Claims

1. A device for preparing a knee joint for a prosthesis in a patient undergoing total knee arthroplasty (TKA) surgery for knee implants , the device consisting of a femoral part and a tibial part , the femoral and tibial part each consisting of:
    a) a plurality of locating probes;
    b) a plurality of slits and a surface for bone cutting;
    c) a guide for adjusting the alignment and the rotation of the implants; and
    d) a plurality of holes for fixation of the devices over the bone surface;

    wherein, the locating probes match bone surfaces and are positioned on cartilage free areas of the bone surfaces; and

    wherein , the device performs reference cuts including a femoral distal cut, a femoral anterior cut and a tibial cut based on two dimensional (2D) implant data.

2. The device according to claim 1, wherein the femoral part of the device has 5 locating probes for positioning over the bone surface, the 5 locating probes consisting of 2 probes in the lateral side, 2 probes in the medial side and the 5th probe in the trochlea area.

3. The device according to claim 1, wherein the tibial part of the device has a hole for the creation of the stem and a slit for the creation of the keel.

4. The device according to claim 1, wherein the alignment includes a coronal and a sagittal orientation of the knee implants based on a mechanical axis of the femur and tibia, in addition to rotation of the femoral and tibial part.

5. The device according to claim 1, wherein the locating probes are cannulated to allow fixation pins to pass through and securely fix the device to the bone; and

    wherein, the orientation and the direction of the slits and surface for bone cutting are modeled to prevent any intersection between fixation pin and the cutting tool.

6. The device according to claim 1, wherein the device is designed in the form of a cutting block, through which the bone cutting is carried out.

7. The device according to claim 2, wherein the device is positioned directly to the bone with no interfaces with conventional tools or guides.

8. A method of planning and completing virtual surgery leading to production of a device for preparing a knee joint for a prosthesis in a patient undergoing total knee arthroplasty (TKA) surgery for knee implants, the method comprising the steps of: sizing of knee implants, alignment, bone cutting and positioning of the knee implants;

   wherein, the method is based on the conversion of the 2D data of the implant to 3D format; and

   wherein, the method is based on dimensions of the implant and angles of all the formal cuts to allow surgeons to make reference cuts for the femur (distal, anterior and rotation), the same is used for a proximal tibial cut and a rotation of a tibial implant and;

   wherein a flexion and extension angles of a distal cut, thickness of a femoral cut, a posterior slop of tibia and a thickness of the tibial cut all are done based on 2D implant data.

9. The method according to claim 8, the method comprising the additional steps of sizing the knee implants, alignment of the knee implants over the bone and rotation of the knee implant.

10. The method according to claim 8, the method comprising image based 3D preoperative planning based on images captured from CT-scan.

11. The method according to claim 8, wherein the method is based on specific information captured from the CT-scan images and the 2D data of the implant including the following information:

    - Evaluation of the anatomy and pathology of the knee joint.

- Identification of landmarks and mechanical axis.
- Flexion and extension angle of the distal cut and Varus/Valgus angles.
- Dimensions of the implant such as femoral cuts angles, lengths of anteroposterior and mediolateral sides of the implant and the thickness of the implant.
- Sizing of implants, alignment, bone cutting and positioning of the implants.

12. The method according to claim 8, wherein an output of the method is an electronic file in a format of STL (Standard Tessellation Language).