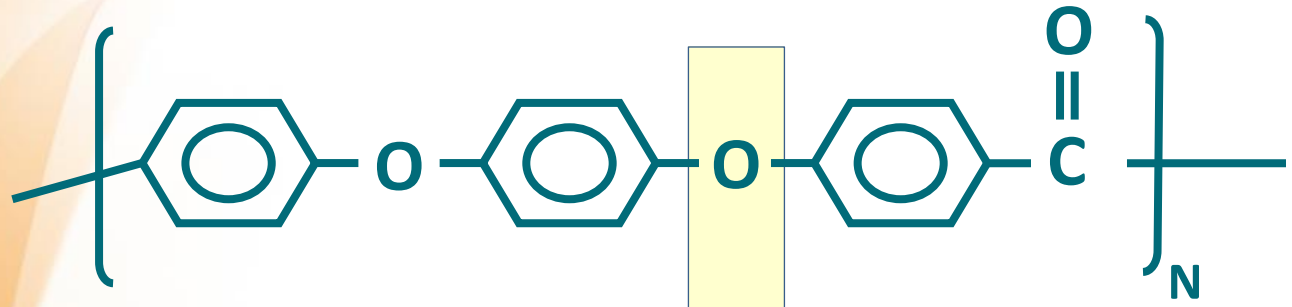
orthopaedic & spine development

Osseointegration of PEKK Implants

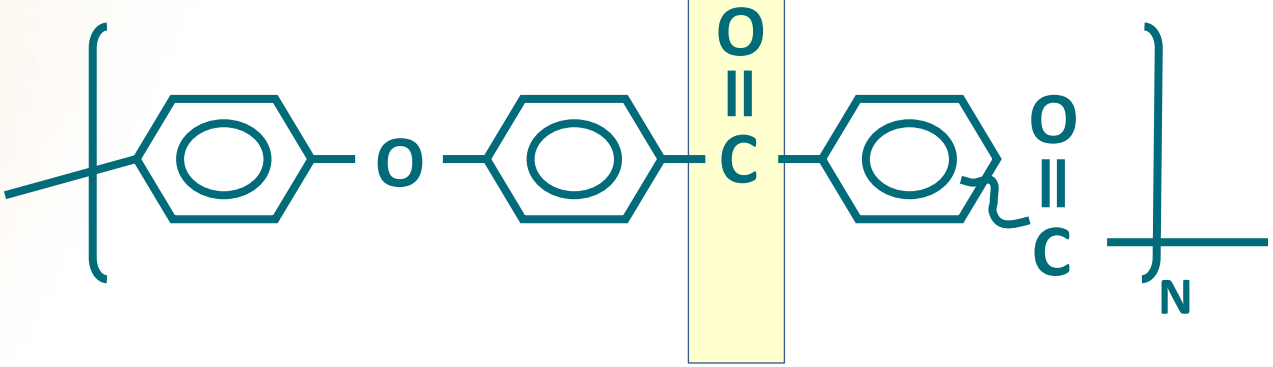
Preliminary Data from an Oxford Performance Materials (OPM) Animal Study

PEKK chemistry



PEEK

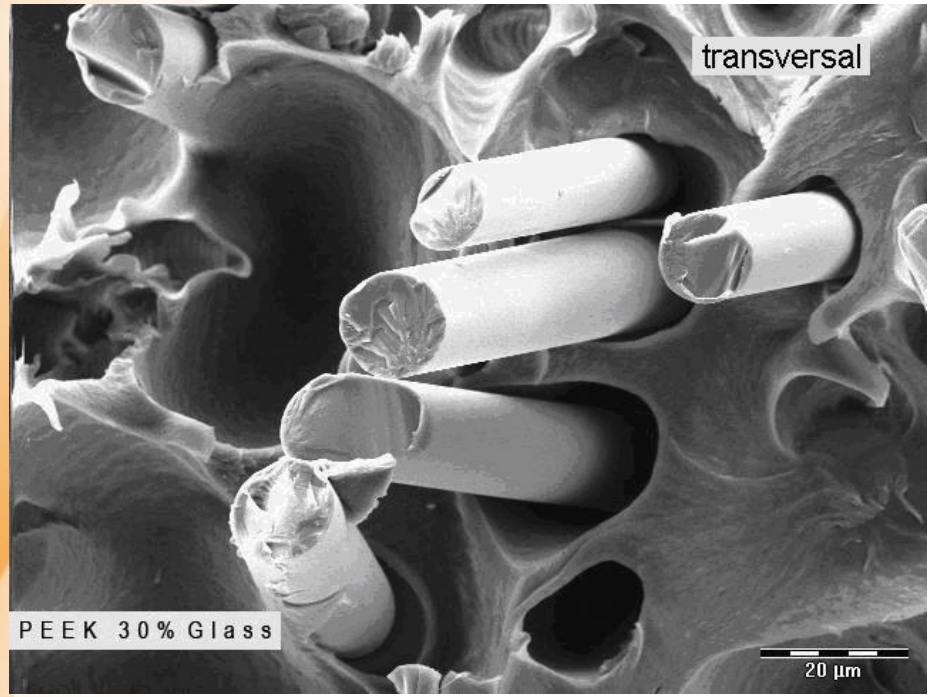
Polyetheretherketone

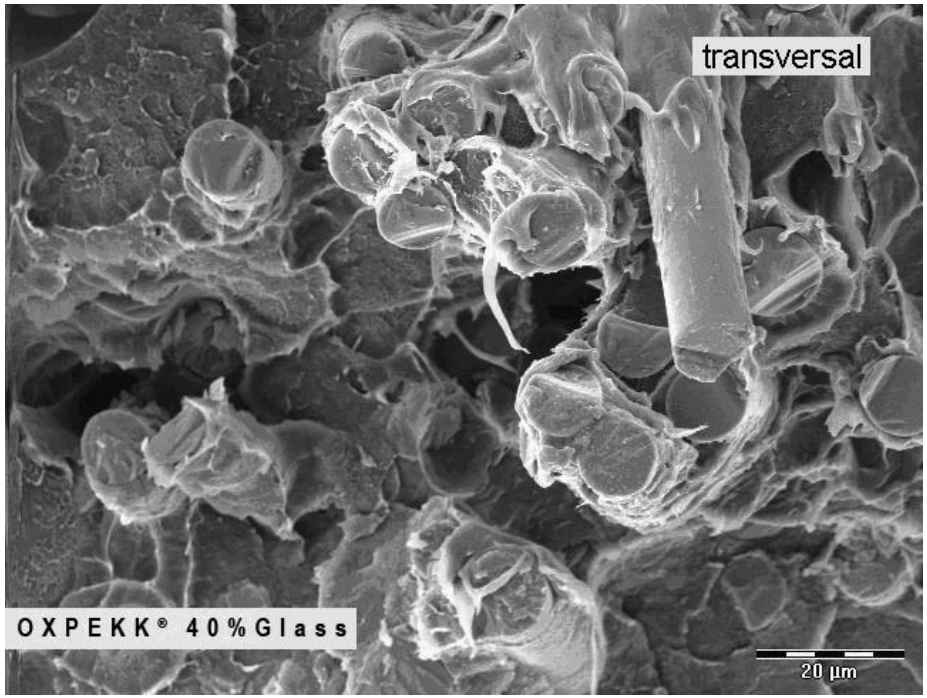


PEKK

Polyetherketoneketone

OXPEKK® Advantage: Adhesion & Wetting





Adhesion Performance

PEKK chemistry highly suitable for bonding

- Used with fillers and other adhesive systems
- Used as an adhesive to join housings
- Ability to adhere to itself

Mechanisms of osseointegration

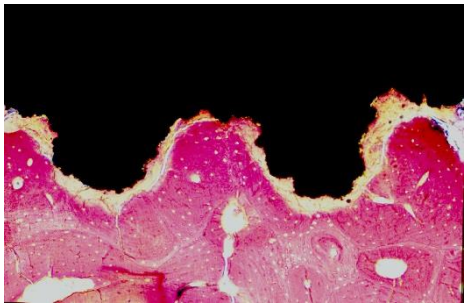
Fixation of orthopedic implants

- Primary Fixation – Geometry
- Secondary Fixation – Ingrowth / Ongrowth (Osseointegration)

Three main phases:

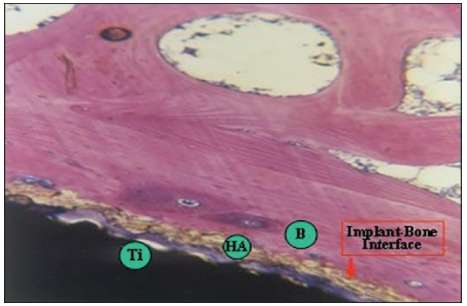
- Osteoconduction
- De novo bone formation
- Bone remodeling

Ti



https://commons.wikimedia.org/wiki/User:RobertGougaloff

HA coated Ti



http://www.jicdro.org/article.asp?issn=2231-0754;year=2015;volume=7;issue=3;spage=6;epage=12;aulast=Pal

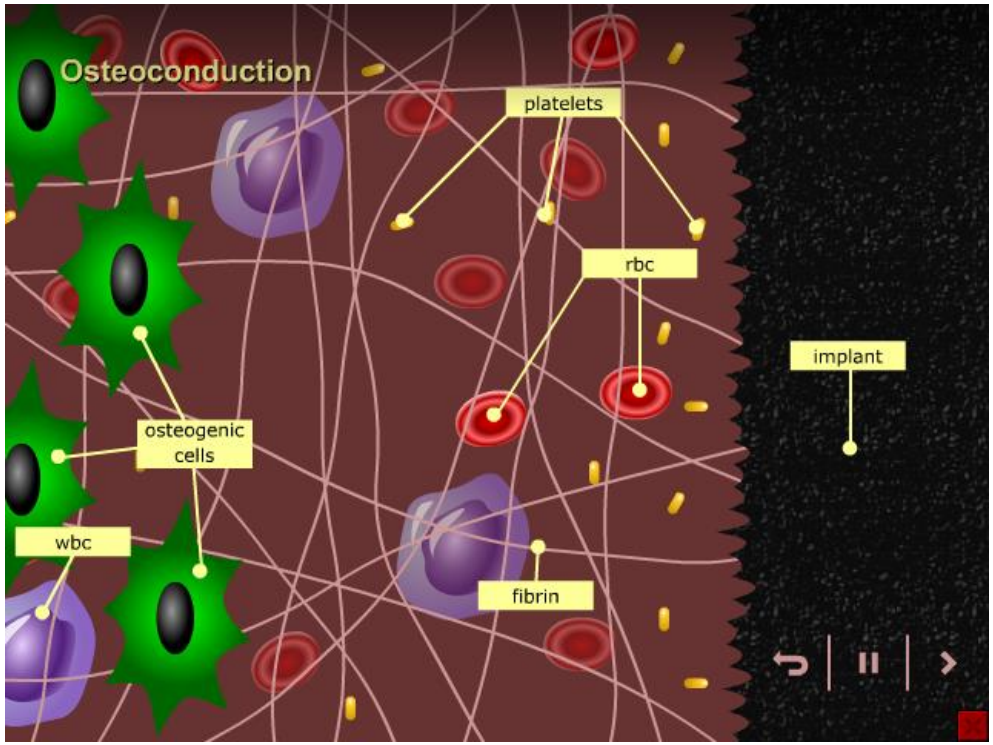
Example of osseointegration in commonly available Ti implants.

Black – Ti Implant
Red/pink - Bone

Osteoconduction

The recruitment and migration of osteogenic cells to the implant surface

Surface chemistry and hydrophilicity plays a crucial role in cell signaling and cell/protein attachment to the implant surface



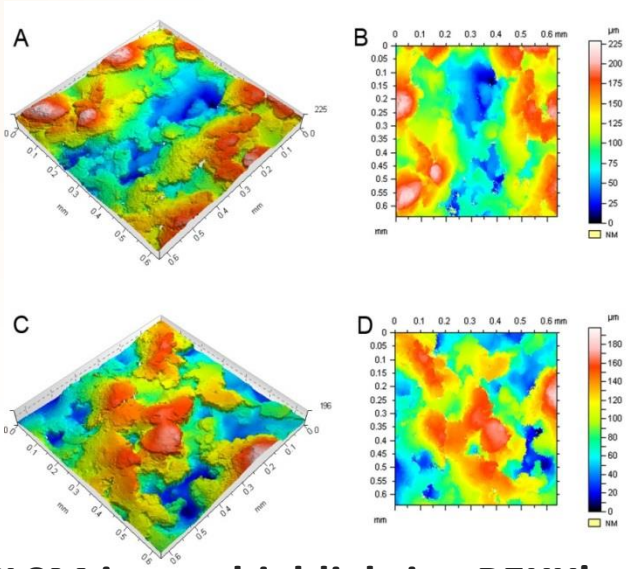
www.ecf.utoronto.ca/~bonehead/flash/osteoconduction.htm

De Novo Bone Formation

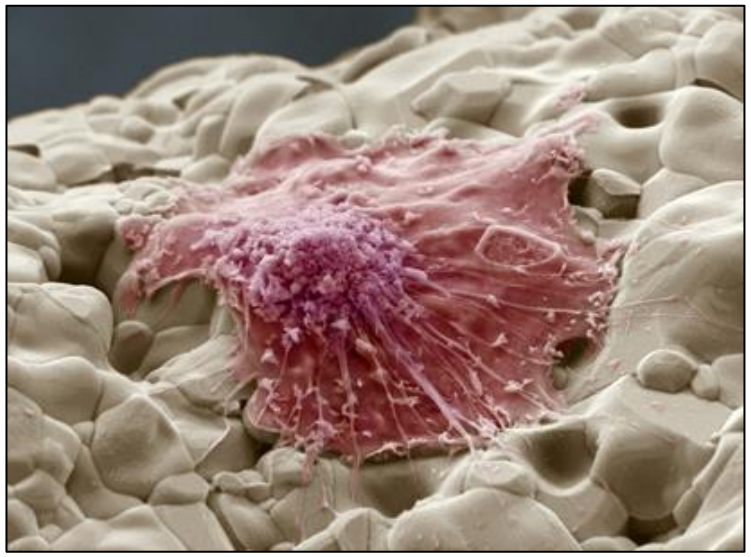
Osteoblast cells attach to the implant surface and begin forming new bone

Implant surface topography will determine if the newly formed bone is bonded to the surface

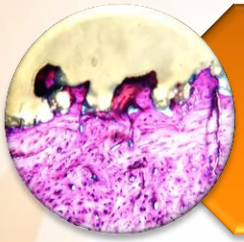
www.branemark.se/Osseointegration.html



CLSM image highlighting PEKK's natural peak/pit topography



www.pathologyoutlines.com/topic/bonemarrowosteoblats



In vivo study : preliminary tissue response – PEKK vs. PEEK, 8 and 12 weeks

Comparison to most broadly used polymer - PEEK

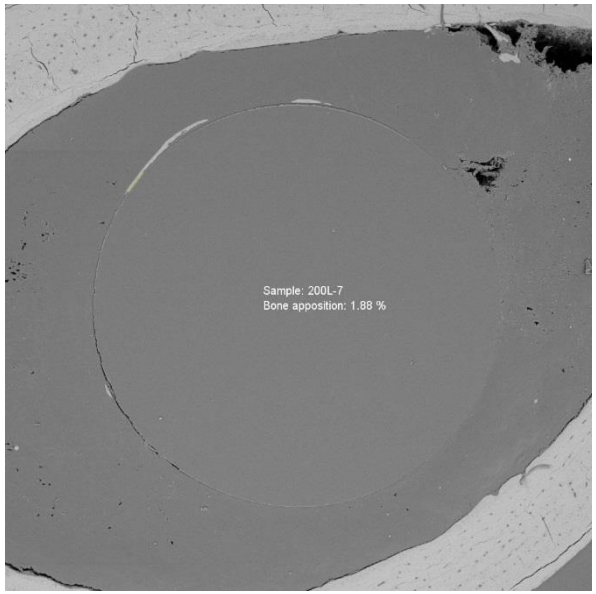
- 94 NZW rabbits, bilateral femoral rod implantation
- PEKK rods
  - OXPEKK® (extruded)
  - OsteoFab®
- Extruded PEEK rods
- Differing surface topographies (smooth, grit-blasted, laser-sintered, combinations)
- 8 and 12 week BSEM imaging, micro-CT imaging, histology

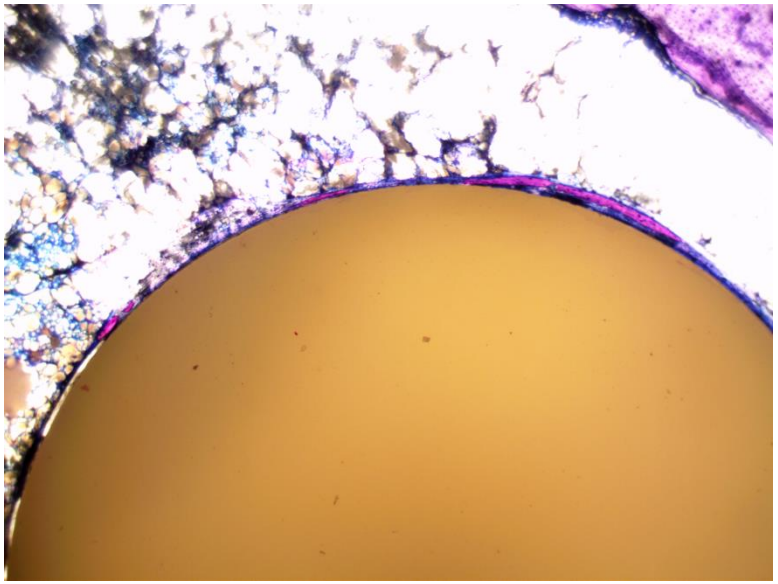
Machined PEEK Implants (Smooth)

BSEM

Histology

12 weeks





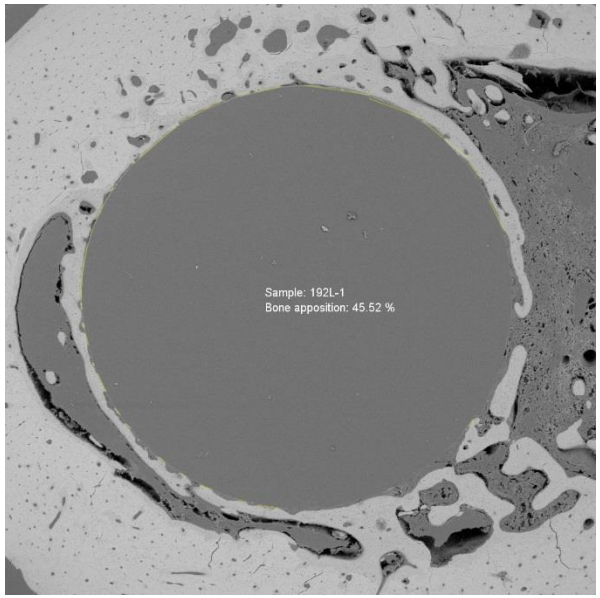
Images courtesy of OPM. Preliminary data from an OPM animal study.

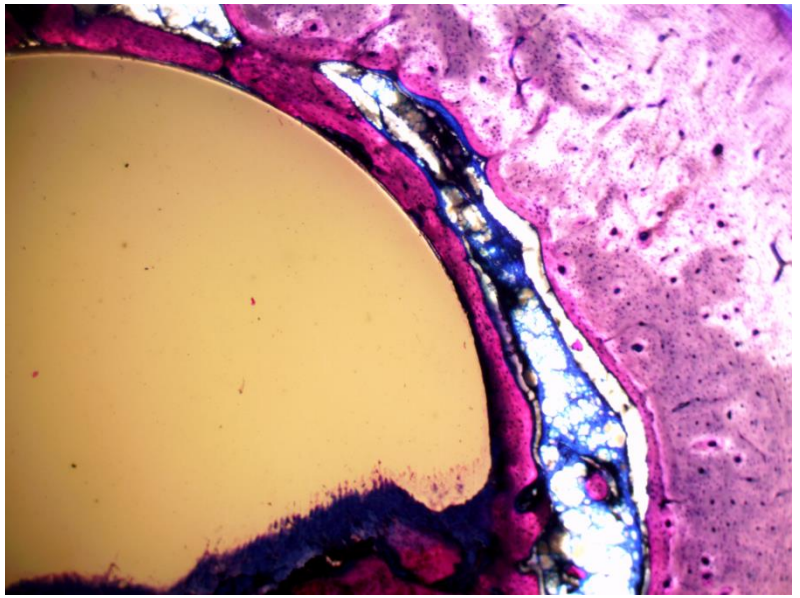
Machined OXPEKK® Implants (Smooth)

BSEM

Histology

12 weeks





Images courtesy of OPM. Preliminary data from an OPM animal study.

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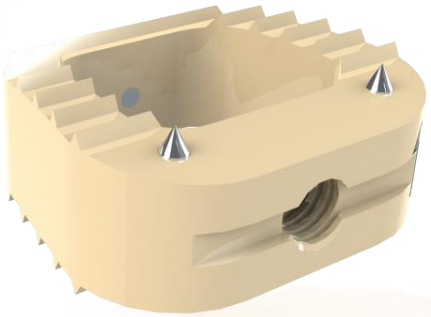
SQUALE™

Anterior Cervical Cage

Instrumentation set



Version EN-003

Instrumentation for SQUALE

Implant-holder
A-IMS-0001-02

Impactor Implant holder
A-IMS-0001

Shape distractor
SQA-FA-1404 ➡ *2007*

Impactor for shape distractor
SQA-IM

Optional Instruments

Caspar distractor double mobility

A-DCM-0001

Distractor pins double mobility

A-VCM-0012

A-VCM-0014

A-VCM-0016

Screwdriver caspar double mobility

A-TCM-0001

Instrumentation for SQUALE

SQUALE BOX

SQA-2-BO

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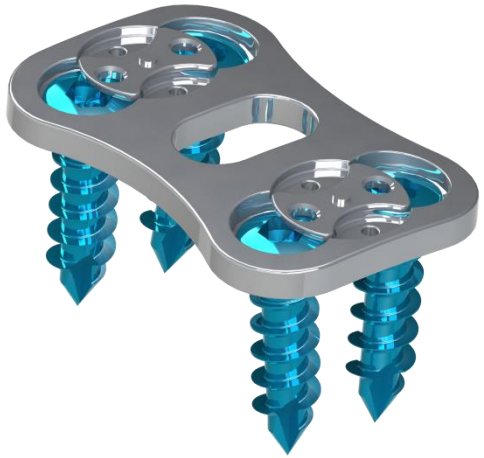
ORIGIN™

Anterior Cervical Plate

Instrumentation set



Version EN-003

ORIGIN instruments

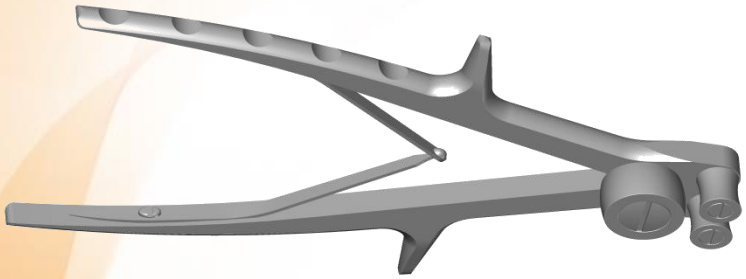


Plate Bender *A-CPL-0001*

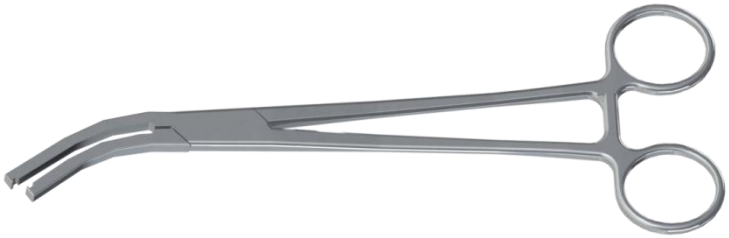
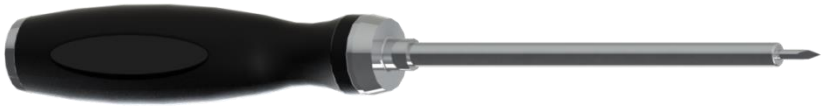


Plate Holder Clamp *A-PPL-0001*

Screwdriver
A-TPC-0002

Spring support for Origin screwdriver
A-TPC-0002

Locking screwdriver *A-TPC-0001*



Circular Awl *A-SQA-0025*

Optional instruments

Caspar Distractor Double Mobility

A-DCM-0001

Distractor Pins Double Mobility

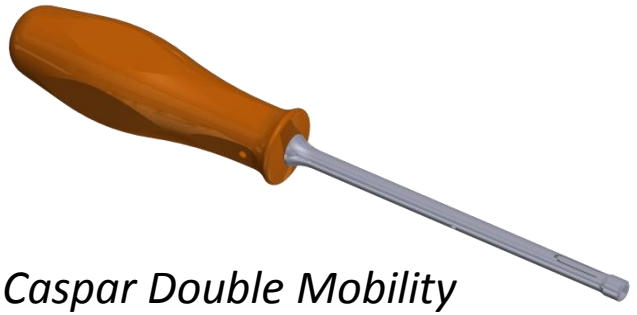
A-VCM-0012

A-VCM-0014

A-VCM-0016

Single Drilling Guide

A-GPS-0001



Screwdriver Caspar Double Mobility

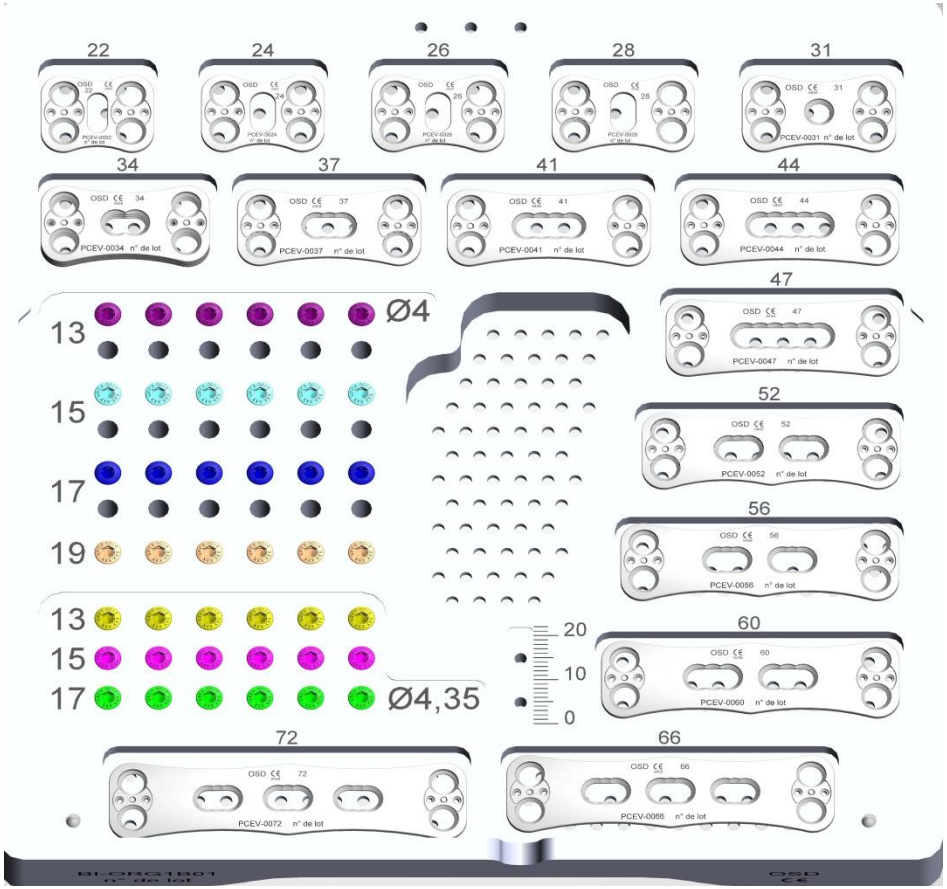
A-TCM-0001

Instruments box

Origin instrument box

ORG-BO

Implants box



Origin implant box

BI-ORG1B01

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SWINGO™

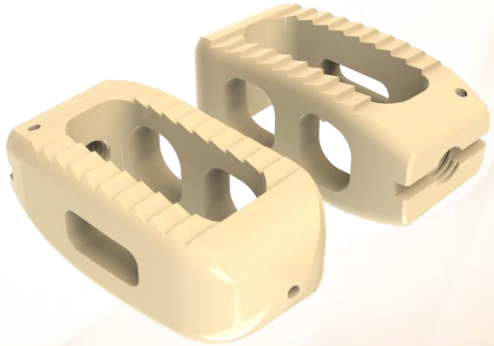
Instrumentation set

Swingo™-T

TLIF Cage

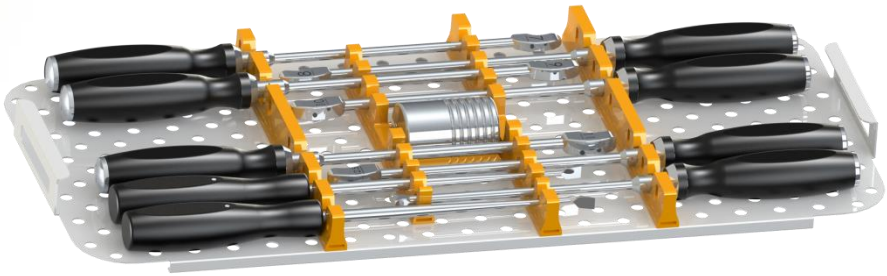
Swingo™-P

PLIF cage



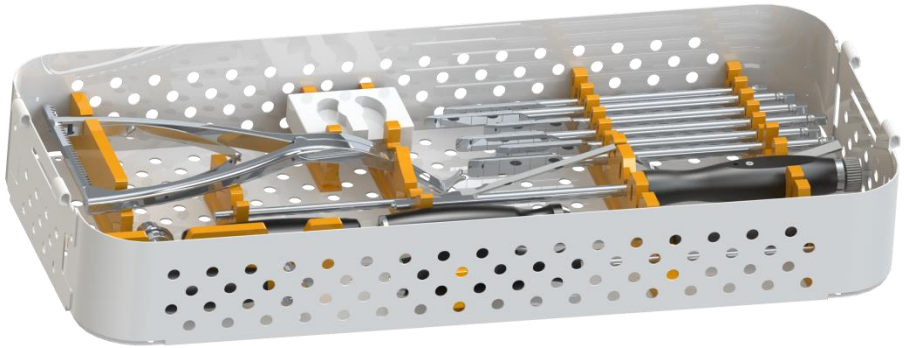
Same Instrumentation set For both SWINGOs

- Only one box for TLIF & PLIF
- Two impactors to reduce operating time



SWINGO-T insert

BO-SWCOM-2



Common SWINGO Box

BO-SWCOM-1

Same Instrumentation set For both SWINGOs

Ring Curette
A-CUR-0002

Curette
A-CUR-0003

Impactor
A-PIM-0002

Distractor reamer
A-DAL-0007 → A-DAL-0012

Silicon Handle
T23 1/4
A-HTP-0002

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Same Instrumentation set For both SWINGOs

Bone Impactor

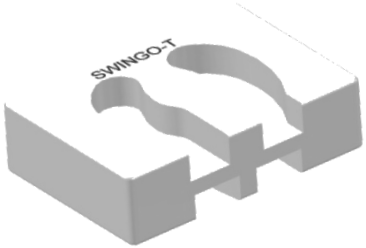
A-TGR-0001

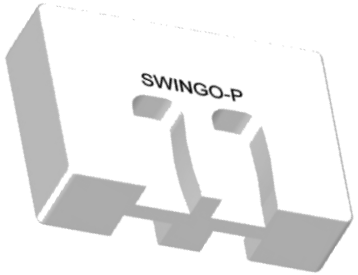
Interlaminar pliers

A-PIL-0002

Nerve Roots Retractor

A-ECR-0002





Filling graft support

A-SUC-0004

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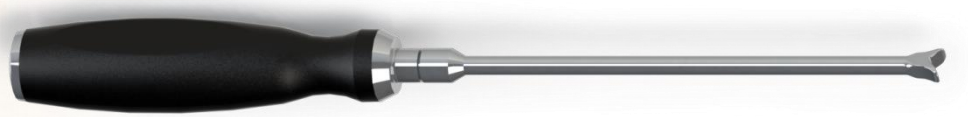
Instrument for PLIF only

Push cage for PLIF

A-POU-0001

Additional instruments for TLIF

Extraction mass
A-MAS-8460
(optional for PLIF technique)



Push cage for TLIF *A-POU-6001*

Straight bone chisel *A-COD-0001*
(optional for PLIF technique)

Curved bone chisel *A-COC-0001*
(optional for PLIF technique)

Shape distractor
SWI-FA-07 → SWI-FA-12.5

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Optional instruments

Extraction mass with handle

A-MAS-8430

Distractor

A-DPE-1005 → A-DPE-1014

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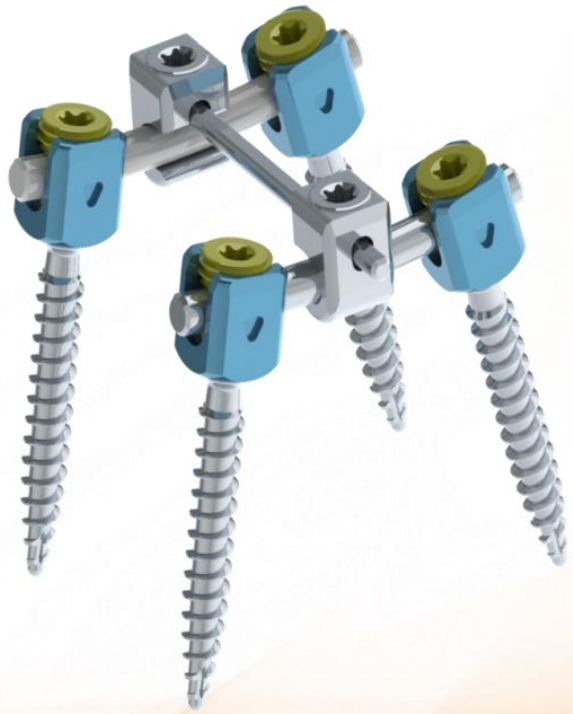
SAXXO™

Spine Fixation System

Instrumentation Set

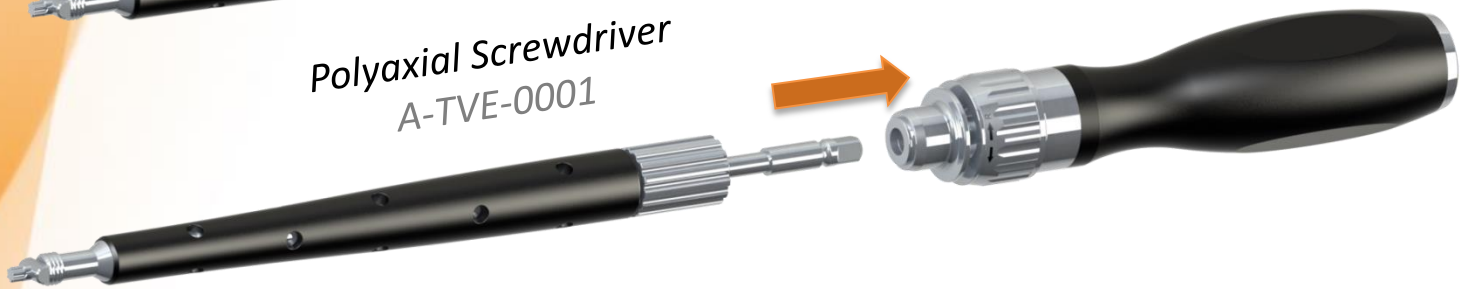


Version EN-006

Instrumentation for SAXXO

Ratchet Silicon Handle
T 23 ¼"
A-HTR-0002

Polyaxial Screwdriver
A-TVE-0001



Cannulated Ratchet
Silicon Handle
D28 ¼"
A-HSR-0003

Instrumentation for SAXXO

Nut Holder *A-PBO-0010*

Torx Driver *A-TTM-0001*

Counter Torque
A-ATQ-007

Dynamometric Silicon Handle T 23 ¼" *A-HTD-0001*

Torx Screwdriver ¼"
A-TTP-0001

Instrumentation for SAXXO

Square awl lg 12,5 *A-SQA-0006*

Circular awl lg 25 *A-SQA-0003*

Square awl lg 25 *A-SQA-0004*

Square awl lg 40 *A-SQA-0005*

1 instrument per instrumentation set

Instrumentation for SAXXO

Lumbar Probe Straight *A-LPR-0001*

Thoracic Probe Curved *A-TPR-0001*

French Bender *A-BND-0001*

Straight Sounder
A-SDN-0001

Tracking Probe
A-SDC-1702

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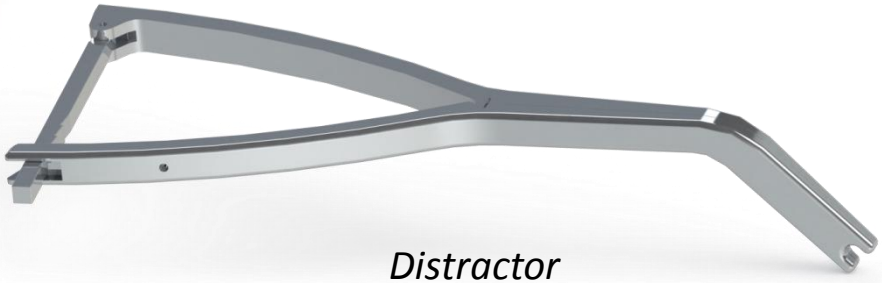
Instrumentation for SAXXO

Compressor
A-COM-0001

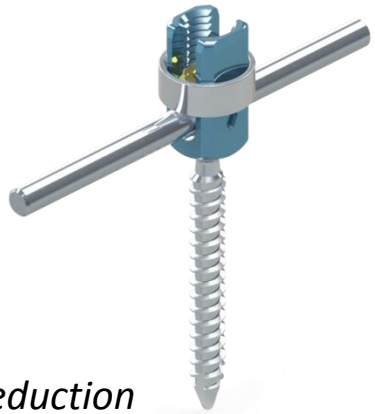


Distractor
A-DIS-0001

Persuader
A-PER-0010

Instrumentation for SAXXO

Rod-pusher A-POT-0001



Holding ring for reduction screw
A-BMV-0001

Rocker A-RCK-0001

Rod Clamp A-RCL-0005

Optional Instruments

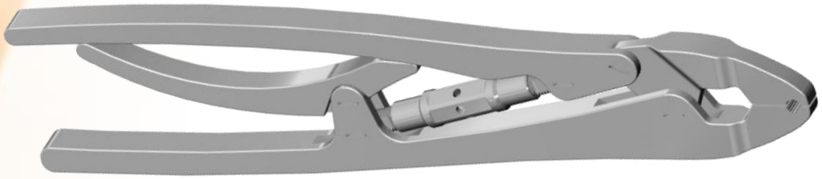
Threaded awl *A-THA-0001*

Head adjuster *A-AJT-0001*

Monoaxial screw screwdriver *A-TVE-0003*

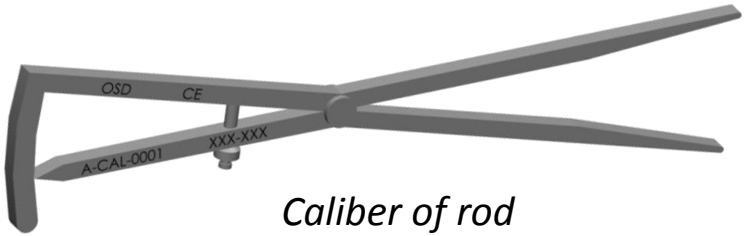
Optional Instruments

Hexagonal screwdriver *A-TCL-0001*



Rod gripper *A-RGP-0002*

Tap screw Ø 5 ou 6 mm
A-TAP-0050
A-TAP-0060

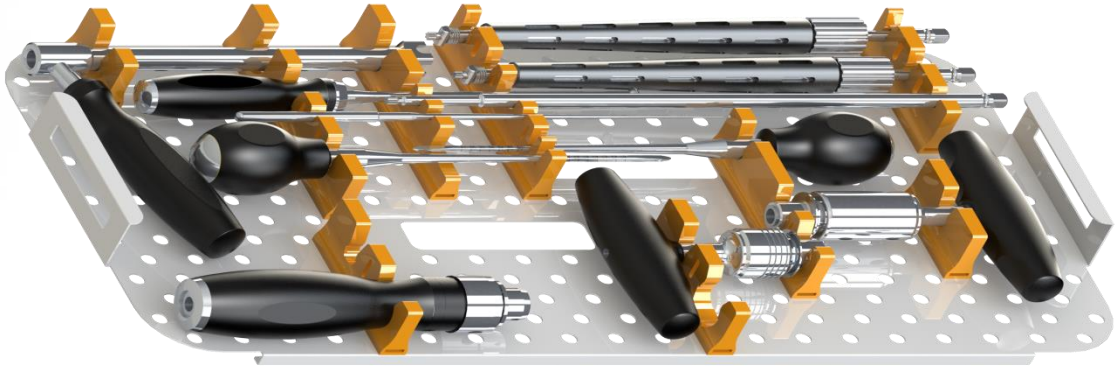


Caliber of rod
A-CAL-0001

Parallel compressor
067002-5

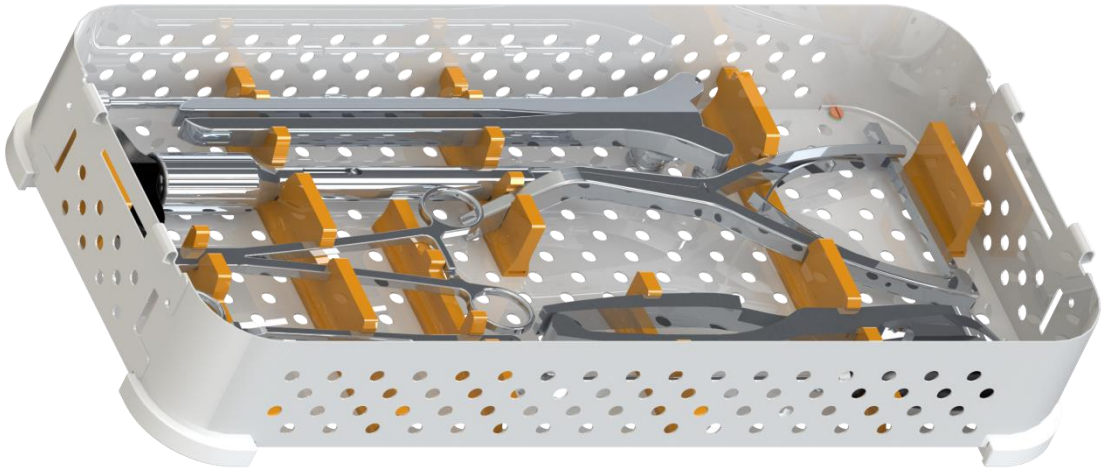
Cutter Rod
7-450

Instrument Box



Upper tray SAXXO

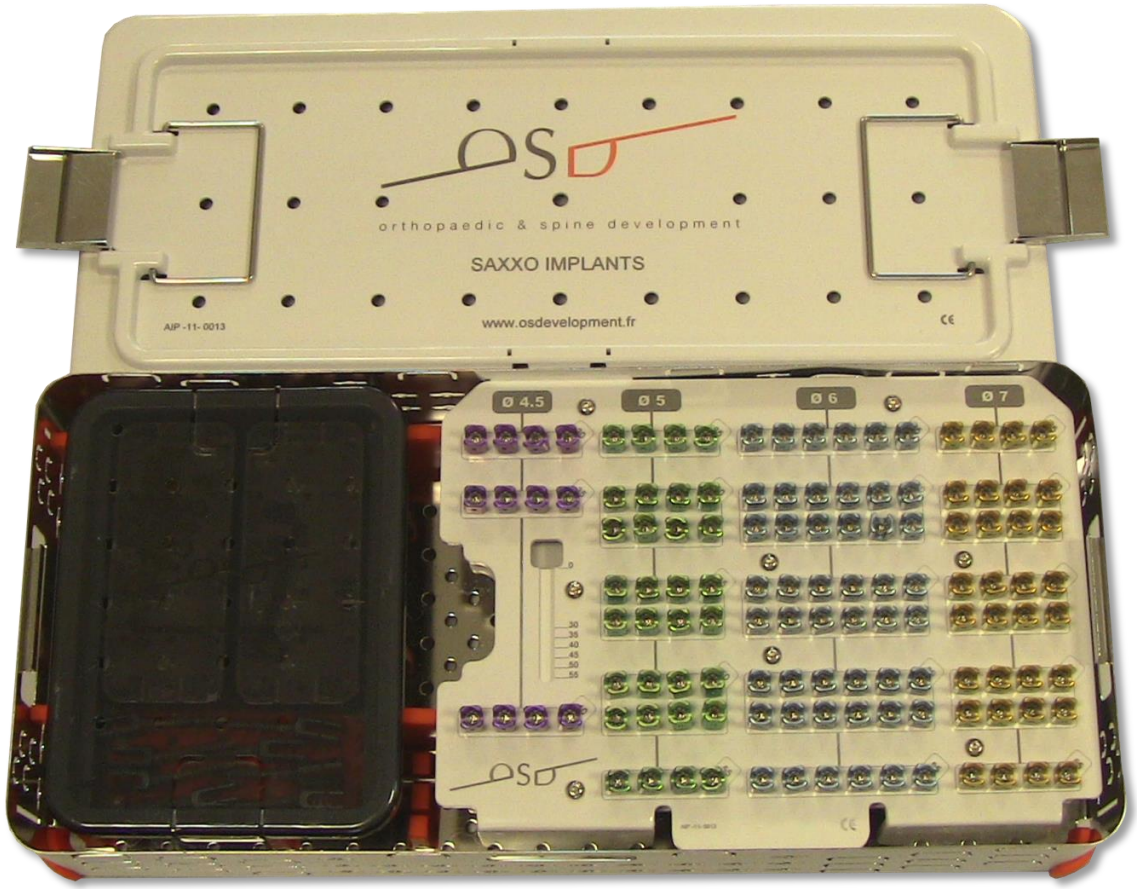
INS-SAX



Instrument box SAXXO

BO-SAX

Implant box



Implants box SAXXO

SAX-BO-2

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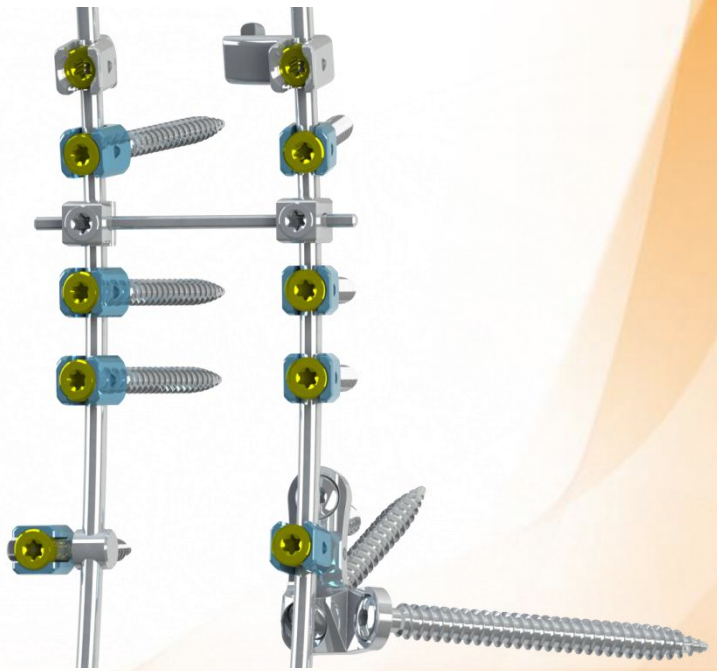
SAXXO Deformities™

Fixation System for spinal deformities

Instrumentation set



Version EN-001

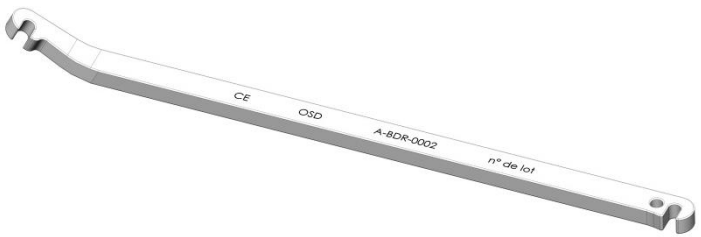
Instrumentation for SAXXO deformities

Left Coronal Rod Bender

A-BCL-0001

Right Straight Rod Bender

A-BCR-0001



Right Sagittal Rod Bender

A-BDR-0002

Left Sagittal Rod Bender

A-BDL-0002

Instrumentation for SAXXO deformities

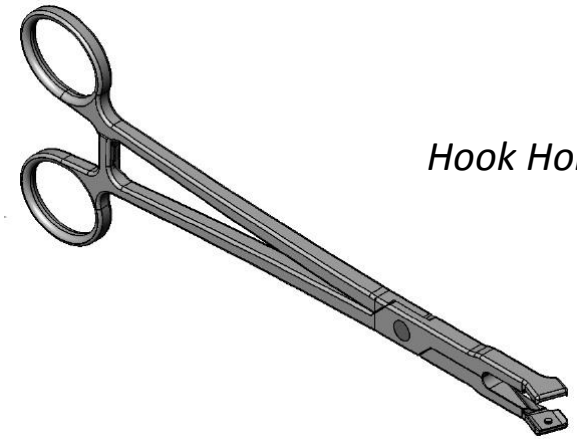
Hook Holder
A-PCR-0001

Hook Pusher
A-POC-0001

Hexagonal Screwdriver *A-TCL-0001*

Instrumentation for SAXXO deformities

Rod Gripper *A-RGP-0001*



Hook Holder Pliers *A-PPC-0001*