

Corin & Synopsys Simpleware

Streamlining Orthopedic Surgical Planning

“The Simpleware technology is integral to our production system. We have always had a very good relationship with Synopsys and regularly are able to reach out for their support. The introduction of Simpleware’s Custom Modeler has not only reduced segmentation time but also enabled faster training of the production process to new staff.”

Alicia Miller, Production Engineering Manager, Corin

Thanks to:



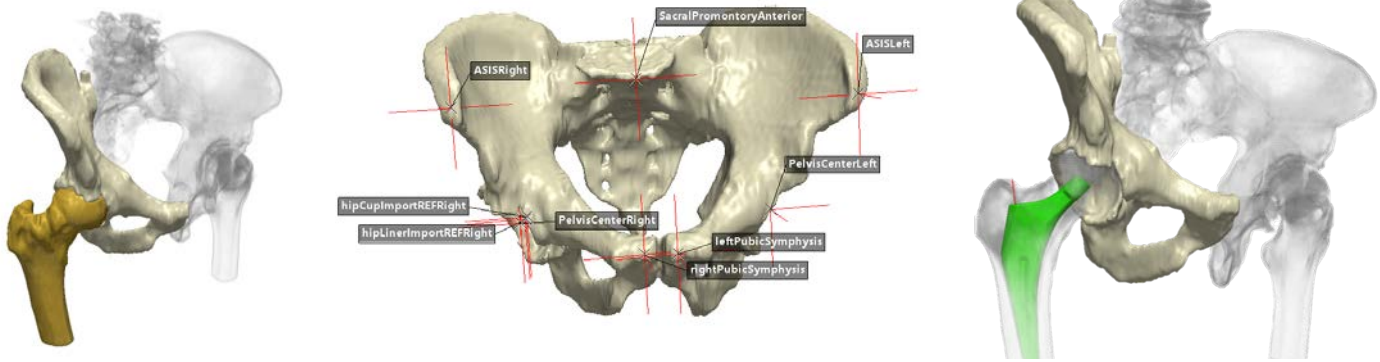
Highlights

- Simpleware software enables Corin to process 3D image data for its OPS system
- Recent updates in the deployed Simpleware Solution, via Simpleware Custom Modeler’s AI tools, have made this process more streamlined and efficient
- OPS technology has been used in 20,000+ procedures

Introduction

Total hip arthroplasties (THAs) that include patient-specific implants, guides and surgical plans have been rapidly increasing in frequency over the past decade. This increase is creating more demand from patients, and growing pressures on clinicians and medical device companies to deliver and deploy their patient-specific products quickly and safely. In this context, patient-specific data from MRI and CT scans can be used to create 3D models for orthopedic cutting guides, implants, and pre-surgical plans.

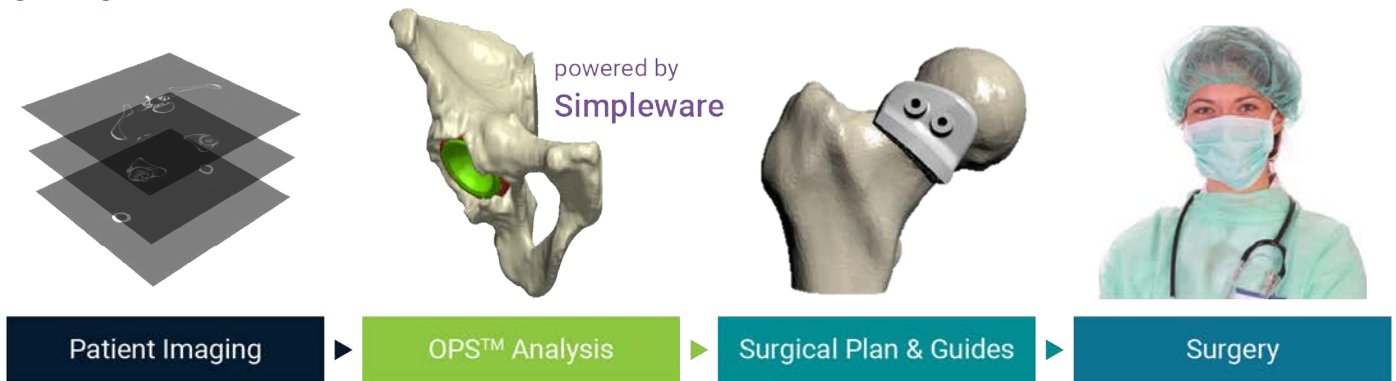
The primary challenge when optimizing patient-specific workflows is to ensure speed, efficiency, and scalability, while also maintaining clinical accuracy and regulatory compliance. When creating 3D models of a patient’s anatomy, it is typically left up to a group of highly-trained and valuable biomedical engineers to complete this task; it is therefore particularly important for a company to deploy a highly efficient and scalable process, to free up engineering time, save on costs, get to market faster, and maintain the quality of the final output.



Synopsys and the Corin Optimized Positioning System (OPS) group have been working together for over 10 years to develop and streamline their OPS workflow, which is designed to optimize stability, longevity, biomechanics, and patient outcomes for THAs over time. This relationship has grown from a few licenses of the Synopsys Simpleware software platform to a deeply integrated and customized solution for different stages of the OPS workflow where it has been deployed to over 20,000 patients. This has been a long-term relationship where the Simpleware group has focused on aligning to the vision of the OPS group to achieve the success and wide adoption of the OPS system we see today.

More recently, the addition of Machine Learning-based AI technologies, via the Simpleware Custom Modeler solution, enabled Corin to take the next leap in efficiency by completely automating their segmentation and landmarking workflows. This automation significantly speeds up their workflow, eliminates segmentation and landmarking bottlenecks, and frees up their engineers to focus on higher-value tasks.

Workflow



A typical workflow for Corin users of Simpleware software is as follows:

1. CT scans of the hip, knee and ankle are ordered by the operating physician, and once acquired, the image data is sent to the OPS group at Corin for importing into Simpleware ScanIP software.
2. Once in Simpleware ScanIP, the Simpleware Custom Modeler add-on module is used to automatically perform segmentation and landmarking much faster than is possible manually, typically requiring minimal (if any) corrections to the results. Custom Modeler filters can be run with a single button click in ScanIP, or a set of project files can be batch processed using the Console version of Simpleware ScanIP to maximize throughput.
3. By leveraging Simpleware's scripting API (available for C#, Python), Corin were able to develop custom plugins within the Simpleware software platform to further streamline and customize the software for their workflow.
4. Implant templating is carried out. 3D surgical templating is conducted on Corin's OPS Insight online planning platform.
5. The templates are 3D printed. Once the surgeon has reviewed and validated the planning, PSI guides are 3D printed to be used as an intraoperative delivery system for the surgeon to achieve their target implant positioning.

Workflow Automation

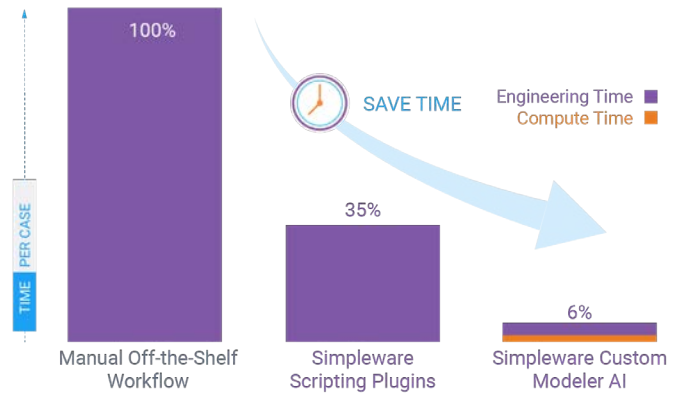
Typical Simpleware processing time savings for Hip, Knee and Ankle combined (segmentation and landmarking) when compared to using off-the-shelf software with no customization.

- Using non-AI scripting plugins*: Reduced time by 65% per case
- Using original Custom Modeler plugin: Reduced time by 80% per case ~2/3 of time is computer time (no human interaction) and remaining is tidy up time
- Using enhanced** Custom Modeler plugin: Reduced time by 94% per case ~2/3 of time is computer time (no human interaction) and remaining is tidy up time

* Plugins developed using the Simpleware C# scripting API.

** Thanks to the flexibility of the Custom Modeler solution, Corin was able to provide additional data for Synopsys to enhance the AI model, enabling coverage of a greater variance in case types, giving an even more robust and efficient result to the automatic tools, thereby further reducing the tidy up time.

Typical Simpleware Processing Time Savings



Clinical Impact

The use of Corin's OPS solution has gradually expanded worldwide, and it is currently used for approximately 6,000 cases per year, with the milestone of 20,000 total cases passed earlier this year. In addition, OPS is now available in 13 countries and used by almost 280 surgeons around the globe. The OPS technology has been the subject of 26 peer-reviewed publications, supporting the clinical relevancy and value of this technology.



Corin NOT FOR CLINICAL USE

100% C€2797

! Anterior prosthetic impingement

- Planned anatomical limb length is 10mm longer than contralateral side
- Osteotomy close to LT (4mm)
- Step cut required

Supine-to-stand -1°	Supine cup inclination 40°	Operative hip is 3 mm short pre-operatively	Lengthening 5 mm	Stem version (native) 6° (14°)
Stand-to-seated -2°	Supine cup anteversion 20°		Offset change -7 mm	
Standing PT +4°				
Lumbar flexion 70°				
PI-LL mismatch -18°				

Dynamics Cup Stem

Cup

Trinity™

54() mm

Poly Liner Neu

Stem

TriFit CF™

Size 7

127 Std

Head

Corin Ceramic

32 mm

4 mm

Ext Flex

Anterior Lateral

Anterior prosthetic impingement

Functional cup orientation

Inclination 41°

Anteversion 22°

Anterior Posterior Lateral

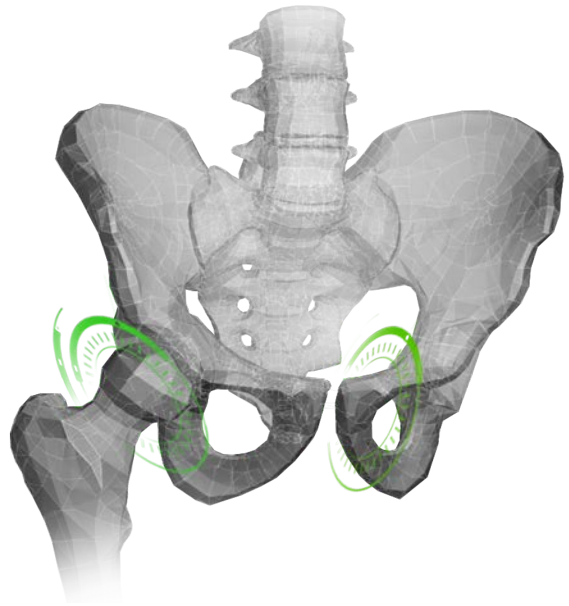
Advanced

Undo Fixto Pencil Save Validate

Next Steps

As the use of patient-specific workflows for device design and surgical planning grows into different anatomies and medical device applications, having access to flexible and customizable end-to-end solutions like Simpleware Custom Modeler will be crucial to future innovation and growth for Medical Device companies.

Looking to the future with Corin specifically, there are many more challenges that the Simpleware and OPS teams may tackle when it comes to optimizing patient-specific data and virtual surgical planning. The goal is to have the fastest turnaround time without compromising on quality and accuracy. Therefore, the Simpleware team looks forward to the next ten years of collaborative efforts with Corin to deliver exceptional solutions that enable the best outcomes to patients who entrust Corin with their joint health and wellbeing.



Learn More

- Corin OPS: <https://www.coringroup.com/healthcare-professionals/solutions/optimized-positioning-system-ops/>
- Simpleware AI solutions: <https://www.synopsys.com/simpleware/software/auto-segmenter-modules.html>
- OPS™ reaches 20,000 cases performed worldwide: <https://www.coringroup.com/about-us/our-news/ops-reaches-20000-cases-performed-worldwide>

Acknowledgements

We want to thank the various members of the OPS team over the years who have worked hand-in-hand with the Simpleware Engineers to keep pushing towards the efficient workflow we see today.