6 x 1.0 Threaded Extractor	3						
STP118	M7 x 1.0 Threaded Extractor	3						
STP119	M8 x 1.0 Threaded Extractor	3						
STP120	M8 x 1.25 Threaded Extractor	3						
STP121	M10 x 1.0 Threaded Extractor	3						
STP122	M10 x 1.25 Threaded Extractor	3						
STP123	M10 x 1.5 Threaded Extractor	3						
STP124	M12 x 1.25 Threaded Extractor	3						
STP130	8-32 Female Threaded Extractor	3						
STP131	1/4-20 Female Threaded Extractor	3						
STP132	3/8-32 Female Threaded Extractor	3						
SDR013	2.0mm Hex Driver	1						
SDR014	2.5mm Hex Driver	1						
SDR015	6.0mm Hex Driver	1						
SDR016	6.0mm Hex Socket Driver	1						
SDR017	8.0mm Hex Driver	1						



S9WINQ Case 1 • Level 1



S9WINQ Case 1 • Level 2



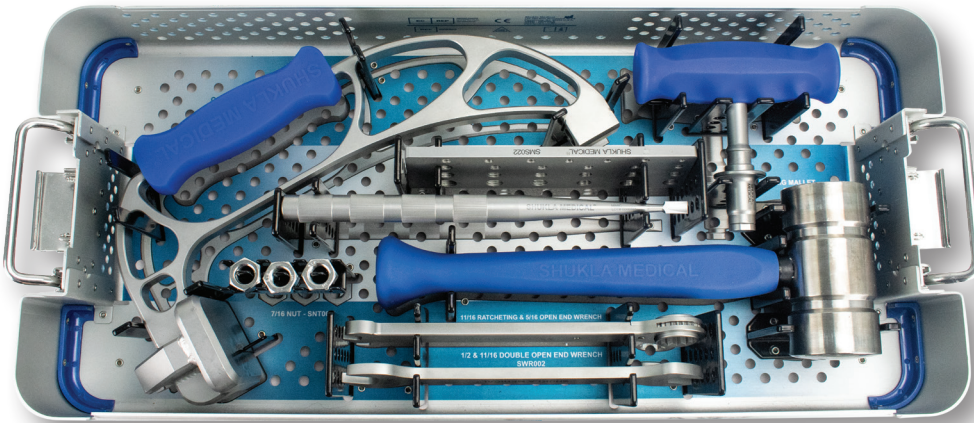
S9WINQ Case 2

### S9WINQ Cases

Part #	Description
SCS024	Winquist 4 Case #1
SCS025	Winquist 4 Case #1 Tray
SCS026	Winquist 4 Case #1 Lid
SCS027	Winquist 4 Case #2
SCS028	Winquist 4 Case #2 Lid



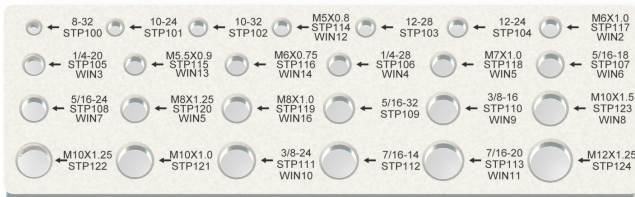
Parts not shown to scale



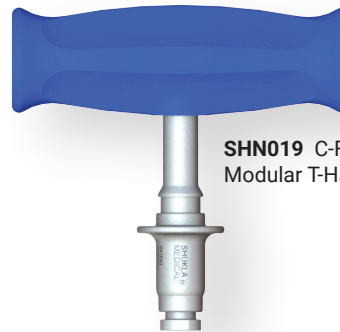
S9WINQ Case #2

### S9WINQ Case #2

SCS027	Case #2 Body
SCS028	Case #2 Lid



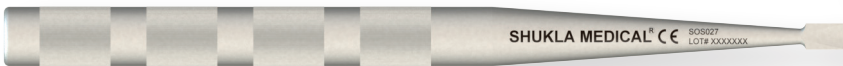
SMS022 Thread Sizing Board



SHN019 C-Frame Modular T-Handle



SBD008 C-Frame



SOS027 Bone Chisel



SMT002 Big Mallet



SWR007 11/16" Ratcheting & 5/16" Open End Wrench

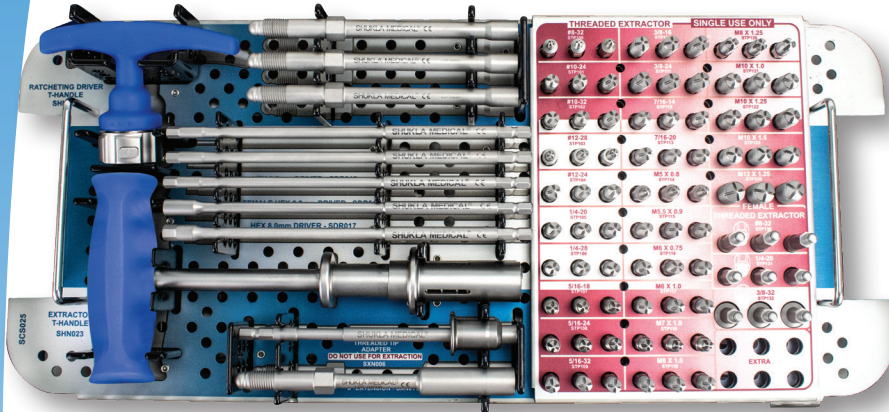


SWR002 1/2" & 11/16" Double Open End Wrench

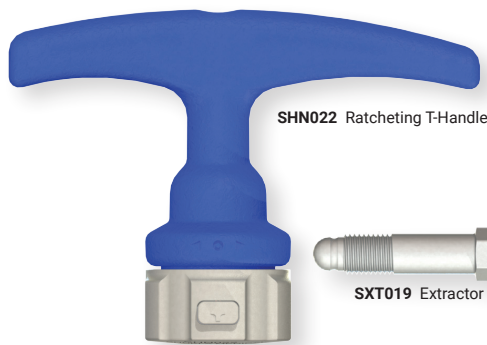


SNT001 7/16" Nut

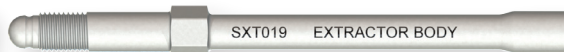
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S9WINQ Case #1 Level 1



SHN022 Ratcheting T-Handle



SXT019 Extractor Body



SDR013 2.0mm Hex Driver



SDR014 2.5mm Hex Driver



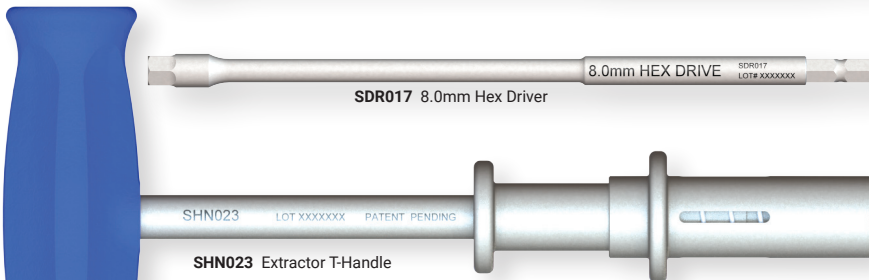
SDR015 6.0mm Hex Driver



SDR016 6.0mm Hex Socket Driver



SDR017 8.0mm Hex Driver



SHN023 Extractor T-Handle

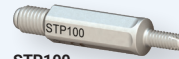


SXN006 Threaded Tip Adapter



SXN011 6" Extension

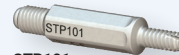
## Single-Use Only Extractors



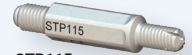
STP100 8-32 Threaded Extractor



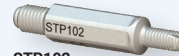
STP114 M5 x 0.8 Threaded Extractor



STP101 10-24 Threaded Extractor



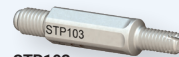
STP115 M5.5 x 0.9 Threaded Extractor



STP102 10-32 Threaded Extractor



STP116 M6 x 0.75 Threaded Extractor



STP103 12-28 Threaded Extractor



STP117 M6 x 1.0 Threaded Extractor



STP104 12-24 Threaded Extractor



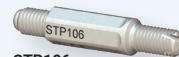
STP118 M7 x 1.0 Threaded Extractor



STP105 1/4-20 Threaded Extractor



STP119 M8 x 1.0 Threaded Extractor



STP106 14-28 Threaded Extractor



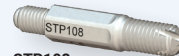
STP120 M8 x 1.25 Threaded Extractor



STP107 5/16-18 Threaded Extractor



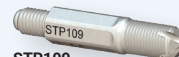
STP121 M10 x 1.0 Threaded Extractor



STP108 5/16-24 Threaded Extractor



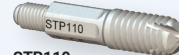
STP122 M10 x 1.25 Threaded Extractor



STP109 5/16-32 Threaded Extractor



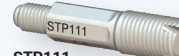
STP123 M10 x 1.5 Threaded Extractor



STP110 3/8-16 Threaded Extractor



STP124 M12 x 1.25 Threaded Extractor



STP111 3/8-24 Threaded Extractor



STP130 8-32 Female Threaded Extractor



STP112 7/16-14 Threaded Extractor



STP131 1/4-20 Female Threaded Extractor



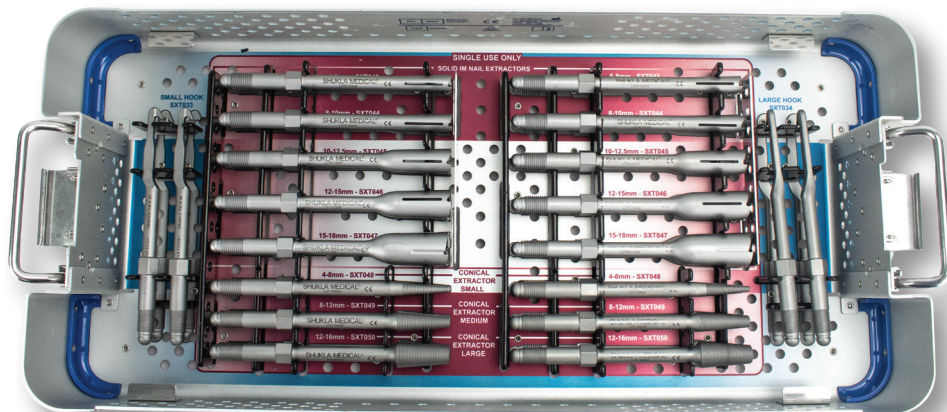
STP113 7/16-20 Threaded Extractor



STP132 3/8-32 Female Threaded Extractor



Parts not shown to scale



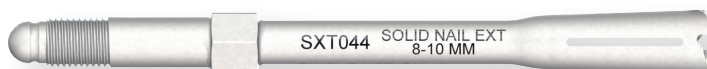
S9WINQ Case #1 Level 2

### S9WINQ Case #1

- SCS024 Case #1 Body
- SCS026 Case #1 Lid
- SCS025 Case #1 Tray



SXT043 Solid IM Nail Extractor (6.0mm-8.0mm)



SXT044 Solid IM Nail Extractor (8.0mm-10mm)



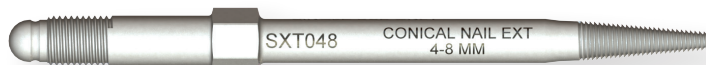
SXT045 Solid IM Nail Extractor (10mm-12.5mm)



SXT046 Solid IM Nail Extractor (12mm-15mm)



SXT047 Solid IM Nail Extractor (15mm-18mm)



SXT048 Small Conical Extractor (4.0mm-8.0mm)



SXT049 Medium Conical Extractor (8.0mm-12mm)



SXT050 Large Conical Extractor (12mm-16mm)



SXT033 Small Hook



SXT034 Large Hook



For the most up-to-date information on supported implants, use the X-Ray Search Engine™ Implant Compatibility Database.

The X-Ray Search Engine™ makes cross-compatibility identification easy. Enter keywords for any implant, manufacturer, or brand to find a list of all compatible Xtract-All® tools and related surgical techniques, x-rays, and videos. Our database is updated frequently as we are made aware of other implant systems.

Contact customer service or your sales representative to access the X-Ray Search Engine™.



## 1 Remove Bone Screws

1. Remove all proximal & distal screws (Fig. A).
2. Verify that all locking screws are removed.



Figure A

## 2 Prepare Nail for Extraction

1. Remove excess bone around proximal neck of IM nail with Bone Chisel (SOS027). (Fig. B)
2. Remove threaded cap if present.



Figure B

## 3 Extraction Method Selection

The Winquist 4 IM nail extraction system contains several options (A-D) to remove IM nail implants in the event that primary or subsequent methods fail.

Extraction methods are presented in the recommended order of execution. Some methods are destructive, causing damage to the nail threads that can make it difficult to return to preceding methods.

### Option A: Threaded Extractor Tips (Single-Use)

#### STP100-STP132

1. Select the compatible extraction tip by matching threads on the IM nail to an extractor (Fig. C.1). If a nail cap is present, use the thread sizing board (SMS022) (Fig. C.2) to accurately identify the appropriate tip.
2. Tighten the tip into the Extractor Body (SXT019) using the 5/16" & 11/16" wrenches (SWR007 & SWR002) (Fig. D).
3. Attach the extractor body to the Extractor T-Handle (SHN023) and thread the tip into the IM nail tightly.

*\* Threaded Extractor Tips are single-use only and must be discarded after nail removal. Used extractors may have damaged threads and will not connect securely in subsequent procedures.*



Figure C.1

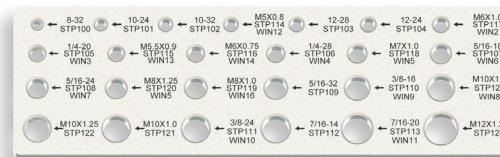


Figure C.2 Use the Thread Sizing Board to determine the thread size of the IM nail cap. Use the size measurement to select the appropriate threaded extractor tip

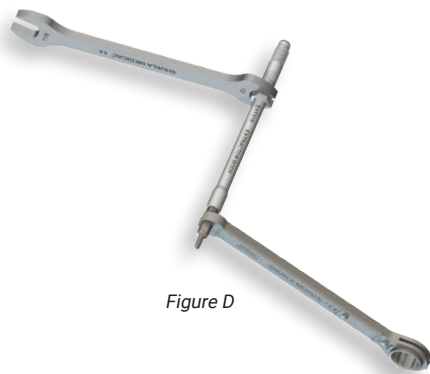


Figure D

**Note:** The extractor tips feature flutes that clear bone as the tip is screwed into the nail. If excessive bone ingrowth is encountered, connect the extractor tip to the Threaded Tip Adapter (SXN006) and insert the tip adapter into the Ratcheting T-Handle (SHN022) (Fig. E). Twist the extractor tip back and forth to clear bone and properly seat the extractor tip. Then disconnect the tip adapter from the tip.

*Do not extract the nail with the Threaded Tip Adapter & Ratcheting Driver Handle, as this can damage the instrumentation.*



Figure E

## Option B: Conical Extractor (Single-Use)

### SXT048-SXT050

If a compatible tip cannot be identified, or nail threads are damaged, use a Conical Extractor (Fig. F).

1. Select the size that fits best into the IM nail based on the diameter of the proximal head.
2. Use the Extractor T-Handle (SHN023) to drive the extractor clockwise into IM nail, using downward force and inserting as far as possible, engaging at least 3-4 threads. The extractor will cross-thread the IM nail shaft threads, ensuring secure attachment.

Once you use the conical extractor, threaded extraction tips may no longer be effective due to thread deformation inside of the IM nail.

*Conical Extractors are single-use only and must be discarded after nail removal. Used extractors may have damaged threads and will not connect securely in subsequent procedures.*

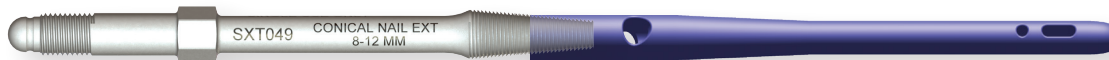


Figure F

## Option C: Solid IM Nail Extractor (Single-Use)

### SXT043-SXT047

If the IM nail has no opening, if the nail is broken proximally, or if the IM nail threads are otherwise inaccessible, use a Solid IM Nail Extractor (Fig. G). Solid Extractors feature bone-clearing teeth that improve access to the IM nail during attachment.

1. Choose an extractor large enough to fit completely over the exterior of the IM nail shaft. Reaming may be necessary to create space for the extractor over the IM nail.
2. Use the Extractor T-Handle (SHN023) to drive the extractor as far as possible onto IM nail, applying downward force in a clockwise direction. The threads inside of the extractor will bite into the nail shaft to create a secure attachment.

*Solid IM Nail Extractors are single-use only and must be discarded after nail removal. Used extractors may have damaged threads and may not connect securely in subsequent procedures.*



Figure G

## Option D: Hook Extractor

### SXT033-SXT034

If the IM nail cannot be removed using Options A, B, or C, and if a slot, hole, or recess is present, a Hook Extractor may be used (Fig. H).

1. Ensure that the hook can fully access and engage with the IM nail slot.
2. Connect the C-Frame (SBD008; see step 4) **prior to** engaging the Hook Extractor with the IM nail.



Figure H

## 4 Build Extractor Assembly

1. Connect Extractor T-handle (SHN023) to the chosen extractor. Screw extractor into IM nail. (Fig. I)
2. Once the extractor is securely attached to the IM nail, remove the t-handle (Fig. J).
3. Connect the Extraction C-frame (SBD056) to the extractor using a Hex Nut (SNT001). (Fig. K) Tighten the nut fully with the 11/16" Wrench (SWR007), applying counter-torque with the 1/2" Wrench (SWR002).



Figure I



Figure J

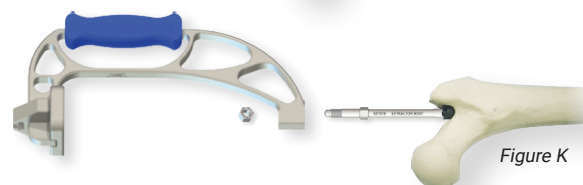


Figure K

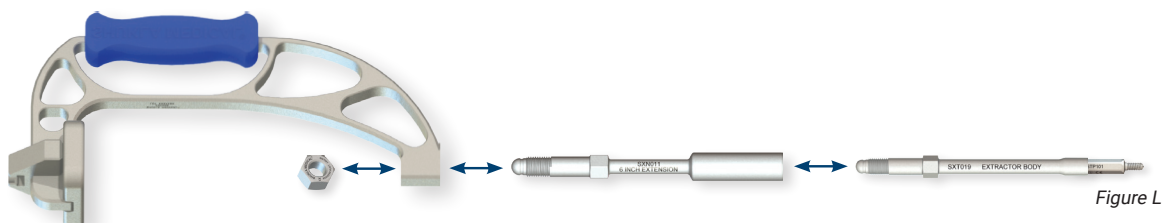


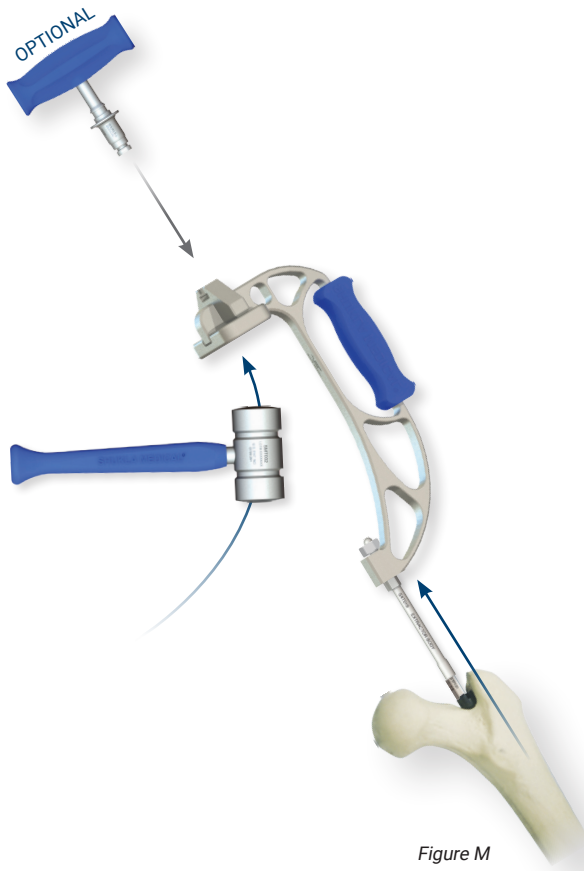
Figure L

If the threaded tip extractor, conical extractor, or hook extractor is not long enough to attach to the C-frame when engaged with the IM nail, attach the 6" Extension (SXN011) (Fig. L)



### 5 Extract Implant

1. Extract the implant using repeated strikes of the Big Mallet (SMT002) on the Extraction C-frame strike plate. (Fig. M)
  - If additional grip is needed, attach the Modular T-Handle (SHN019) to the C-Frame.
  - If the implant resists removal after several strikes, use the Bone Chisel (SOS027) to loosen bone around implant before continuing.



### Tibial Nail Removal

When removing tibial nails, clear bone at both the proximal end and posterior to the bend in the nail before using the extraction tools in this system.

### Broken Nail Removal

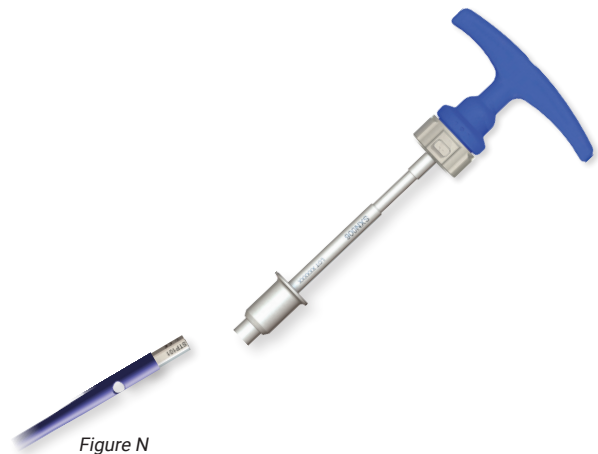
This system is equipped to remove broken nails provided the broken portion of the nail is accessible using the included instrumentation.

### On Bone Growth

If the nail is fixed by bone growth through screw openings, bone must be cleared prior to removal. Use a drill bit to clear the bone from screw openings, rocking the drill to ensure the nail is freed from bone.

### A Note on Breakage

If an extractor tip breaks, (Fig. N) use the Threaded Tip Adapter (SXN006) or the Ratcheting Combo Wrench (SWR007) to remove the broken tip from the IM nail. Replace with a new tip and make another attempt.



*Threaded Extractor Tips, Conical Extractors, and Solid IM Nail Extractors are single-use only and must be discarded after nail removal. Used extractors may have damaged threads and will not connect securely in subsequent procedures.*



Your choice for revision

**Shukla Medical** designs & manufactures instrumentation for orthopedic implant extraction in St. Petersburg, Florida, USA.

In 1998, aerospace component manufacturer S.S. White Technologies, Inc. acquired the Snap-On Winquist IM Nail system. S.S. White rebranded the medical division in 2007 to create Shukla Medical.

Today, Shukla Medical is the industry leader in orthopedic implant extraction tools. We are the only company to offer a comprehensive, truly universal orthopedic revision line for removing IM nails, hip and knee implants, spine hardware, and broken or stripped screws. Surgeons and industry leaders know: **If Shukla can't get it out, no one can.**

Contact us to learn more

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