

**COST MADE LOWER...
SURGERY MADE EASIER...
RECOVERY MADE QUICKER...**



SurgiNovi

Rapid Reproducible Results





PATIENT SPECIFIC TEMPLATES



CUSTOM-MADE IMPLANTS



JOINT REPLACEMENT MODELLING



SurgiNovi

3D PRINTING TECHNOLOGY



PREOPERATIVE PLANNING SOFTWARE



ABOUT US

SurgiNovi is a highly talented group of multi-national orthopaedic surgeons, scientists, engineers, researchers and software specialists, who have joined together to provide a solution to the main obstacle in the provision of total joint replacement operations worldwide.

This inhibiting factor is the customary requirement for each hospital to invest in large numbers of expensive, capital equipment in the form of highly specialised surgical instruments and trials (often amounting to hundreds of items for just one procedure) along with the extra cost of their mandatory sterilisation which can be prohibitive, if not impossible, in some parts of the world which lack the infrastructure to do this.

An added complication is that every joint replacement manufacturer supplies sets of instruments which can only be used with their own design of implants thereby reducing the operating surgeon's learning curve which inevitably adds extra minutes to the length of the operation due to the lack of standardisation between instrument sets.

ABOUT US

This can have the effect of increasing both operating room costs and the duration of hospital stays which reduces the overall number of procedures a hospital can perform.

We are exploiting and developing the novel concept of hospital-based PSI, where all processes are done under one roof. CT-Scan, design, planning, 3D printing, and sterilizing.

In 2018, **SurgiNovi** received ISO 13485:2016. We apply the QA and QC for all steps in the design and manufacturing processes.

Although our custom-made products are exempted from the CE mark, we working towards certification by the end of 2021 in order to follow international standards.

All of our manufacturing material passed the biological, mechanical, and performance tests according to the relevant ASTM and ISO standards.

WHY USE CUSTOMISED SURGICAL CUTTING GUIDES?

SURGERY MADE EASIER

Another major advantage of **SurgiNovi's** patient specific templates is the elimination of the need to penetrate the femoral medullary canal. This reduces blood loss and decreases the potential risk of infection and fat embolisms.

COST MADE LOWER

SurgiNovi has helped surgeons worldwide to significantly reduce their operating learning curve when performing joint replacements and other major orthopaedic procedures.

RECOVERY MADE QUICKER

Our minimally invasive techniques reduce bleeding, operating time, and the risk of fat embolisms. Patients can also benefit from time-saving simultaneous bilateral joint replacements.

NEW HEALTHCARE OPPORTUNITIES

SurgiNovi's PST has provided less fortunate patients with new opportunities to get their orthopaedic treatments who cannot otherwise undergo surgery using conventional techniques.

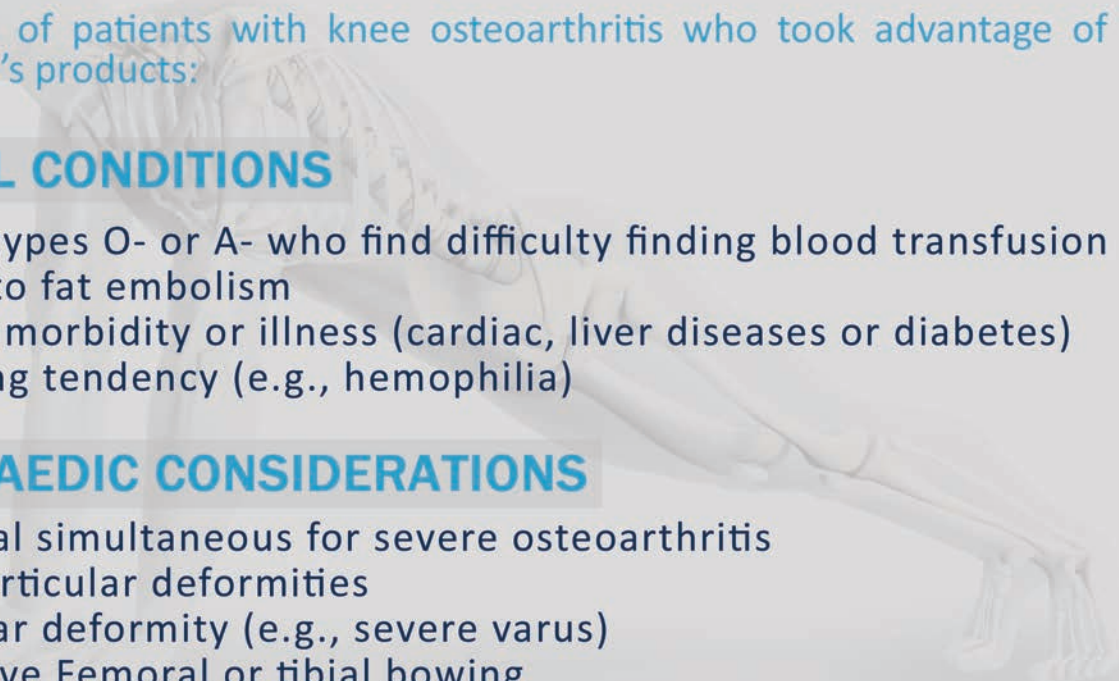
Examples of patients with knee osteoarthritis who took advantage of SurgiNovi's products:

GENERAL CONDITIONS

- Blood types O- or A- who find difficulty finding blood transfusion
- Prone to fat embolism
- Severe morbidity or illness (cardiac, liver diseases or diabetes)
- Bleeding tendency (e.g., hemophilia)

ORTHOPAEDIC CONSIDERATIONS

- Bilateral simultaneous for severe osteoarthritis
- Extra-articular deformities
- Articular deformity (e.g., severe varus)
- Excessive Femoral or tibial bowing
- Instability
- Retained metal (e.g., old plate, IMN)



SURGEON'S TRAINING:

In order to achieve such high precision with least risk, it is highly recommended for each orthopaedic surgeon to take proper training on the surgical technique prior to doing real surgeries on patients.

SAFETY NOTE:

The major advantage of **SurgiNovi's** patient specific templates is the elimination of violating the medullary canal with subsequent risks of blood loss, infection and fat embolism.

ACCURACY:

SurgiNovi's custom-made surgical guides have proven accuracy results in alignment, rotation and sizing. Surgical planning at **SurgiNovi** is done on weight-bearing imaging and relies on mechanical axis alignment which is the gold standard in knee surgery. Planning is based on anatomical landmarks from the patient's CT scans.

VALUE-BASED PRODUCTS AND SERVICES:

SurgiNovi offers many other services to orthopaedic surgeons as a preoperative planning of joint replacement surgeries and 3D alignment assessment of lower limb. **SurgiNovi** assigns a planning team for each individual surgeon to reach true understanding of each surgeon's technique and preferences.

CUSTOM MADE IMPLANTS

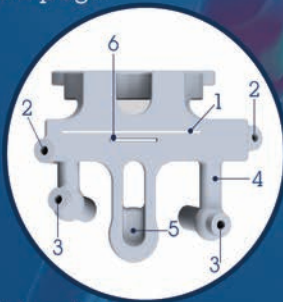


SurgiNovi can help you design custom made orthopaedic implants for any skeletal deformity, disease, fracture or filling missing tissue. We have a unique design for a patient specific hip spacer fit to the femoral canal and aided by a side and internal slots allow the surgeons to insert antibiotic through these semicircular shapes of the slots.

TKR 15-in-1 PST Femur Cutting

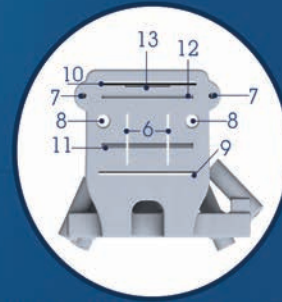


With **15-in-1 PST** a surgeon can easily perform all the femoral cuts applied in TKR in a straight forward way. These cuts include distal cut, posterior cut, anterior cut, posterior and anterior chamfers, notch cut and box cut. The template also includes positioning and drilling of femur implant pegs.



- 1- Distal cut slot
- 2- Fixation holes placed on epicondyles
- 3- Fixation holes placed on condyles
- 4- Extended legs securing matching
- 5- Femur trochlear positioning leg
- 6- Box cut slot

*in addition to 2 pin locators.

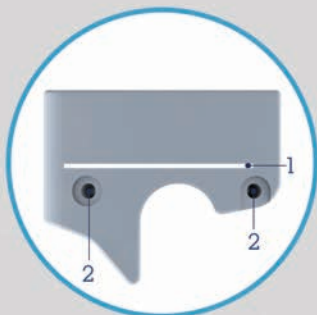


- 7- Extra fixation holes securing rigidity
- 8- Lug holes
- 9- Anterior cut slot
- 10- Posterior cut slot
- 11- Anterior chamfer cut slot
- 12- Posterior chamfer cut slot
- 13- Notch cut slot

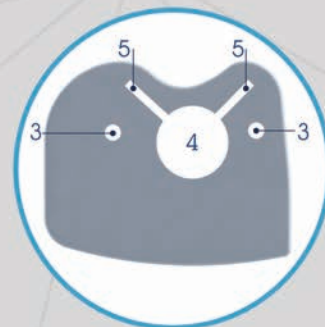
TKR SurgiTotal PST Tibial Cutting



SurgiTotal Tibial PST can help to perform the tibial cut according to a pre-planned positioning of prosthesis to tibia bone. In addition, the Tibial PST unique features allow surgeons to determine stem hole location and carry out keel cuts according to prosthesis design

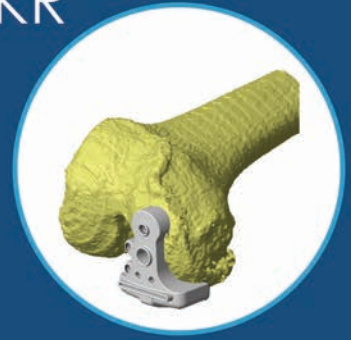


- 1- Tibial cut slot
- 2- Fixation holes with oblique direction to tibia bone



- 3- Extra fixation with parallel holes
- 4- Stem hole
- 5- Keel making slots

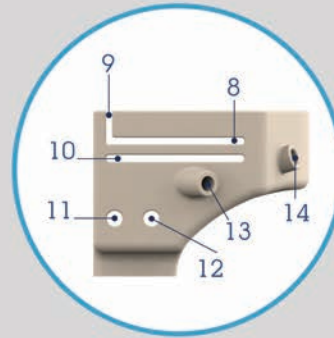
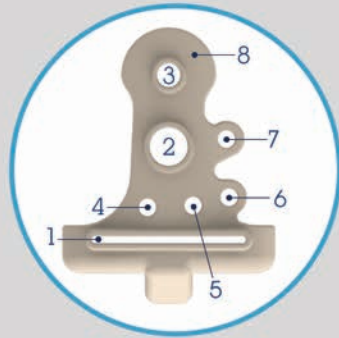
Unicompartmental TKR (Mobile Bearing)



Femoral Partial Knee Replacement PST (**PKR-PST**) guides surgeons in performing complete resection process including posterior cut and drilling the holes of the other two pegs. The **Femoral PKR-PST** also provides an opportunity for the surgeon to select the best and most comfortable way to fix the template using multiple fixation holes.

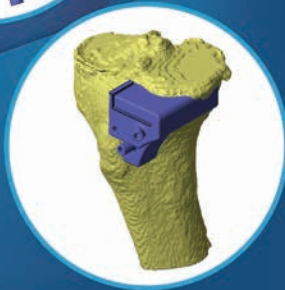
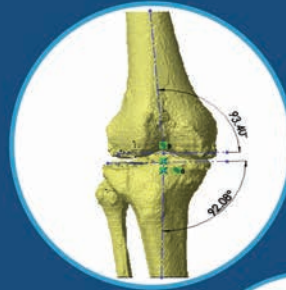
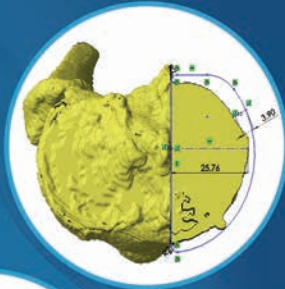


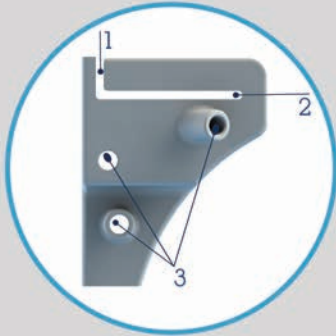
Tibial PKR-PST has a creative and unique design for the cutting plane with double slits which allows the surgeon to make extra bone removal if needed.



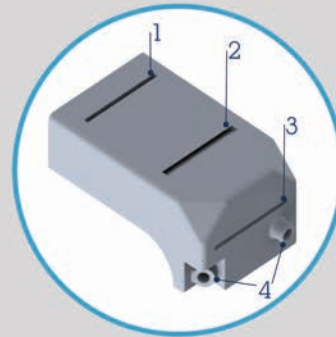
- 1- Posterior cut slot
- 2- The large hole with 6.35 mm diameter
- 3- The small hole with 4 mm diameter
- 4- Fixation hole with 2.5 mm diameter
- 5- Fixation hole with 2.5 mm diameter
- 6- Fixation hole with 2.5 mm diameter
- 7- Fixation hole with 2.5 mm diameter
- 8- Tibial cut slot
- 9- Tibial vertical cut slot
- 10- Extra tibial cut slot
- 11- Fixation hole with parallel direction and 2.5 mm diameter
- 12- Fixation hole with parallel direction and 2.5 mm diameter
- 13- Fixation hole with oblique direction
- 14- Fixation hole with oblique direction

Unicompartmental TKR (Fixed Bearing)

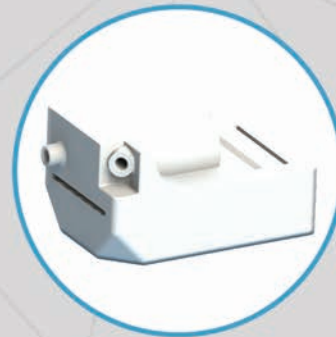




- 1- Vertical Cut
- 2- Tibial Cut
- 3- Fixation Holes



- 1- Posterior Cut
- 2- Chamfer Cut
- 3- Distal Cut
- 4- Fixation Holes

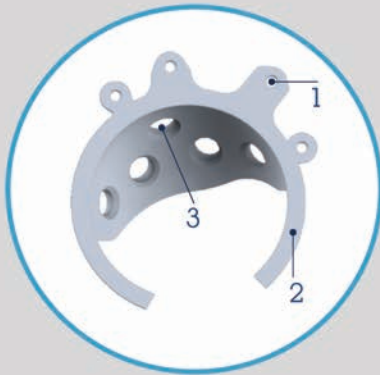


PST for HIP REPLACEMENT

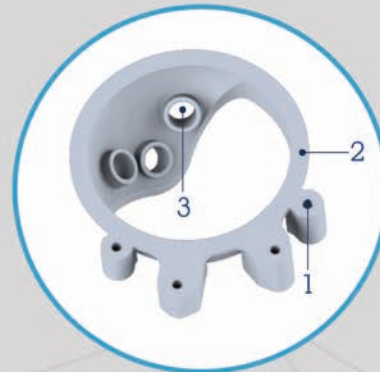


SurgiHip PST consists of two parts covering all screws of the cup. The two parts are for the pubis and ischium and they are aided by arms for matching and positioning PST over the bone. PST is designed to guide the surgeon for the trajectories of the screws and the best bone quality over the acetabulum.

SurgiHip PST is available for both primary and revision hip replacements.



SurgiHip - Ischium



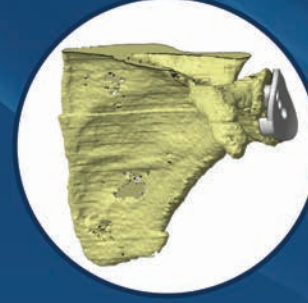
SurgiHip - Pubis

- 1-** Fixation hole placed on ischium and/or pubis
- 2-** Arms for matching with bone surface
- 3-** Trajectories guide holes with 4.5 mm diameter

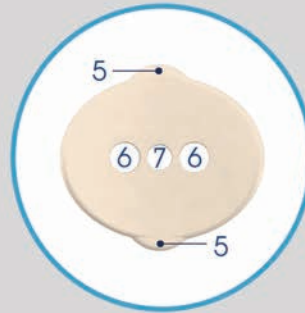
SHOULDER PST



Humeral PST, is the first humeral custom-made guide that depends on matching with the bone surface after removing of osteophytes. Three fixation holes with 2.5 mm diameter are used to ensure fixation and positioning of PST on bone. The creative design of PST ensures its easy positioning on the humeral head by using a hooked arm on the top.

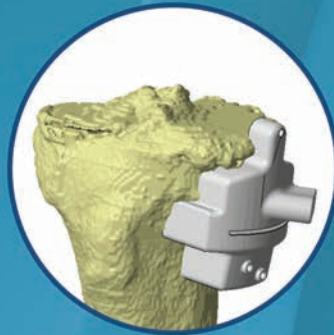


Glenoid PST is placed on a glenoid bone to direct surgeons to areas of maximum bone thickness to drill peg or peek holes aided by three drilling guides designed for commercially used glenoid implants.

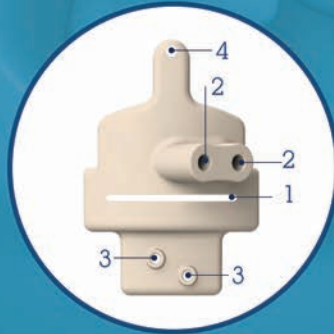


- 1- Humeral cut surface
- 2- Humeral head surface matching arm
- 3- Fixation hole in parallel direction
- 4- Fixation holes with oblique directions
- 5- Glenoid surface matching wings
- 6- Keel or peg preforming holes
- 7- Central hole

OSTEOTOMY PST

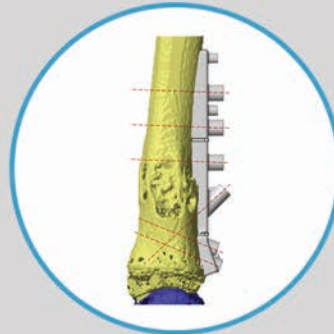


SurgiOst PST provides a single cut to perform deformity correction (varus and valgus) with comfort fixation. Five holes are used for positioning of PSI on the bone surface: four holes for secure fixation and a fifth hole to detect tibial plateau level.

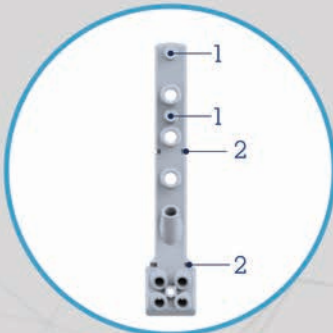


- 1- Osteotomy cut slot
- 2- Fixation holes with oblique direction
- 3- Fixation holes in parallel direction
- 4- Tibia plateau detection hole

Benign Tumors and Fracture Fixation



SurgiNovi provides a personalized plate guide PST that is designed to achieve any local control of benign tumors or multiple fractures. For benign tumors, the guide is characterized by four fixation holes and two grooves located at both sides to detect the boundary of tumor and help the surgeon to make the correct resection levels. For multiple fractures, the grooves help to determine the original location of the fractured bone and assist in fracture fixation by selecting and placing the fixation screws and plates.



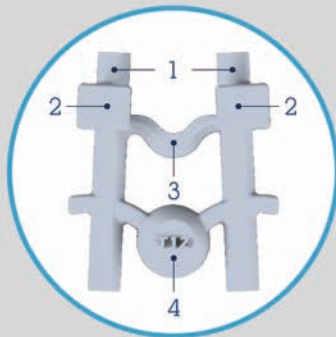
- 1- Fixation holes with 3 mm diameter
- 2- Upper and lower boundaries of tumor

SPINE PST: PEDICLE SCREW FIXATION

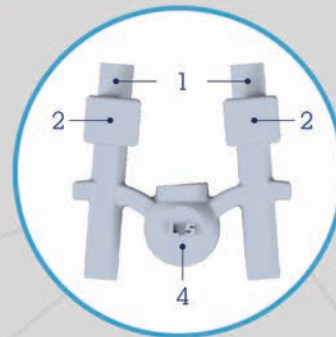


SurgiSpond PST is a pedicle screw pair fixation guide used for Spondylosis correction. Consisting of 4 parts for the lumbar and sacral, it provides a secure guide for pedicle screws trajectories inside the vertebrae. **SurgiSpond PST** relies on the spinous process, transvers process and the articular surface. The surgeon is given a choice to select the number of PSTs needed in surgery depending

SurgiScol Spine PST is a pedicle screw pair fixation guide used for Scoliosis correction that consists of a set of 12 parts (T1 to T12). The 12 parts are provided for the thoracic with a unique shape characterized by two transversal ribs to secure the relay of the PST guide over the spinous process, the transvers process and the articular surface.



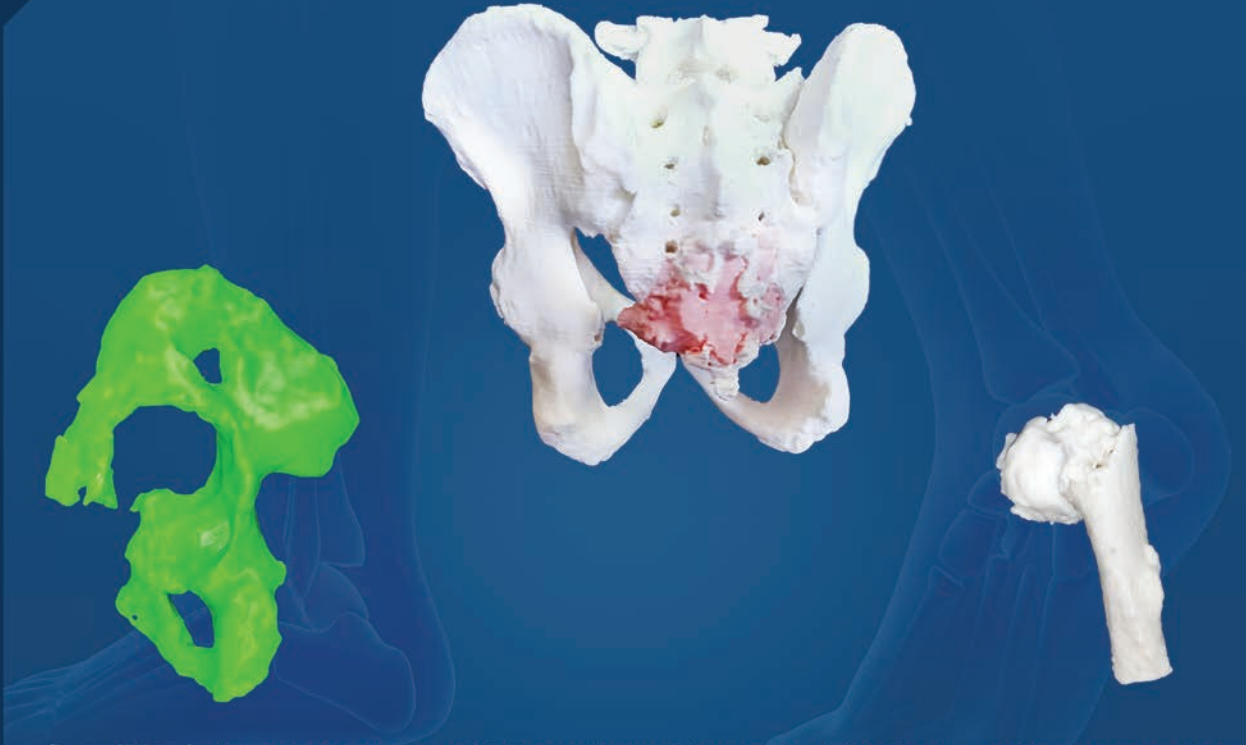
SurgiScol PST



SurgiSpond PST

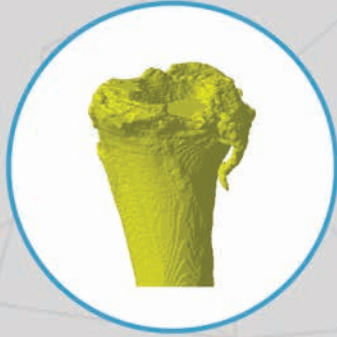
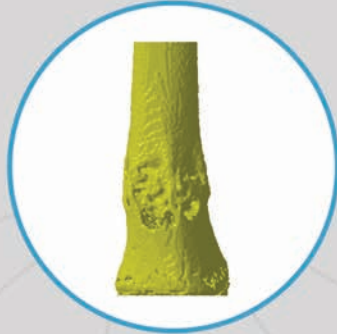
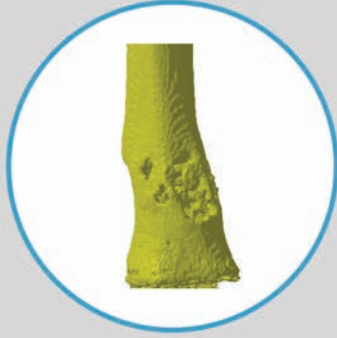
- 1- Pedicle screw guide with 3 mm diameter
- 2- Transverse process positioning probe
- 3- Articular surface positioning rib
- 4- Spinous process positioning head

3D PRINTING BONE MODELS



SurgiNovi offers the service of 3D printing of bone models. Orthopedic surgeons/researchers and biomedical engineers can view bone deformity, irregularity or any inaccuracy for medical and research purposes. Medical scholars, students and educators can also use 3D-printed bone models for educational purposes.

3D PRINTING BONE MODELS



Awards:

1. Entrepreneur UK Alumni Award, British Council 2018.
2. Semi-finalist Business Plan Competition for PSI Innovation, Orthopaedic Research Society (ORS), USA, 2018.
3. IFIA Laurel of 4th World Cup of Computer Implemented Inventions, International Federation of Inventors Association, Hungary 2014 & 2016.
4. Gold Medal at Geneva Inventions 2014.
5. Hap Paul award, International Society for Technology in Arthroplasty, USA 2010.

Publications:

1. Computer-assisted total knee arthroplasty using patient-specific templating. *Clinical Orthopaedic and Related Research*. 2006; 444:184–92.
2. Custom made cutting guides for TKA. In *Surgery of the Knee (5th Ed.)*, Insall JN, Scott N (Eds). Churchill Livingstone. 2012; 1240–1254.
3. Hospital-based Patient-specific Templates for Total Knee Arthroplasty: A Proof of Concept Clinical Study. *Techniques in Orthopaedics*. 2017.
4. Computer Assisted Orthopaedic Surgery for Hip and Knee. *Current State of the Art in Clinical Application and Basic Research*. 2018; Pages 41–51.
5. Postoperative Mechanical Axis Alignment and Components Position after Conventional and Patient-Specific Total Knee Arthroplasty. *Scientific Research*. 2016; 6(8): 253–258.
6. Patient-specific template shortens the operative time in total knee arthroplasty in comparison to the conventional technique. *Current Orthopaedic Practice*. 2016; 27(2):187–191.
7. Computerized tomography based “patient specific blocks” improve postoperative mechanical alignment in primary total knee arthroplasty. *World J Orthop*. 2016; 7(7): 426–433.
8. Patient-specific instruments: advantages and pitfalls. *SICOT J*. 2017; 3: 66.
9. Finite Element Analysis of Mobile-bearing Unicompartmental Knee Arthroplasty: The Influence of Tibial Component Coronal Alignment. *Chin Med J (Engl)*. 2015; 128(21): 2873–2878.
10. The impact of patient-specific instrumentation on unicompartmental knee arthroplasty: a prospective randomised controlled study. *Knee Surg Sports Traumatol Arthrosc*. 2018; 26(6): 1662–1670.
11. 3D-printing techniques in a medical setting: a systematic literature review. *Biomed Eng Online*. 2016; 15: 115.
12. Surgical Guides (Patient-Specific Instruments) for Pediatric Tibial Bone Sarcoma Resection and Allograft Reconstruction. *Sarcoma*. 2013; 2013: 787653.


Patents:

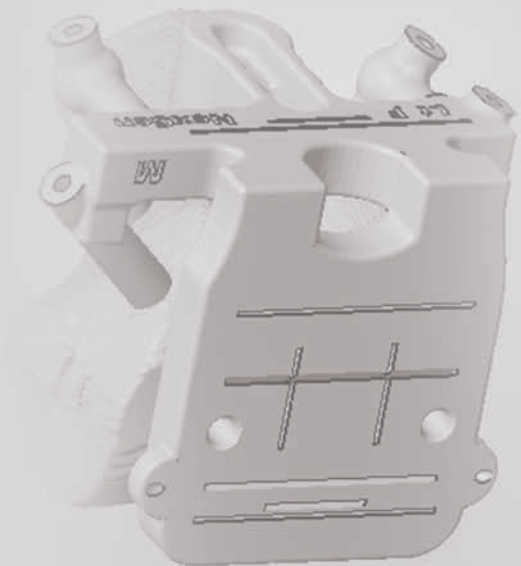
- 1 - Patient specific instruments and related methods for joint replacement
(US Patent Application No. 61/641.851)
- 2 - A Device and A Technique of PSI for TKA with A Universal and an Open Platform
(International Patent Application No. PCT/EG2013/000014)
- 3 - 15-in-1 Femoral Cutting Block and Guide for Knee Replacement
(Egyptian Patent Application No. 1906/2016)
- 4 - A tool for custom made instruments and implants for artificial knee joint of dog
(International Patent Application No. PCT/EG2015/000004)
- 5 - A method for connected custom made guides to conventional instruments for joint replacement
(International Patent Application No. PCT/EG2015/000013)
- 6 - An Apparatus and system for acquiring data from bone and joints, plan surgery and manufacture instruments and implants (International Patent Application No. PCT/EG2016/000015)
- 7 - A patient specific template and method for partial knee replacement
(International Patent Application No. PCT/EG2017/000030)
- 8 - A Method and Device for patient Specific Instruments for One Stage and Two Stages of Revision Knee Arthroplasty Using Constraint and Hinged Knee Implant
(International Patent Application No. PCT/EG2018/000005)
- 9- A patient-specific electronic template for usage in corrective osteotomies for treating bone and joint deformities (International Patent Application No. PCT/EG2018/000013)

Patents:

- 10 - Patient-specific templates for pedicle screw insertion in corrective scoliosis surgeries
(International Patent Application No. PCT/EG2018/000014)
- 11 - A patient specific spacer (International Patent Application No. PCT/EG2018/000021)
- 12 - Method and patient specific template for fixation of benign tumor fractures
(International Patent Application No. PCT/EG2018/000022)
- 13 - Method and device for patient specific shoulder replacement
(International Patent Application No. PCT/EG2018/000023)
- 14 - 3-in-1 custom made block for ankle replacement
(International Patent Application No. PCT/EG2018/000028)
- 15 - Patient specific guides for acetabulum defects in hip replacement based on bone quality
(International Patent Application No. PCT/EG2018/000029)
- 16 - Custom made guides for knee replacement based on reference cuts and 2D data of knee implants
(Egyptian Patent Application No. 1118/2018)
- 17 - Patient specific surgical guide for percutaneous fixation of fractures
(International Patent Application No. PCT/EG2020/000020)
- 18 - A method and tool for measuring and correcting deformities for osteotomies and fractures
(International Patent Application No. PCT/EG2021/000007)

Granted Patents:

- 1- Device and method for fitting an artificial knee joint using universal electronic templates which can be adapted to all artificial joints
in: USA (no. 10/849636), Canada (no. 2,914,713), Nigeria (no. 7968), Jordan (no. 3690), Iraq (no. 5292), Korea (Allowance)
 - 2- An apparatus and system for acquiring data from bones and joints, plan surgery and manufacturing instruments or implants
in: USA (no. 10/966787), Europe (no. 3,448,237), Lebanon (no. 11172)
 - 3 - A method for connecting custom made guides to conventional instruments of joint replacement
in: Sudan (no. PCT/SD/463), Egypt (Accepted)
 - 4 - An artificial joint for a patient in severe injury, deformity or curvature of the knee joint
in: Egypt (no. 30020)
 - 5 - A Method For Treating And Repairing Knee Fractures Resulting From Benign Tumors Using Patient-Specific Electronic Templates
in: USA (Allowance)
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