OPERATIVE TECHNIQUE

FIREBIRD™
DEFORMITY CORRECTION SYSTEM

Firebird™ Deformity Correction Operative Technique

ORTHOFIX®

1 INTRODUCTION & SYSTEM FEATURES

3 THORACIC FIXATION

15 ILIAC FIXATION

21 HOOK FIXATION

27 IMPLANT/INSTRUMENT CATALOG

Orthofix Spinal Implants wishes to thank the following surgeons for their contribution to the development of the technique:

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INTRODUCTION

As an extension to the already versatile Firebird™ Spinal Fixation System platform, the Firebird Deformity Correction System offers even greater options for patients with spinal deformity. When surgically treating a variety of thoracolumbar and sacral pathologies, the Firebird Deformity Correction System offers additional implant and instrument options needed to perform complex spine procedures.

SYSTEM FEATURES

Thoracic Fixation

Uniplanar Screws

- Work in conjunction with DVR instrument for rotation procedures
- Facilitate rod placement in kyphotic deformities
- 4.0mm, 4.5mm, 5.5mm and 6.5mm diameters

Improved Reduction and Rotation Instrumentation

- Linear rod reducer and reduction tube
- DVR instrument construct that is easy to use as well as assemble and disassemble

Iliac Fixation

- Modular bone screw capability provides more options
- Larger bone screws available in 9.5mm, 10.5mm and an optional 11.5mm diameter in up to 110mm lengths
- Mono-Axial Lateral Offsets
- Low Profile Offset for use with modular Bone Screws

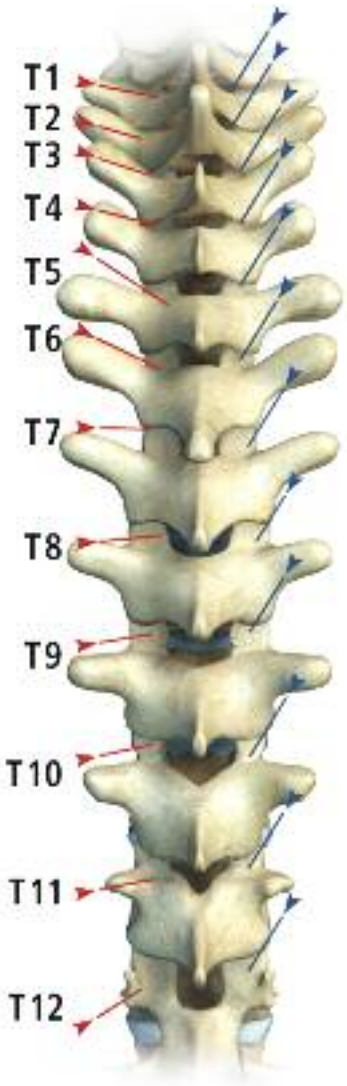
Hook Fixation

- Laminar Hooks (narrow and wide)
- Pedicle Hooks
- Thoracic Hooks (narrow and wide)
- Offset Hooks (left and right)
- Angled Hooks (left and right)

FIREBIRD™
DEFORMITY CORRECTION SYSTEM

Thoracic Fixation Operative Technique

The Firebird Thoracic Fixation System provides all the necessary instruments and implants for thoracic pedicle fixation as well as those needed for rod reduction, rod and vertebral rotation, and thoracic deformity correction.



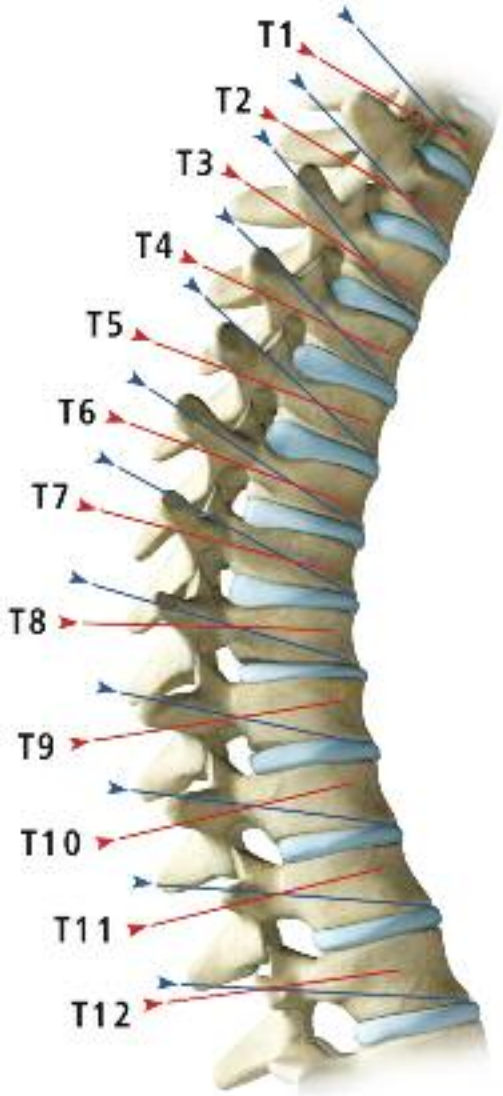


Fig. 1

1. THORACIC PEDICLE SCREW STARTING POINTS

Use Mono-Axial Screws, Uniplanar Screws, or Multi-Axial Screws for the straightforward approach indicated by the redlines. Use Multi-Axial Screws and Uniplanar Screws only for the anatomic approach indicated by the black lines. **(Fig. 1)**

Level	Cephalad-Caudad Starting Point	Medial-Lateral Starting Point
T1	Midpoint TP	Junction: TP-Lamina
T2	Midpoint TP	Junction: TP-Lamina
T3	Midpoint TP	Junction: TP-Lamina
T4	Junction: Proximal Third-Midpoint TP	Junction: TP-Lamina
T5	Proximal Third TP	Junction: TP-Lamina
T6	Junction: Proximal Edge-Proximal Third TP	Junction: TP-Lamina-Facet
T7	Proximal TP	Midpoint Facet
T8	Proximal TP	Midpoint Facet
T9	Proximal TP	Midpoint Facet
T10	Junction: Proximal Edge-Proximal Third TP	Junction: TP-Lamina-Facet
T11	Proximal Third TP	Just medial to lateral pars
T12	Midpoint TP	At the level of lateral pars

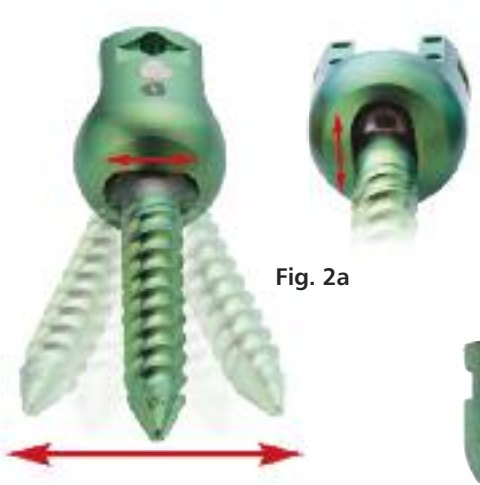


Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2d

2. SCREW OPTIONS

NOTE: Please refer to the Firebird Spinal Fixation System Operative Technique regarding steps for pedicle preparation prior to screw insertion, loading bone screws onto their respective drivers and screw adjustment.

Uniplanar Screws (Fig. 2a)

Uniplanar Screws are available in diameters from 4.0 – 6.5mm, in Non-Modular configuration only. Uniplanar Screws permit screw movement in the cephalad/caudal directions allowing for proper rod placement, yet have restricted motion in the medial/lateral direction, giving them the correction capability of a Mono-Axial Screw. Uniplanar Screws can be distinguished by colored heads. Insertion should be performed via the Multi-Axial Screwdriver. (52-1331)

Mono-Axial Screws (Fig. 2b)

Mono-Axial Screws may be used for straightforward approaches and direct vertebral rotations. Insertion should be performed via the Mono-Axial Screwdriver. (52-1030)

Multi-Axial Screws (Fig. 2c)

With a 50° cone of angulation, Multi-Axial Screws facilitate secure mating of the screw head and rod for final set screw closure despite shank trajectory. Insertion should be performed via the Multi-Axial Screwdriver. (52-1331)

Reduction Screws (Fig. 2d)

Reduction Screws have the ability to perform rod reduction via the tightening of the set screw. The tabs can be broken off after the set screw is below the line of the extended tabs. These screws are available in Multi- and Mono-Axial varieties. Insertion should be performed via the Multi-Axial (61-1331) or Mono-Axial Reduction Screwdrivers (61-1330). Reduction screws provide 19mm of reduction travel.

Fig. 3a

Fig. 3b

Fig. 3c

3. ROD REDUCTION WITH LINEAR ROD REDUCER

Capture the rod in the slot at distal end of the Linear Rod Reducer (51-1455). Attach the instrument to pedicle screw by applying axial force the until spring-loaded tips of Linear Rod Reducer snap on and engage the gripping features on the pedicle screw. **(Fig. 3a)**

Push the Reduction Rack to meet the level of the rod to be reduced. **(Fig. 3b)**

Actuate handles to advance the Reduction Rack incrementally and persuade the rod into the tulip of pedicle screw. When the rod is fully reduced, the handles will not be able to advance the Reduction Rack any further. The Linear Rod Reducer will provide up to 30mm of reduction travel. **(Fig. 3c)**

Fig. 3d

Fig. 3e

Fig. 3f

Insert a Set Screw using the Set Screw Holder / Driver, Long (51-1259) through the cannulation in the Linear Rod Reducer.
(Fig. 3d)

Retract the reduction rack by turning its knob ¼ turn counter clockwise and pulling away from the pedicle screw.
(Fig. 3e)

After the Reduction Rack has been fully retracted, remove the Linear Rod Reducer from the pedicle screw by depressing the spring loaded tips and easing the instrument off of screw body. **(Fig. 3f)**

CAUTION: Too much force can cause pulling of the screw from the pedicle or loosening of the screw-pedicle interface.

Fig. 4a

Fig. 4b

Fig. 4c

4. ROD REDUCTION WITH REDUCTION TUBE

In its unlocked position, depress the Knurled Knob at the proximal end of the Reduction Tube (51-1489) to expand distal tip.
(Fig. 4a)

Capture the rod in its slot at the distal tip. While depressing the Knurled Knob, match the pins on the inside of the distal end of the Reduction Tube with the pin holes on the outside of the screw body.
(Fig. 4b)

Release the Knurled Knob to allow the distal end of the Reduction Tube to surround screw head. Turn Knurled Knob clockwise to the locked position. This prevents expansion of the distal end and head holder from disengaging from the screw head.
(Fig. 4c)

CAUTION: Failure to lock Reduction Tube prior to rod reduction may result in jamming of the instrument.

Fig. 4d

Fig. 4e

Fig. 4f

Rod reduction is achieved by the turning outer sleeve of the Reduction Tube clockwise. The instrument will provide up to 25mm of reduction travel.
(Fig. 4d)

If resistance is encountered, the optional Driver (51-1490) may be attached to the desired ratcheting handle. Slide the Driver over the Reduction Tube being careful to match the ends of the Driver with the outer sleeve of the Reduction Tube. Turn driver clockwise to complete the reduction maneuver. Complete reduction has been achieved when laser marked bands on the Reduction Tube match those on the Driver.
(Fig. 4e)

Remove the Driver and insert a set screw with provisional tightening using Set Screw Holder/Driver, Short (51-1258).
(Fig. 4f)

NOTE: Both Cobalt Chrome and Titanium Rods are available, based on surgeon preference. Cobalt Chrome Rods can be recognized by the two black lines laser etched into each rod. Titanium Rods have a single black line laser etched in each rod.

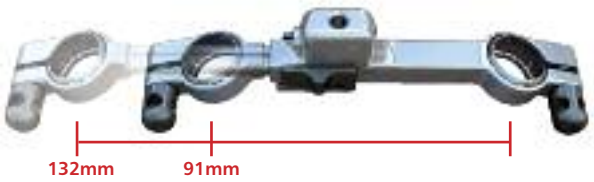


Fig. 5a

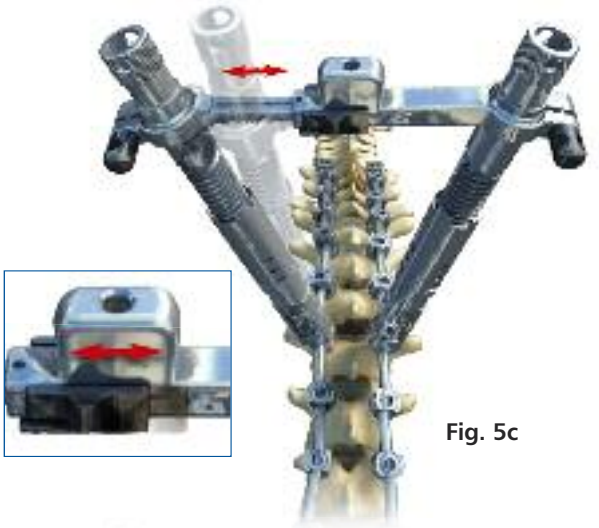


Fig. 5c

Fig. 5b

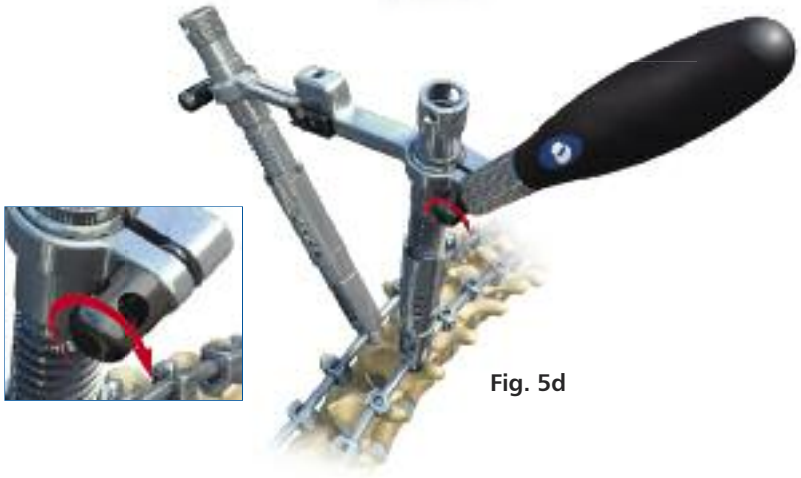


Fig. 5d

5. DIRECT VETEBRAL ROTATION (DVR)

The Ratcheting Connectors are available in two sizes: **(Fig. 5a)**

Small – Range of 66mm – 91mm
Large – Range of 91mm – 132mm

Direct Vertebral Rotation can be performed with bilateral attachment of the Reduction Tubes to desired levels. Attach the Ratcheting Connectors to the proximal ends of the Reduction Tube by sliding the spherical interface over each Reduction Tube. **(Fig. 5b)** This will secure the orientation of the Reduction Tubes and provide a stable base of rotation.

To adjust the medial / lateral size of the Ratcheting Connectors, slide the rack to desired length and actuate Locking Plate to the locked position. **(Fig. 5c)**

To adjust trajectory of the Reduction Tubes based on pedicle anatomy, find the desired orientation and actuate the thumb screws until spherical interfaces are tightened around the Reduction Tubes. Additional leverage to tighten thumb screws may be achieved by using the Rotation Handle (51-1486) in the holes provided in thumb screws. **(Fig. 5d)**

WARNING: Do not over-tighten or over-loosen thumb screws.

Fig. 5e

Fig. 5f

Fig. 5g

Attach the Rotation Handle to handle connector on top of the Ratcheting Connector. **(Fig. 5e)**

Repeat steps A-F for each level to be rotated. Perform DVR maneuver as appropriate. **(Fig. 5f)**

If final tightening of a set screw is desired after rotation, it may be achieved by using Set Screw Driver (52-1061) along with the Torque Handle (55-1068). **NOTE:** Counter Torque Wrench is not required as linked Reduction Tubes provide counter torque during final tightening. **(Fig. 5g)**

NOTE: The Firebird Spinal Fixation System includes both Mono-Axial and Uniplanar Screws to assist with derotation maneuvers.

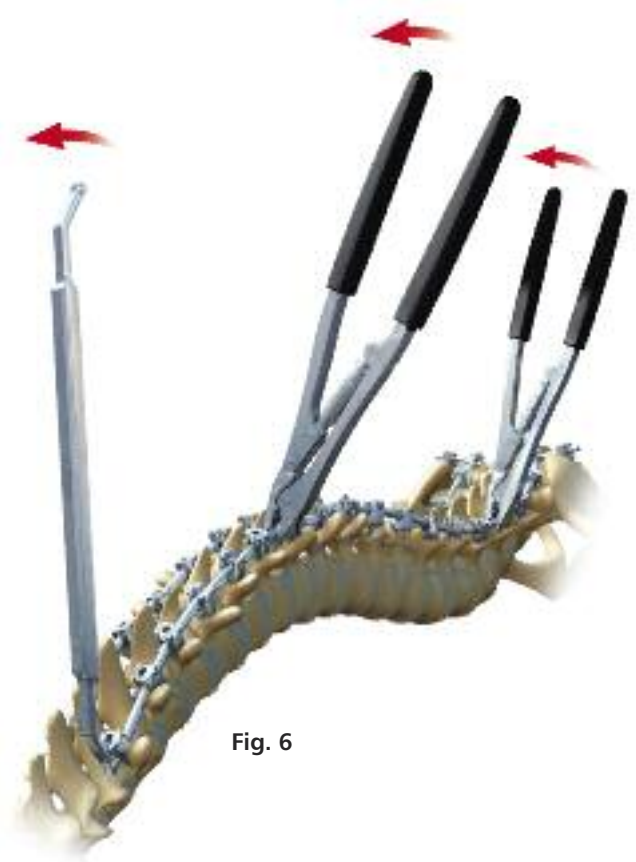


Fig. 6

Fig. 7

6. ROD ROTATION

Utilize Hex Wrench (51-1080) to rotate the rod to its desired orientation by engaging wrench on the hex feature at end of the rod. An angled end of the hex wrench is provided to accomodate patient anatomy.

Rod Grippers (51-1480) can be used to facilitate rotation of the rod to desired orientation along its length. Multiple Rod Grippers can also be used to incrementally rotate the rod to desired orientation. **(Fig. 6)**

7. IN SITU ROD CONTOURING

Coronal Rod Benders (51-1475, 51-1476) are provided to achieve additional coronal balance after the implantation of the rod. Place Coronal Rod Benders along rod and contact the knurled surface of each instrument to provide leverage during rod contouring. **(Fig. 7)**

NOTE: Sagital contouring can be performed using the In Situ Rod Benders available in the Firebird Spinal Fixation System. (52-1070, 52-1071)

Fig. 8

8. FINAL SET SCREW TIGHTENING

Adjustable Counter Torque Wrench (52-1265)

Set Screwdriver (52-1061)

Ratcheting Torque Limiting Handle (RTL Handle) (55-1068)

Position the adjustable Counter Torque Wrench (52-1265) over the pedicle screw and rod. Place the Set Screwdriver (52-1061) through the cannulation of the Counter Torque Wrench and into the hex of the set screw. Turn the RTL handle (52-1012) clockwise to tighten the set screw to 100 in-lbs. The handle will reach its maximum torque and release at 100 in-lbs.

(Fig. 8)

(OPTIONAL) CROSS CONNECTIONS

Cross-Connector Calipers (52-1101)

Cross-Connector Benders, Right (52-1102) and Left (52-1103)

Cross-Connector Driver (52-1104)

The appropriate size Cross-Connector is determined with the Cross-Connector calipers (52-1101). The appropriate multi-axial or fixed Cross-Connector is chosen and placed between the two rods in the construct. If contouring of the multi-axial cross-connector is needed, use the Cross-Connector Benders, right (52-1102) and left (52-1103).

Once the correct position of the Cross-Connector is established on the rods, use the Cross-Connector driver (52-1104) to advance each of the set screws. Fixate the Cross-Connectors onto the rods applying 13 in-lbs of torque. It is recommended to alternate tightening from side to side in order to get uniform closure onto both rods.

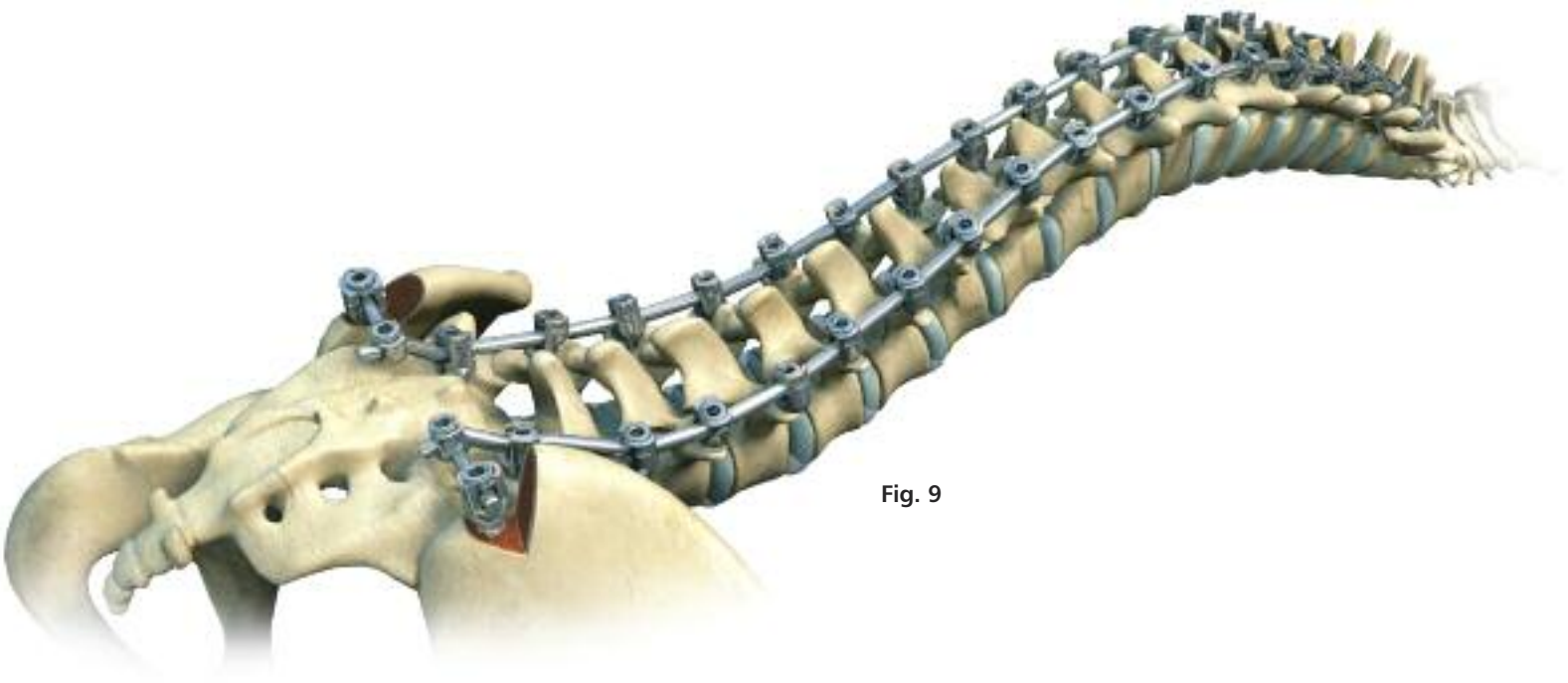


Fig. 9

9. FINAL CONSTRUCT

ILIAC FIXATION OPERATIVE TECHNIQUE

The Firebird Iliac Fixation System provides a variety of connection options that cater to spinal deformities including neuromuscular or idiopathic scoliosis with pelvic obliquity, or when additional load sharing is needed at the lumbosacral junction.

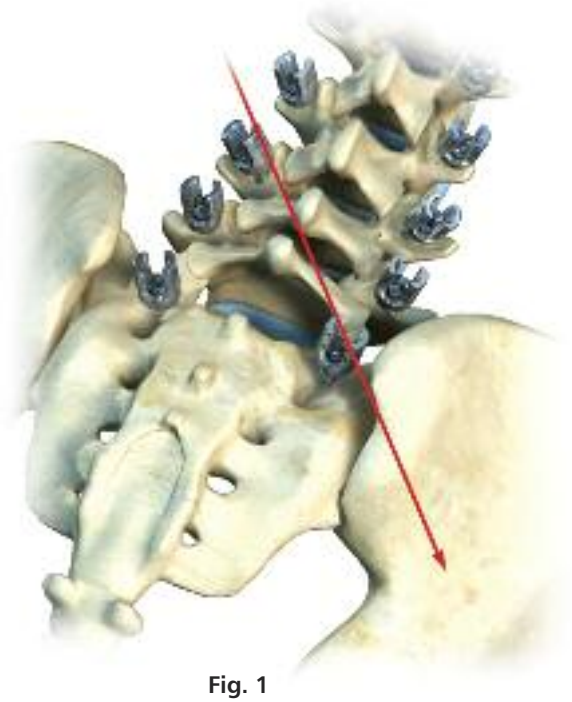


Fig. 1

Fig. 2

1. APPROACH TO THE ILIAC CREST

The iliac crest and posterior superior iliac spine are exposed with the surgeon's preferred method. Care should be taken to expose enough of the iliac crest to allow a proper trajectory of the bone screw and ensure the iliac cortex is not compromised during intraosseus placement of the screw.

2. PREPARATION OF THE ILIAC CREST

It is recommended to notch the iliac crest sufficiently enough around the screw head to sink it to a level obviating implant prominence.

Fig. 3a

Fig. 3b

Fig. 4a

Fig. 4b

3. PROBING THE ILIUM

Place the Iliac Bone Probe (51-1302 / 51-1303) in such a way that the path is approximately 1.0mm to 1.5mm above the greater sciatic notch. The probe can be used to start the screw path but does not need to extend the entire length of the chosen screw. When choosing a screw size, it is generally considered best to use the largest diameter possible. **(Fig. 3a)**

(OPTIONAL) TAPPING THE ILIAC

Tap to the appropriate depth based on the length of the bone screw to be implanted for optimized screw purchase, using the millimeter markings on either the Bone Tap or the Iliac Bone Probe as a guide. **(Fig. 3b)**

NOTE: For standard tip screws only. Self-tapping screws do not require the use of a tap to facilitate screw insertion.

4. INSERTING MODULAR BONE SCREWS IN THE ILIAC CREST

Attach the appropriate bone screw onto the Modular Screw Driver (52-1332) by placing the head of the bone screw into the distal tip. Turn the knob clockwise until the sleeve completely surrounds the collar. Ensure the bone screw is rigidly fixed on the distal tip and is in alignment with the driver shaft before using. **(Fig. 4a)**

Insert the bone screw into the prepared ilium until it is positioned to the correct level. The bone screw should extend far enough above the iliac crest to allow for insertion of the screw body. To disengage the bone screw from the Screwdriver tip, turn the knob counter clockwise until the instrument disengages from the bone screw. **(Fig. 4b)**

NOTE: An optional Decorticating Planer (52-1334) is available for decorticating over the spherical head of the bone screw. Please refer to the Firebird Spinal Fixation System operative technique for detailed instructions on its use.

NOTE: If iliac connectors and bone screws will be used in the iliac crest, bone screw fixation must extend to S1/S2 to ensure a stable construct.

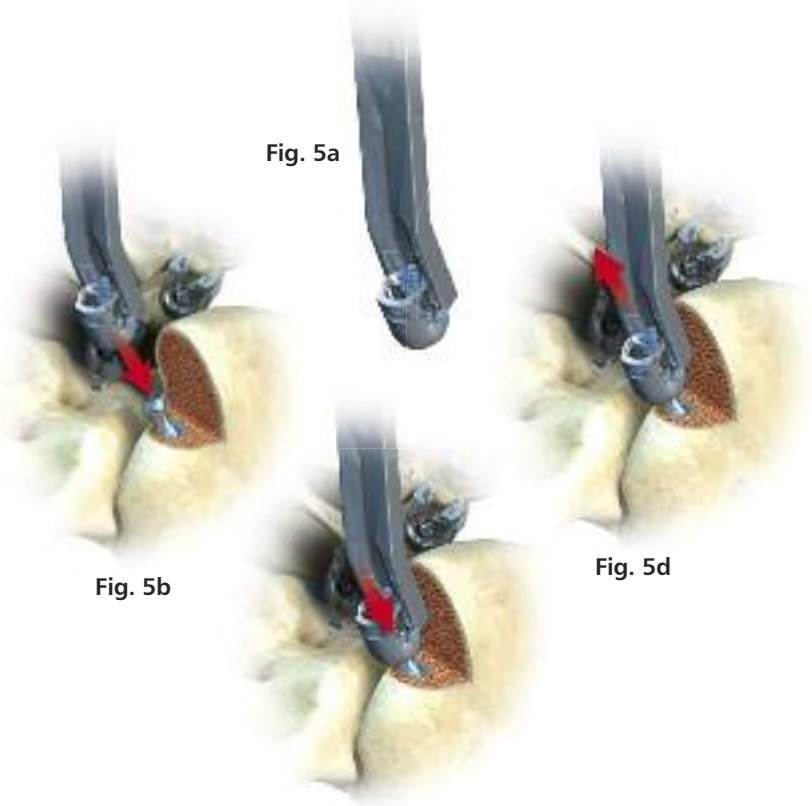


Fig. 5a

Fig. 5b

Fig. 5c

Fig. 5d

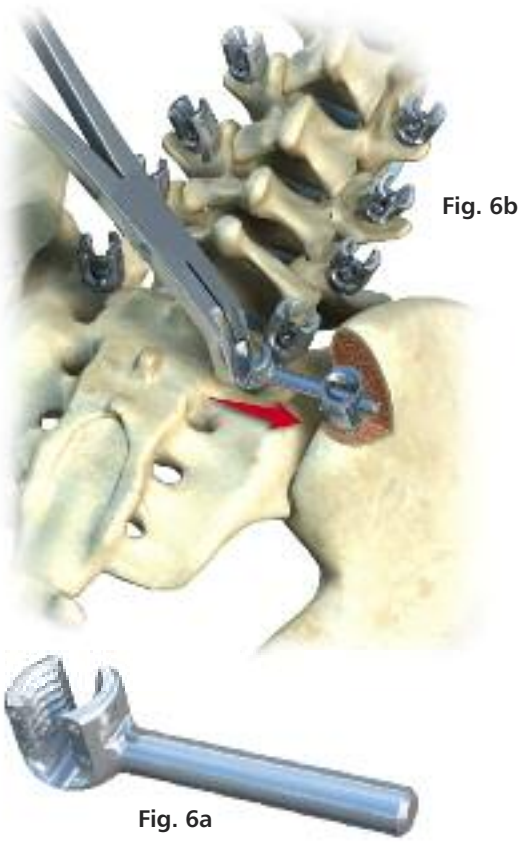


Fig. 6b

Fig. 6a

5. MULTI-AXIAL BODY INSERTION

To attach the appropriate modular body to the Body Inserter (54-0007), align pin holes on the body with the inserter and clamp. **(Fig. 5a)** Slide the body onto the bone screw by applying an axial force to connect the base of the body to the spherical head of the bone screw **(Fig. 5b and 5c).** The pressure cap will move freely in the body to allow for proper insertion. Confirm a secure connection between the body and bone screw by pulling up on the body inserter prior to disconnecting. **(Fig. 5d)** When the body remains attached to the bone screw, the assembly is secure.

6. ILIAC CONNECTOR OPTIONS

The Firebird Deformity Correction System provides two options to connect a construct to the ilium:

Mono-Axial Lateral Offset (Fig. 6a)

- Available in lengths from 15 – 35mm in 5mm increments.
- An 80mm connector is provided and may be cut to the desired length by the surgeon prior to implantation.
- In situ cutting is available using In situ Rod Cutter (59-1041) (by request only)

Application Of Mono-Axial Lateral Offset (Fig. 6b)
Preload the Mono-Axial Lateral Offset Connector onto the Head Inserter. Insert into iliac screw and apply to Longitudinal Rod preliminary fixating with set screw.

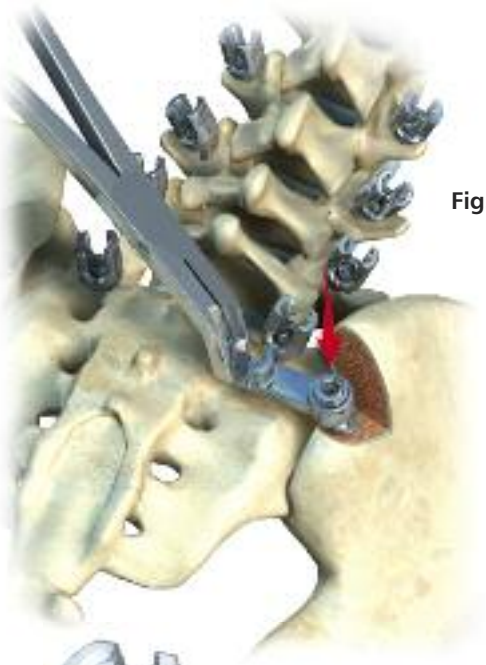


Fig. 6d

Fig. 6c

Low Profile Offset (Fig. 6c)
(For use with modular bone screws only)

- Available in lengths from 8 – 35mm in 3mm increments

Application of Low Profile Offset (Fig. 6d)
Preload the low Profile Offset onto the Head Inserter and trial an appropriate length connector to confirm distance from the bone screw to longitudinal rod. **Do not assemble Low Profile Offset onto bone screw until appropriate length is confirmed.** Disassembly is not possible and will therefore require bone screw removal.

NOTE 1: Integrated set screw can be removed from implant if removal / revision is required. **Regular Firebird Set Screws do not work on the end of the Low Profile Offset that sits on top of the bone screw.** If integrated offset Set Screw is lost, a new offset Set Screw will need to be used.

NOTE 2: Although the screws provided in the iliac fixation implant tray are provided in a modular configuration, the surgeon has the option of assembling the heads prior to screw insertion if desired.

NOTE 3: The Mono-Axial Lateral Offset and Low Profile Offset may also be used at points along the construct to connect to a screw that may be lateral and out of line with the pedicle screw at adjacent levels.

Fig. 7

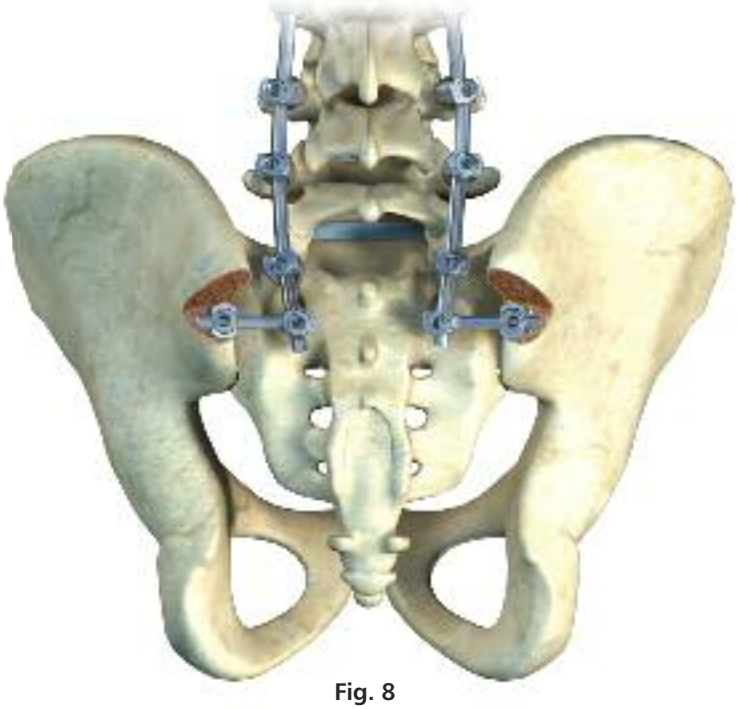


Fig. 8

7. SET SCREW TIGHTENING

Provisional Tightening

When tightening the Set Screws, first secure the Set Screws along the Longitudinal Rod. Then secure the Set Screw where it connects with the post of the Lateral Connector within the Iliac Screw.

Final Tightening

Adjustable Counter Torque Wrench (52-1265)

Set Screwdriver (52-1061)

Ratcheting Torque Limiting Handle (RTL Handle) (52-1012)

Position the adjustable Counter Torque Wrench (52-1265) over the pedicle screw and rod. Place the Set Screwdriver (52-1061) through the cannulation of the Counter Torque Wrench and into the hex of the Set Screw. Turn the RTL handle (52-1012) clockwise to tighten the set screw to 100 in-lbs. The handle will reach its maximum torque and release at 100 in-lbs.

8. FINAL CONSTRUCT

Hook Fixation Operative Technique

In spite of the widespread acceptance of pedicle screws for spinal fixation, posterior element hook fixation is still a valuable adjunct in many situations where screws are not possible or desirable, or need to be supplemented.

Firebird Spinal Fixation System Hooks are top loading and come in various orientations, throat sizes, and blade widths. Hook selection depends on where the desired force is to be applied and in what direction based on the patient's anatomy, deformity, and preferred method of correction.

Fig. 1

1. GENERAL HOOK PREPARATION

Site preparation prior to hook placement necessitates meticulous soft tissue debridement in order to define the bony anatomy facilitating proper seating of the hook. Bone preparation depends on the site of application and type of hook used. Proper use of provided instrumentation allows safe placement with optimal stability and minimal risk to adjacent neurovascular structures.

2. LAMINAR HOOK INSERTION

Laminar Hooks may be placed in either an up going infra-laminar location to deliver a cephalad directed force or in a down going supra-laminar location to deliver a caudal directed force.

Infra-laminar upgoing hook preparation is facilitated by separating the ligamentum flavum from the underside of the lamina using the Laminar Elevator (51-7120). Ligamentum removal is not usually necessary since it attaches cephalad to the inferior edge of the lamina. As with all hooks, it is imperative to avoid intraosseous hook placement to minimize the risk of hook pullout. An impaction cap is provided to apply force as necessary to ensure full seating of the hook against the inferior edge of the lamina. A hook holder is utilized to place the hook but stability is not usually achieved until the hook is loaded and secured to the rod with a set screw. **(Fig.1)**

Supra-laminar down going hooks pose the greatest risk to underlying neurologic structures due to the ventral inclination of the superior lamina and the more dorsal attachment of the ligamentum flavum which necessitates its removal for proper hook seating. The midline ligamentous raphe is identified with a Leksell rongeur and then enough ligamentum flavum and minimal lamina is removed to allow the hook to be rotated or "rolled" underneath the lamina while grasping it with a hook holder. The throat depth of the hook should match the lamina thickness to prevent unnecessary penetration of the hook into the spinal canal during hook and rod insertion. This hook is preferably used to apply a posteriorly directed force, away from the neural elements.

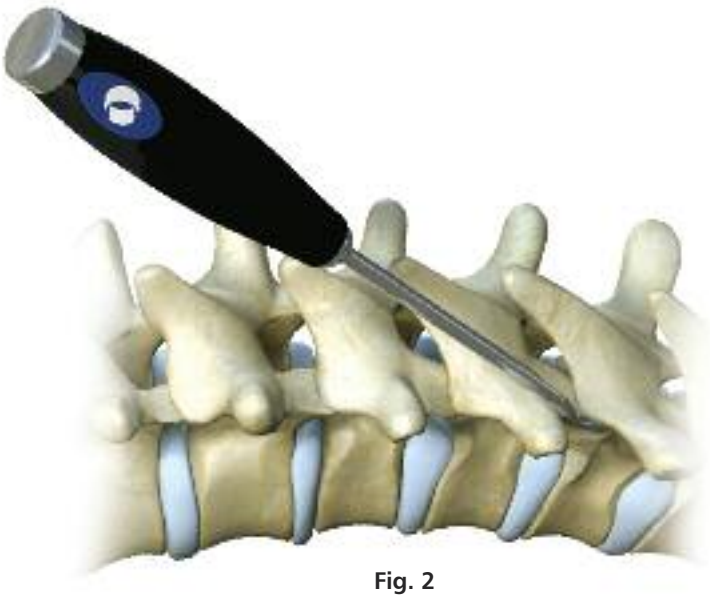


Fig. 2

Fig. 3

3. PEDICLE HOOK INSERTION

Completely excise the facet capsule with the bovie and/or curettes to define the joint. Use the Pedicle Elevator (51-7121) to open the joint and locate the pedicle as an endpoint while avoiding intraosseous penetration of the descending facet, often caused by underestimating the kyphotic angulation of the spine in the upper thoracic region. **(Fig. 2)**

Squaring off the caudal edge of the descending facet with an osteotome or drill may facilitate placement. Hook is then placed with 2 handed control of inserter with hook locked securely in place. Hook must be within facet joint and engaging the pedicle as evidenced by medial/lateral stability.

4. TRANSVERSE PROCESS HOOK INSERTION

Transverse Process Hooks are usually applied in a down going direction over the superior surface, using a hook holder. Use a bovie and/or Transverse Process Elevator (51-7122) to detach the ligament from the superior edge. Ensure elevator and subsequent hook blade goes around entire process and is not intraosseous. Offset, angled, or regular laminar hooks may be used with appropriate throat size to allow hook to line up with adjacent pedicle hooks or screws. Again, hook will not be stable until loaded with caudal force and set screw is engaged against rod. **(Fig. 3)**

Fig. 4a

Fig. 4b

Fig. 5a

Fig. 5b

5. OFFSET AND ANGLED HOOK INSERTION

Use of Offset and Angled Hooks are dependent on the anatomical need, procedure type, and surgeon preference. **(Fig. 4a and 4b)**

6. HOOK HOLDERS

The Regular Hook Holders (51-7100/51-7101) attach securely to each side of the hook tulip, while the Lateral Hook Holders (51-7105/51-7106) attach to the hook on a single side. **(Fig. 6a)**

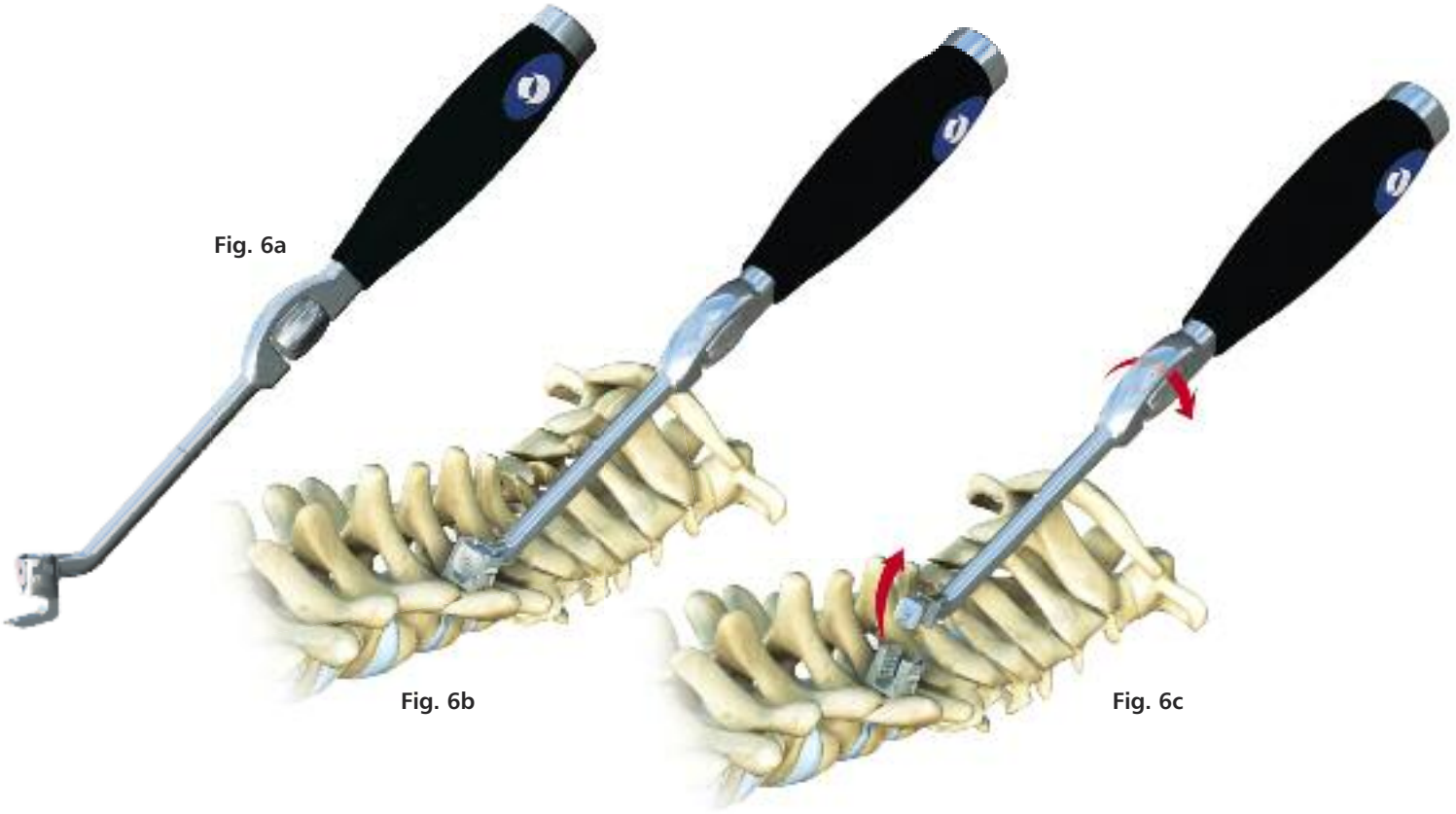


Fig. 6a

Fig. 6b

Fig. 6c

7. HOOK PUSHER

If necessary, the Hook Pusher (51-7111) may be used to apply a controlled force in the direction of hook application. This is most commonly used with pedicle hooks and occasionally infra-laminar or Transverse Process Hooks.

With the scalloped knob loosened fully counter-clockwise, place hook in distal end of pusher. Secure hook to instrument by rotating clockwise until finger tight and gripper plate makes full contact with hook. **(Fig. 6a)**

An impaction cap is provided to allow controlled mallet strike by assistant as necessary for final hook seating. **(Fig. 6b)**

Loosen knob by turning counter-clockwise to disengage while holding hook in seated position, then remove. **(Fig. 6c)**

Fig. 7

8. FINAL SET SCREW TIGHTENING

Adjustable Counter Torque Wrench (52-1265)

Set Screwdriver (52-1061)

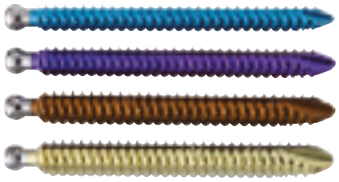
Ratcheting Torque Limiting Handle (RTL Handle) (55-1068)

Position the Adjustable Torque Wrench over the implant and rod. If seating is not possible, impeding bone may be removed or the counter torque may be placed on the rod next to the implant or over an adjacent implant. Place the Set Screwdriver through the cannulation of the counter torque wrench and into the hex of the set screw. Turn the Ratcheting Torque Limiting Handle clockwise to tighten the set screw to 100 in-lbs. The handle will reach its maximum torque and release at 100 in-lbs.

Implant/Instrument Catalog

ILIAC FIXATION 51-9060

Implants

	Part #	Description	Qty Set
	**44-2001**	Set Screw	30
	**44-2101**	Body, Top Loading	30
	**44-2102**	Body, Closed	10
	**44-5760**	7.5mm x 60mm Bone Screw, Self Tapping	4
	44-5770	7.5mm x 70mm Bone Screw, Self Tapping	4
	44-5780	7.5mm x 80mm Bone Screw, Self Tapping	4
	44-5790	7.5mm x 90mm Bone Screw, Self Tapping	4
	44-5710	7.5mm x 100mm Bone Screw, Self Tapping	4
	44-5860	8.5mm x 60mm Bone Screw, Self Tapping	4
	44-5870	8.5mm x 70mm Bone Screw, Self Tapping	4
	44-5880	8.5mm x 80mm Bone Screw, Self Tapping	4
	44-5890	8.5mm x 90mm Bone Screw, Self Tapping	4
	44-5810	8.5mm x 100mm Bone Screw, Self Tapping	4
	44-5960	9.5mm x 60mm Bone Screw, Self Tapping	4
	44-5970	9.5mm x 70mm Bone Screw, Self Tapping	4
	44-5980	9.5mm x 80mm Bone Screw, Self Tapping	4
	44-5990	9.5mm x 90mm Bone Screw, Self Tapping	4
	44-5910	9.5mm x 100mm Bone Screw, Self Tapping	4
	44-5060	10.5mm x 60mm Bone Screw, Self Tapping	4
	44-5070	10.5mm x 70mm Bone Screw, Self Tapping	4
	44-5080	10.5mm x 80mm Bone Screw, Self Tapping	4
	44-5090	10.5mm x 90mm Bone Screw, Self Tapping	4
	44-5010	10.5mm x 100mm Bone Screw, Self Tapping	4

ILIAC FIXATION 51-9060

Implants

	Part #	Description	Qty Set
	**51-6315**	Mono-Axial Lateral Offset, 15mm	4
	51-6320	Mono-Axial Lateral Offset, 20mm	4
	51-6325	Mono-Axial Lateral Offset, 25mm	4
	51-6330	Mono-Axial Lateral Offset, 30mm	4
	51-6335	Mono-Axial Lateral Offset, 35mm	4
	51-6380	Mono-Axial Lateral Offset, 80mm	4
	**51-6408**	Low Profile Offset, 8mm	4
	51-6411	Low Profile Offset, 11mm	4
	51-6414	Low Profile Offset, 14mm	4
	51-6417	Low Profile Offset, 17mm	4
	51-6420	Low Profile Offset, 20mm	4
	51-6423	Low Profile Offset, 23mm	4
	51-6426	Low Profile Offset, 26mm	4
	51-6429	Low Profile Offset, 29mm	4
	51-6432	Low Profile Offset, 32mm	4
	51-6435	Low Profile Offset, 35mm	4
	**52-2450**	450mm Rod, Ti	4
	**51-2450**	450mm Rod, CoCr	4

FIREBIRD™
DEFORMITY CORRECTION SYSTEM

ILIAC FIXATION 51-9060

Instruments

Part #	Description	Qty Set
51-1029	9.5mm Bone Tap, Modular	1

Part #	Description	Qty Set
51-1020	10.5mm Bone Tap, Modular	1

Part #	Description	Qty Set
51-1077	Flat Rod Bender	2

Part #	Description	Qty Set
51-1302	Iliac Bone Probe	1

Part #	Description	Qty Set
51-1303	Iliac Bone Probe, Duckbill	1

ILIAC FIXATION 51-9060

Instruments

	Part #	Description	Qty Set
	**52-1011**	Ratcheting Handle, T-Handle	1
	**52-1013**	Ratcheting Handle, Straight, Small	1

ILIAC FIXATION 51-9060

Sterilization Case

Part #	Description	Qty Set
51-0060	Iliac Fixation Sterilization Case	1

Iliac Fixation Sterilization Case Level 1

Iliac Fixation Sterilization Case Level 2

Iliac Fixation Sterilization Case Level 3

HOOK FIXATION 51-9070

Implants

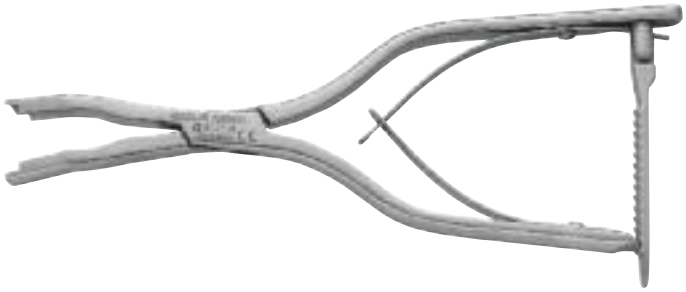
	Part #	Description	Qty Set
	**44-2001**	Set Screw	30
	51-2450	450mm Rod, CoCr	4
	**52-2450**	450mm Rod, Ti	4
	**51-7010**	Angled Hook, Left, Small	4
	51-7011	Angled Hook, Left, Medium	4
	51-7020	Angled Hook, Right, Small	4
	51-7021	Angled Hook, Right, Medium	4
	**51-7030**	Laminar Hook, Narrow, Small	4
	51-7031	Laminar Hook, Narrow, Medium	4
	51-7032	Laminar Hook, Narrow, Large	4
	51-7040	Laminar Hook, Wide, Small	4
	51-7041	Laminar Hook, Wide, Medium	4
	51-7042	Laminar Hook, Wide, Large	4
	**51-7050**	Offset Hook, Left, Medium	4
	51-7051	Offset Hook, Left, Large	4
	51-7060	Offset Hook, Right Medium	4
	51-7061	Offset Hook, Right, Large	8
	**51-7070**	Pedicle Hook, Small	8
	51-7071	Pedicle Hook, Medium	4
	51-7072	Pedicle Hook, Large	6
	**51-7080**	Thoracic Hook, Narrow, Small	6
	51-7081	Thoracic Hook, Narrow, Medium	4
	51-7090	Thoracic Hook, Wide, Small	4
	51-7091	Thoracic Hook, Wide, Medium	4

HOOK FIXATION 51-9070

Instruments

Part #	Description	Qty Set
51-7100	Hook Holder, Regular, Straight	2

Part #	Description	Qty Set
51-7101	Hook Holder, Regular, Angled	2



Part #	Description	Qty Set
51-7105	Hook Holder, Lateral, Straight	2

Part #	Description	Qty Set
51-7106	Hook Holder, Lateral, Angled	2

Part #	Description	Qty Set
51-7120	Transverse Process Elevator	1

Part #	Description	Qty Set
51-7121	Pedicle Elevator	1

Part #	Description	Qty Set
51-7122	Laminar Elevator	1

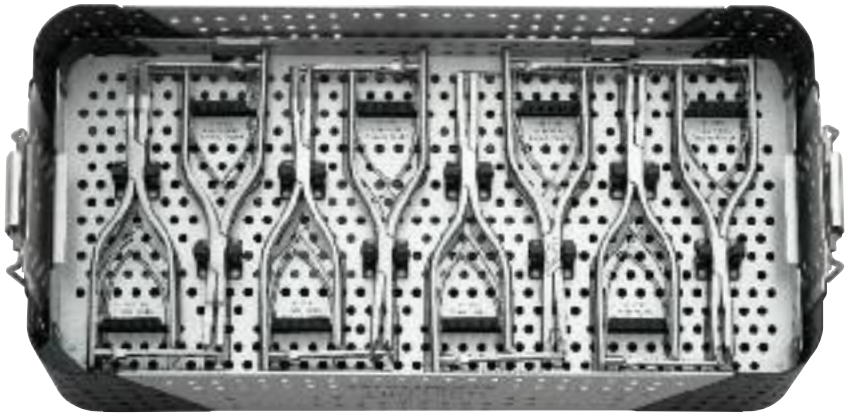
Part #	Description	Qty Set
51-7111	Hook Pusher	1

HOOK FIXATION 51-9070

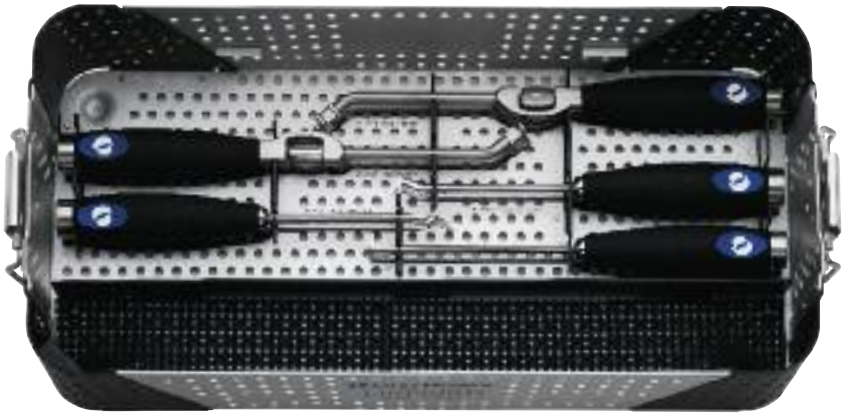
Sterilization Case

Part #	Description	Qty Set
51-0070	Hook Fixation Sterilization Case	1

Hook Fixation Sterilization Case Level 1



Hook Fixation Sterilization Case Level 2



Hook Fixation Sterilization Case Level 3

THORACIC FIXATION 51-9080

Implants

Bottom View

Part #	Description	Qty Set
44-2001	Set Screw	30
51-2450	450mm Rod, CoCr	4
52-2450	450mm Rod, Ti	4
51-3325	4.0mm x 25mm Uniplanar Screw, Self Tapping	6
51-3330	4.0mm x 30mm Uniplanar Screw, Self Tapping	6
51-3335	4.0mm x 35mm Uniplanar Screw, Self Tapping	6
51-3340	4.0mm x 40mm Uniplanar Screw, Self Tapping	6
51-3345	4.0mm x 45mm Uniplanar Screw, Self Tapping	6
51-3425	4.5mm x 25mm Uniplanar Screw, Self Tapping	6
51-3430	4.5mm x 30mm Uniplanar Screw, Self Tapping	6
51-3435	4.5mm x 35mm Uniplanar Screw, Self Tapping	6
51-3440	4.5mm x 40mm Uniplanar Screw, Self Tapping	6
51-3445	4.5mm x 45mm Uniplanar Screw, Self Tapping	6
51-3525	5.5mm x 25mm Uniplanar Screw, Self Tapping	6
51-3530	5.5mm x 30mm Uniplanar Screw, Self Tapping	6
51-3535	5.5mm x 35mm Uniplanar Screw, Self Tapping	6
51-3540	5.5mm x 40mm Uniplanar Screw, Self Tapping	6
51-3545	5.5mm x 45mm Uniplanar Screw, Self Tapping	6
51-3625	6.5mm x 25mm Uniplanar Screw, Self Tapping	6
51-3630	6.5mm x 30mm Uniplanar Screw, Self Tapping	6
51-3635	6.5mm x 35mm Uniplanar Screw, Self Tapping	6
51-3640	6.5mm x 40mm Uniplanar Screw, Self Tapping	6
51-3645	6.5mm x 45mm Uniplanar Screw, Self Tapping	6

THORACIC FIXATION 51-9080

Instruments

	Part #	Description	Qty Set
	51-1080	Hex Wrench	1
	51-1258	Set Screw Holder / Driver, Modular, Short	2
	51-1402	Bone Probe, Straight, Small	1
	51-1403	Bone Probe, Curved, Small	1
	51-1423	3.5mm Bone Tap, Modular	1

FIREBIRD™
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THORACIC FIXATION 51-9080

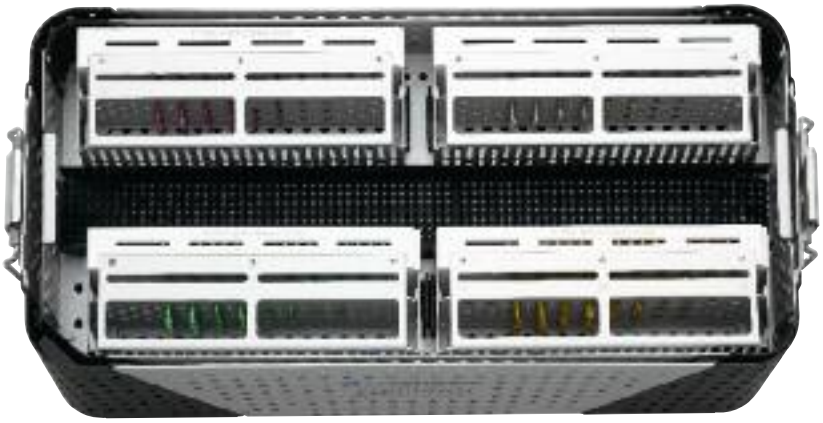
Implants

	Part #	Description	Qty Set
	**51-1475**	Coronal Rod Bender, Right	1
	**51-1476**	Coronal Rod Bender, Left	1
	**51-1480**	Rod Gripper	2
	**52-1011**	Ratcheting Handle, T-Handle	1
	**52-1013**	Ratcheting Handle, Straight, Small	1

THOARACIC FIXATION 51-9080

Sterilization Case

Part #	Description	Qty Set
51-0080	Thoracic Fixation Sterilization Case	1



Thoracic Fixation Sterilization Case Level 1

Thoracic Fixation Sterilization Case Level 2

Thoracic Fixation Sterilization Case Level 3

REDUCTION/DIRECT VERTEBRAL ROTATION 51-9090

Instruments

	Part #	Description	Qty Set
	**51-1455**	Linear Rod Reducer	2
	**51-1486**	Rotation Handle	6
	**51-1487**	Ratcheting Connector, Large	6
	**51-1488**	Ratcheting Connector, Small	6
	**51-1489**	Reduction/Rotation Tube	12

REDUCTION/DIRECT VERTEBRAL ROTATION 51-9090

Instruments

	Part #	Description	Qty Set
	**51-1490**	Driver Reduction Tube	2
	**51-1259**	Set Screw Holder / Driver, Modular, Long	2
	**52-1011**	Ratcheting Handle, T Handle	1
	**52-1013**	Ratcheting Handle, Straight, Small	1

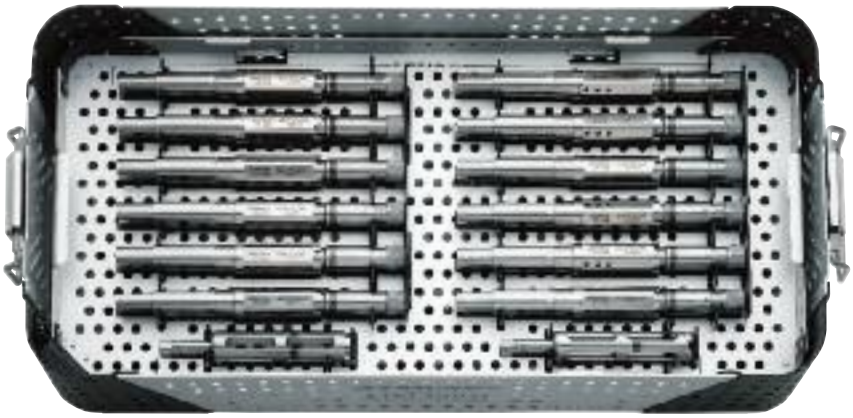
FIREBIRD™
DEFORMITY CORRECTION SYSTEM

REDUCTION/DIRECT VETRTEBRAL ROTATION 51-9090

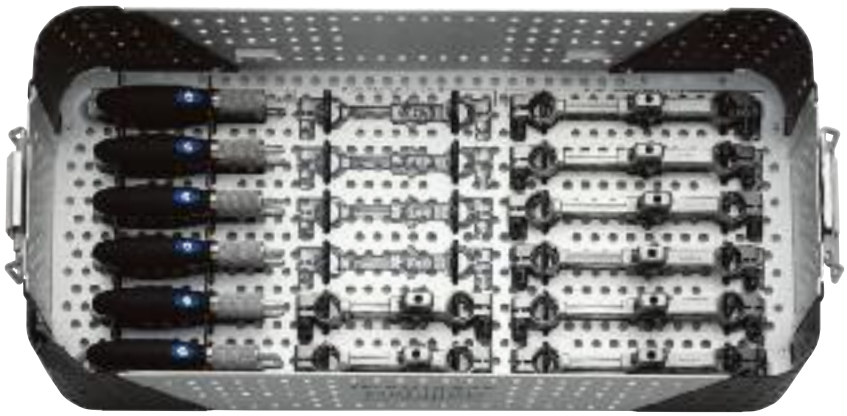
Sterilization Case

Part #	Description	Qty Set
51-0080	Reduction Rotation Sterilization Case	1

Reduction/Rotation Sterilization Case Level 1



Reduction/Rotation Sterilization Case Level 2



Reduction/Rotation Sterilization Case Level 3

Optional Instruments

Part #	Description	Qty Set
59-1041	In-Situ Rod Cutter	OPTIONAL

59-1021	11.5mm Bone Tap, Modular	OPTIONAL
59-1221	11.5mm Bone Tap, Monolithic	OPTIONAL
59-1220	10.5mm Bone Tap, Monolithic	OPTIONAL
59-1229	9.5mm Bone Tap, Monolithic	OPTIONAL

Optional Implants

Mono Axial Reduction Screws, Self Tapping

DIAMETER	25 mm - 95 mm	100 mm	110 mm
4.0 mm	**61-73XX**	**61-7310**	**61-7311**
4.5 mm	**61-74XX**	**61-7410**	**61-7411**
5.5 mm	**61-75XX**	**61-7510**	**61-7511**
6.5 mm	**61-76XX**	**61-7610**	**61-7611**
7.5 mm	**61-77XX**	**61-7710**	**61-7711**
8.5 mm	**61-78XX**	**61-7810**	**61-7811**

Mono Axial Screws, Self Tapping

DIAMETER	25 mm - 95 mm	100 mm	110 mm
4.0 mm	**44-73XX**	**44-7310**	**44-7311**
4.5 mm	**44-74XX**	**44-7410**	**44-7411**
5.5 mm	**44-75XX**	**44-7510**	**44-7511**
6.5 mm	**44-76XX**	**44-7610**	**44-7611**
7.5 mm	**44-77XX**	**44-7710**	**44-7711**
8.5 mm	**44-78XX**	**44-7810**	**44-7811**

Part #	Description	Qty Set
44-2103	Body/Reduction	OPTIONAL

Optional Implants

	Part #	Description	Qty Set
	**55-5325**	25mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5330	30mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5335	35mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5340	40mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5345	45mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5350	50mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5355	55mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5360	60mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5365	65mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5370	70mm Cross Connector / Multi-Axial	OPTIONAL
	55-5375	75mm, Cross Connector / Multi-Axial	OPTIONAL
	55-5380	80mm, Cross Connector / Multi-Axial	OPTIONAL
	**57-5315**	15mm, Cross Connector / Fixed	OPTIONAL
	57-5317	17mm, Cross Connector / Fixed	OPTIONAL
	57-5319	19mm, Cross Connector / Fixed	OPTIONAL
	57-5321	21mm, Cross Connector / Fixed	OPTIONAL
	57-5323	23mm, Cross Connector / Fixed	OPTIONAL
	57-5325	25mm, Cross Connector / Fixed	OPTIONAL
	**52-6700**	5.5mm / 5.5mm, Rod Connector / Axial	OPTIONAL
	**52-6800**	5.5mm / F-F, Rod Connector / Parallel	OPTIONAL
	**52-6805**	5.5mm / T-T, Rod Connector / Parallel	OPTIONAL

FIREBIRD™
DEFORMITY CORRECTION SYSTEM

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