SYNOPSYS®

Corin
Patient-Specific Total Hip Replacements

Improving Patient Outcomes with Simulation

Every patient moves differently and a total hip replacement should be optimised to account for this."

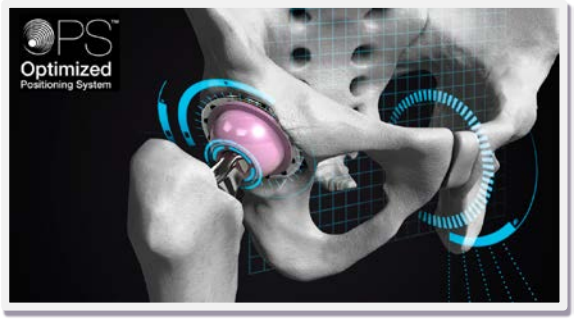
Corin (Australia) Pty Ltd

Corin
Responsible Innovation

Overview

A primary objective when performing a Total Hip Replacement (THR), aside from pain relief, is to restore hip biomechanics such that the patient experiences no discernible deficit. Being able to correctly orientate the components of a THR plays a critical role in optimising the surgical outcome, promoting patient satisfaction and providing an environment conducive to implant longevity.

Corin's OPS™ technology enables surgeons to understand the individual pelvic motion profile of each patient before their surgery. This gives the surgeon the information required to identify, customise and deliver a personalised total hip replacement, specifically designed to optimise biomechanics and functional joint performance. This is driven by a simple imaging protocol which generates key input data that feeds into computational modelling. Multiple simulations can then be produced to highlight the unique way in which patients perform their normal everyday activities, with outputs used by surgeon to accurately achieve the optimised surgical plan.

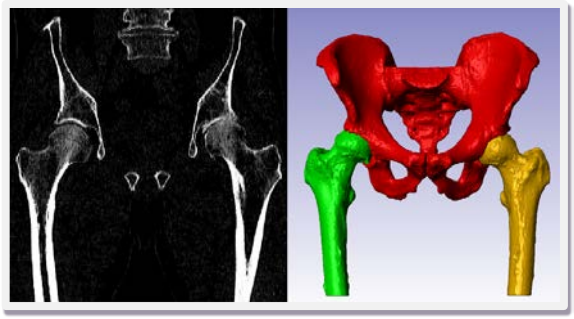


Highlights

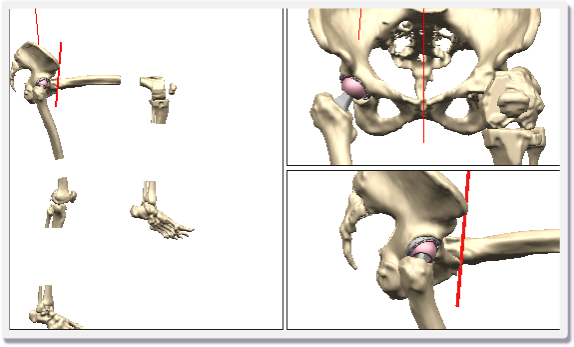
- Patient specific computational modelling from CT data processed in Simpleware ScanIP to improve total hip replacement surgery
- Optimisation of component alignment with the potential to improve implant longevity
- Accurate surgical information and 3D printed instrumentation based on the patient's own geometry to improve intraoperative decision making

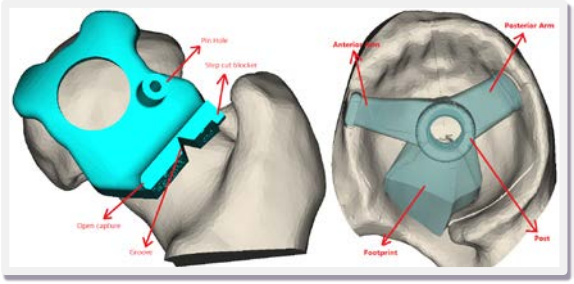
Creating patient-specific simulation inputs

The dynamic simulation used to optimise implant component positioning requires specific landmarks to be taken on each patient's skeleton. Using CT scans, each patient's bones can be segmented to create 3D models within Simpleware ScanIP.



The location of key landmarks can then be identified within the CT reference frame. The appropriate bony landmarks, implant positions and bone models are then fed into the simulation. A significant amount of this process is automated through scripting, which is easily achieved within the Simpleware software suite. This scripting capability allows the above process to be consistently and quickly repeated on a large scale.





THR implant templating in a 3D environment

Traditionally, surgeons use an 2D AP (anterior-posterior) X-ray of their patients to plan the implant arrangement and approximate sizes they will use in surgery. Using Simpleware software, the implant geometries can be imported into an individual patient's CT reference frame. This allows implants to be viewed within a 3D environment, where more detailed planning can be executed.

Generating 3D models for use in 3D printed guide creation

Once the implants positions have been optimised, 3D printed guides are created to enable the surgeon to achieve these positions as planned. Both of the guides used in surgery conform to the patient's individual geometry. This means that accurate segmentation of the relevant areas of bone is essential. Simpleware provides a range of tools which makes this process achievable. The resulting guides fit securely on to the patient's bones giving the surgeon confidence that the planned implant positions will be achieved intraoperatively.

SYNOPSYS®
Predictable Success
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