SYNOPSYS®

Simpleware Software for Analyzing Physiological Flows

Key Benefits

- FDA 510(k) Cleared
- Intuitive, User-Friendly Interface
- Advanced 3D Image Processing
- Export to 3D Printing and Simulation Packages
- Develop Automated Workflows
- Expert Technical Support

Key Features

- Import Clinical Images
- Co-Register Image Data Sets
- Multiplanar Reconstruction (MPR)
- Quick and Accurate Segmentation
- Reslice Images Along Arbitrary Plane, Axis or Path
- Measurements and Statistics

Why Simpleware Software?

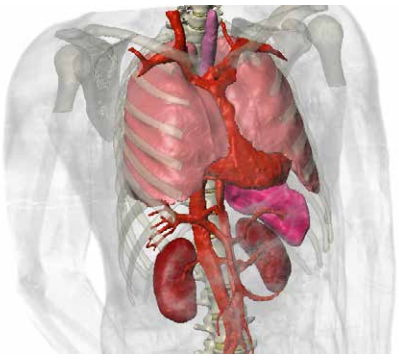
Simpleware™ software offers a certified, easy-to-use solution for processing medical image data into 3D models for physiological flows applications. Take advantage of tools for visualizing and measuring medical image data, as well as combining image and CAD data for evaluating implant positions. Export meshes directly to all leading CFD solvers for blood and airflow simulations. Simpleware software makes complex flow analysis straightforward to achieve.

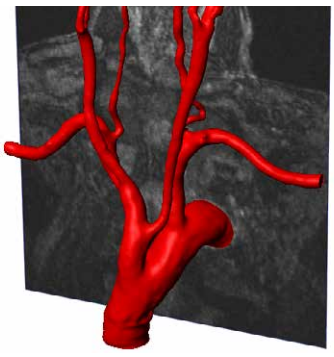
Intuitive and Customizable

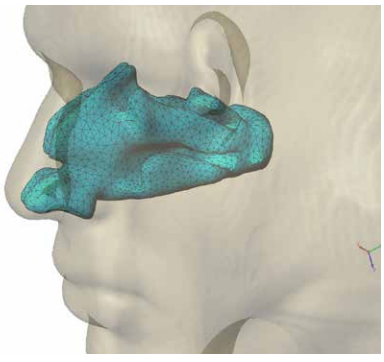
We pride ourselves on the ease-of-use of Simpleware software. Users new to the software can start processing medical images within a short time frame, and very quickly visualize and identify anatomical regions of interest. Our range of fully automated, semi-automated and interactive segmentation tools allow even the most challenging image datasets to be processed efficiently. Meshing tools include quality checks ensuring that CFD models are ready-to-use. The software also offers scripting tools and plug-ins for users to customize the software.

Dedicated Support and Training

Our expert technical support team are here to help you get the most out of the software, including step-by-step guidance and personalized support. We also regularly offer classroom training courses at our offices, or you can arrange customized training sessions online or at your site.







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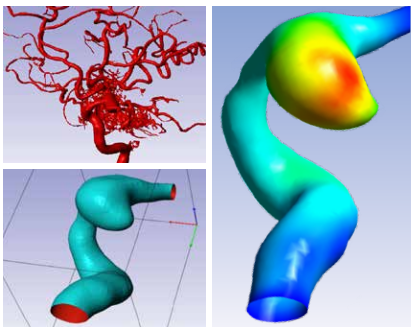
Assessing the Risk of Rupture of Cerebral Aneurysms

M. Sanchez[1,2] • D. Ambard[2] • V. Costalat[2] • S. Mendez[2] • F. Jourdan[2] • F. Nicoud[2,]
[1]Philips Healthcare, France; [2]University of Montpellier, France

CFD models were used for analyzing fluid-structure-interactions (FSI) within an aneurysm, to characterize the risk of rupture for soft (close to rupture) aneurysms and stiff (healthy) aneurysms. MRI patient data of an aneurysm was imported into Simpleware software and segmented and processed to create a model of a specific artery. Boundary conditions were set before the model was exported as a volume mesh to ANSYS Fluent for FSI analyses, enabling the mechanical properties of aneurysm samples and their risk of rupture to be characterized.

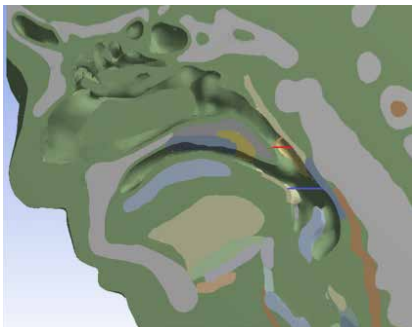


Aneurysm segmentation (left) and displacement through the cardiac cycle in ANSYS Fluent (right)

Understanding Sleep Apnea

N. Carrigy[1] • J. Carey[1] • A. Martin[1] • W. Finlay[1] • M. Noga[1], J. Remmers[2,3] • A. Zareian[2,3] • Z. Topor[2] • J. Grosse[2], ***[1]Univ. Alberta, Canada; [2]Zephyr Sleep Technologies, Canada; [3]Univ. Calgary, Canada***

Analysis of the role of passive mechanical deformation in the human pharynx to upper airway collapse is fundamental to understanding how airway patency is maintained. Finite Element Analysis (FEA) was used in this study to examine deformation using a detailed 3D anatomical model that was created in Simpleware software from CT scans. Results showed good agreement with *in vivo* testing and the literature, providing a starting point for more comprehensive simulations of human upper airway collapse and obstructive sleep apnea therapy.

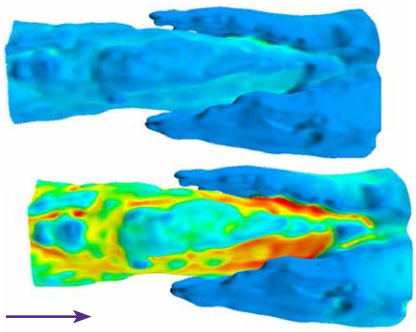


Locations of the various horizontal velopharynx and oropharynx sections (shown by red and blue lines)

Mass and Fluid Transport in the Lymphatic System

J. Wilson • W. Wang • A. Hellerstedt • D. Zawieja • J. Moore Jr., ***Texas A&M University, USA***

The lymphatic system plays a vital role in fluid balance and homeostasis within the body. It is responsible for the transport of lymph from the interstitium to the venous return. Simpleware software was used to segment and mesh samples obtained using confocal microscopy. Generated models were used in Siemens CFD solver Star-CCM+ for flow analysis and characterization of fluid dynamics and nitric oxide (NO) mass transport. Simulations revealed insights into stresses and concentrations within the lymphatic system, enabling better understanding of how intrinsic contractions powered by lymphatic muscle cells are influence by NO.

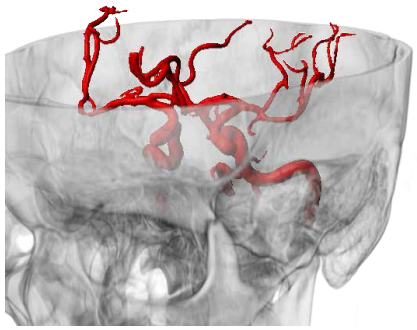


Contours of NO production revealed higher production in areas of elevated wall shear stress (Siemens Star-CCM+)

Circle of Willis Flow Analysis

N. Messaoudi, ***ISIFC—University of Franche-Comté, France***

The Circle of Willis (CoW) is located at the base of the brain providing the primary vascular link to the heart. The communicating arteries of the CoW form a bridge between the cerebral arteries and are thought to maintain the blood supply should problems occur. However, congenital variations can lead to uncertainty with this hypothesis. In this case study, realistic numerical representations of the vessels of interest were obtained by using Simpleware software to convert contrast enhanced MRI scan images into accurate CFD meshes. The role of the communicating arteries was then investigated with blood flow simulation.



Contrast enhanced MRI scan of an adult male head to generate the model of the Circle of Willis

For more information on Simpleware Software Solutions go to www.synopsys.com/simpleware

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