



Mimics[®] Innovation Suite

Software and Services for Engineering on Anatomy[™]

Passionate About Biomedical R&D? So Are We.

At Materialise, we're committed to our role in creating a better and healthier world through Engineering on Anatomy. We're proud of all that our customers achieve with the Mimics Innovation Suite by converting medical image data into highly accurate 3D models and then measuring, designing and modeling.

Our Suite offers accurate and consistent segmentation tools ensuring that your results have scientific relevance. That's why top universities, leading hospitals and successful medical device companies consider Materialise to be their partner for even the most complex R&D challenges.

We're the 'innovators you can count on'.

Our Total Solution

Are you prepared to lead the way in evidence-based biomedical research and engineering? The Mimics Innovation Suite can take your Engineering on Anatomy to the next level with software, services and support you can count on! Our solution begins with importing medical image data for segmentation within our Mimics base. Once your data is segmented and your 3D model is generated, you can use the additional modules to measure, design and model. Below is a diagram that helps to describe how our solution is structured.



Segment Anatomy

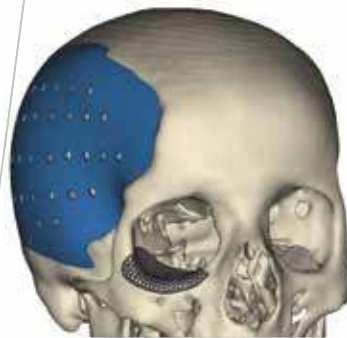
Accurately Convert Medical Image Data to 3D Models

Measure



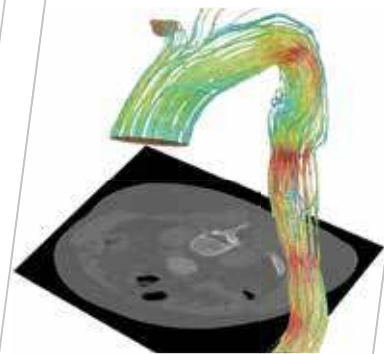
Analyze anatomy & device fit
Characterize populations
Simulate interventions

Design



Create anatomical models
Design guides & implants
Produce benchtop models

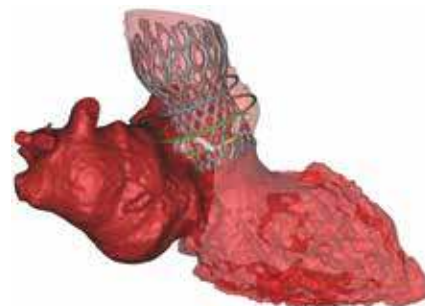
Model



Mesh for FEA & CFD
Assign material properties
Link to MSM

Building Blocks for Engineering on Anatomy™

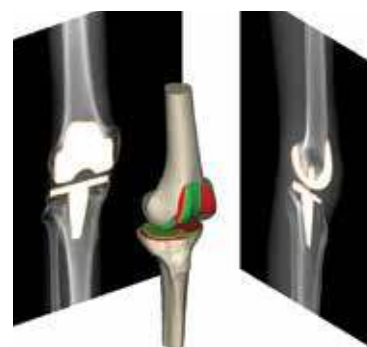
Our Mimics Innovation Suite combines cutting-edge software with engineering services, consultancy and custom software development to form one powerful Suite. The convenient modular structure provides a customized solution to meet your unique needs and advance your biomedical R&D.



Software Solutions

The Mimics Innovation Suite is a complete solution that contains Mimics and 3-matic software packages as well as numerous modules. Our extensive quality system provides validated, stable software to meet all of your research, design, clinical, production, and educational needs.

Mimics allows you to process and edit a stack of 2D image data (CT, micro-CT, MRI, 3D Ultrasound*, etc.) to construct 3D models with the utmost accuracy, flexibility and user-friendliness. The powerful segmentation tools allow you to segment your medical images, take measurements, simulate surgeries and engineer directly on your 3D model. From there you can export your 3D data to a wide range of output formats and engineering applications.



With 3-matic, you can work directly on your .stl files to make complex designs like implants that perfectly fit anatomy. Depending on your workflow, you can also use a traditional CAD package for designing and then 3-matic for reverse engineering. Once your design is ready, you can easily optimize meshes for FEA or CFD analyses.

Our Mimics Innovation Suite is offered in three editions: Medical, Research and Student. The Research Edition includes our latest technologies and modalities and is intended for non-clinical applications. The Medical Edition may be used to treat and diagnose patients. Our Student Edition provides an easy way to teach Engineering on Anatomy and includes a course book and educational data sets.



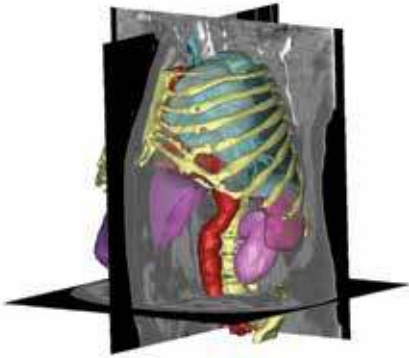
Engineering Services and Consultancy

Materialise's team of skilled professionals is available to collaborate with you on your biomedical challenges. It's the most efficient way to get your desired results. We can complete portions of projects or the entire effort, it's up to you. Common projects include: conversion and segmentation services; population analysis (ADaM™: Anatomical Data Mining); 3D Printing of patient-specific anatomical models; and clinical trial services (patient selection reports and corresponding 3D-printed HeartPrint® models).

Materialise also offers consulting services to streamline your process. Our team is available to develop a specific software application for you. Whether you're interested in automating certain workflows, batch processing or have an idea of your own, we have the largest development team in the industry to achieve your goals.



Segment: From 2D to 3D, Visualize the Invisible



With the Mimics Innovation Suite, you can construct a virtual 3D model by importing a stack of 2D images and navigate the axial (XY), coronal (XZ) and sagittal (YZ) views. From there, you can manipulate the data in one of the 2D views, directly on the 3D model or produce a 3D PDF for better communication with your team.

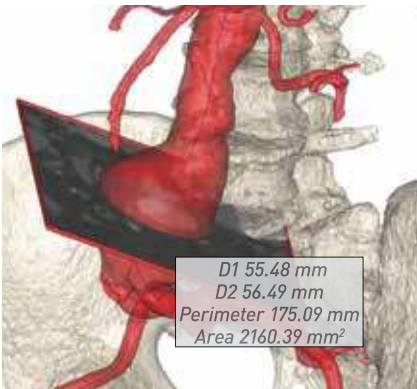
Combine the Mimics Innovation Suite with non-invasive medical imaging to:

- Perform fast and highly accurate segmentations
- Segment the heart and all four valves for in-depth analyses
- Generate 3D models for regions of interest
- Examine, manipulate, measure and engineer directly on anatomical data
- Improve visualization by linking the 3D view and fluoroscopy angles

"The services for population analysis that Materialise provided reduced the number of cadaver specimens we needed from 12 to 6, saved us over \$50k in development costs and generated an additional \$100k in sales by allowing us to get to the market faster."

Director of Product Development

Measure: Analyze Your 3D Model

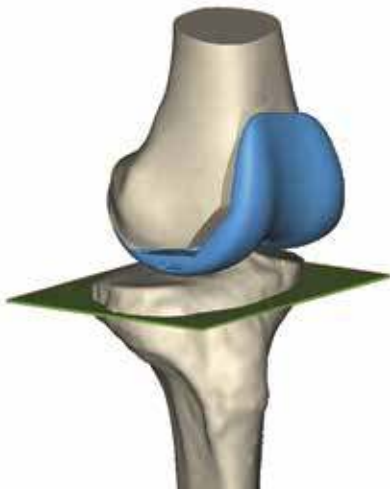


Our solution allows you to accurately measure distances, angles, diameters and densities either on your 2D images or directly on the 3D model. Even complex measurements like ellipses, centerlines, multi-planar re-slice and curve planar re-slice are just a click away.

Rely on the Mimics Innovation Suite to:

- Perform geometrical analyses: wall thickness, part comparison or curvature
- Calculate more dedicated measurements: vessel centerlines and diameters or tortuosity of arteries, veins and airways
- Take repetitive measurements using your own anthropometric templates
- Export measurements for statistical analysis
- Analyze procedures with post-operative X-ray* images for improved clinical outcomes

Measure: Surgical Simulations



With the Medical Edition of the Mimics Innovation Suite, time in the operating room may be reduced by simulating surgical interventions on patient data. This allows you to derive optimal surgical plans by evaluating outcomes of various approaches or validating custom implants in advance. The Medical Edition literally transforms your computer into a virtual operating room.

Now, you can easily and virtually:

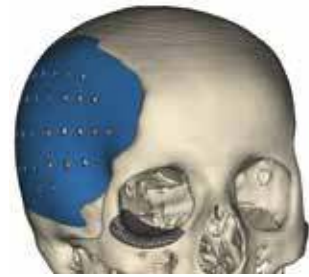
- Plan cutting planes and design reconstructions of missing anatomy
- Reposition bone parts, place plates and screws, fit and position implants, place distractors, calculate volumes, and more
- Determine the size of required grafts or assess available bone to secure an implant
- Prepare a cranial plate with dedicated design and finishing tools
- Virtually implant cardiovascular devices for patient-fit analysis

Design: Patient-Specific Implants, Guides and More

It is easy to perform design operations on complex anatomical data with the Mimics Innovation Suite. You can avoid the lengthy and error prone process of reverse engineering and the need to simplify or smooth complex shapes. Our Medical Edition provides you with a full range of standard CAD tools to design your patient-specific implants, cages, plates and surgical guides directly on anatomical data. You can even record macros in 3-matic for frequently used workflows.

Our software allows you to:

- Smooth your data and designs with shrink-wrap tools
- Use standard CAD tools such as extrude, offset, hollow, mirror and Boolean
- Generate a guiding curve automatically to reconstruct missing anatomy
- Design a patient-specific cage (solid or porous), reconstruction plate or base plate
- Ensure implants fit perfectly by effortlessly removing undercuts

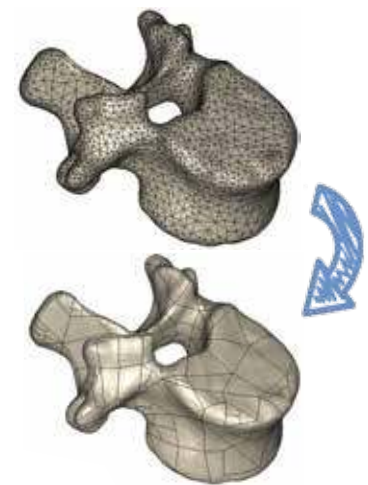


Design: Convert STL Models into a CAD Format

Importing anatomical data into CAD or sending the data to a CNC milling machine requires data to be converted from an .stl format into an analytical geometrical model. With the Mimics Innovation Suite, the process is easy and accurate.

Converting data our way allows you to:

- Smooth and split your freeform geometry automatically
- Use the reconstruction plate wizard to prepare a plate for milling or 3D Printing
- Export as a solid to IGES or STEP format while keeping the file size small



"The Mimics Innovation Suite has enabled sophisticated, multi-component finite element models of complex anatomical structures to be generated from CT and MR data. The advent of 'forward engineering' (digital CAD) significantly reduces design time and simplifies the modeling process."

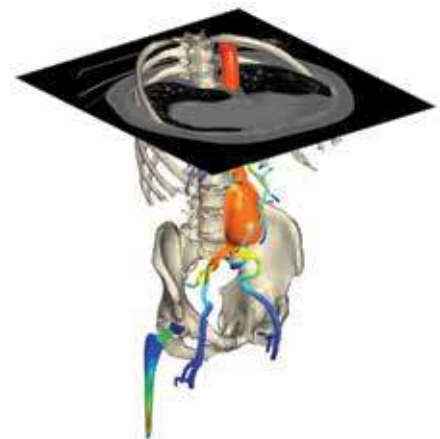
Simon N. Collins, PhD – Centre for Equine Studies, Animal Health Trust, UK

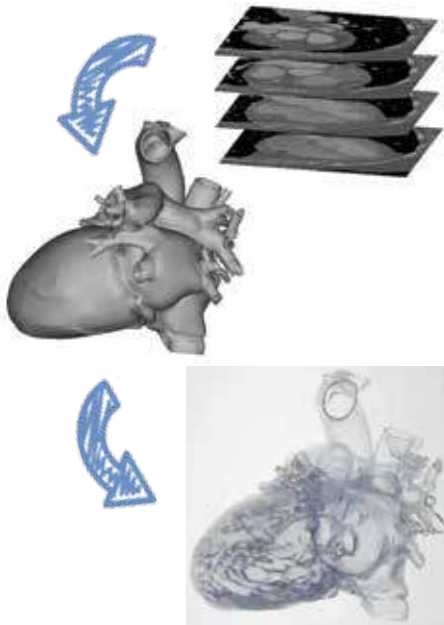
Model: From Scan Data to FEA, CFD and MSM

Whether you're performing musculoskeletal modeling (MSM), finite element analysis (FEA) or computational fluid dynamics (CFD), the Mimics Innovation Suite makes the process easier. Simulating forces, flows and movements on anatomical structures or implants provides important feedback on local stresses, strains and pressures ex-vivo to improve your designs and clinical results. As design and meshing operations are both available in our powerful Suite, you can directly modify your designs based on the simulation outcomes.

Use the Mimics Innovation Suite on image-based 3D data to:

- Optimize and defeature surface meshes
- Generate volume meshes semi-automatically
- Assign material properties for accurate simulations based on image grey values
- Export landmarks or muscle attachment points to any MSM package
- Export optimized anatomical meshes to the FEA or CFD package of your choice





3D Printing: From Virtual to Tangible

3D Printing is revolutionizing the medical industry. With the Mimics Innovation Suite, you can “print” 3D reconstructions with any additive manufacturing (AM) technology. Physical models allow you to explore and evaluate patient anatomy like never before. Whether you’re selecting patients for clinical trials, showing off your device in an anatomically correct model, creating a benchtop model or trying to visualize a patient’s pathology; 3D-printed models are ideal. Materialise has a convenient service for 3D Printing in a wide variety of materials, including our proprietary HeartPrint® Flex.

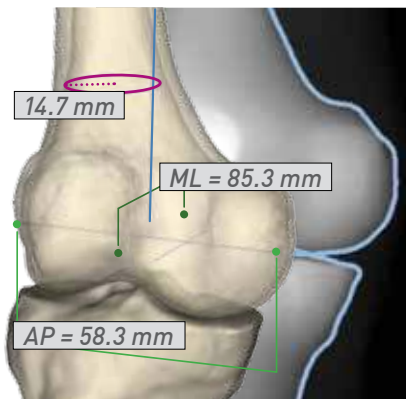
The Mimics Innovation Suite allows you to:

- Export the most complex geometries to any 3D printer
- Ensure manufacturability by defining wall thickness
- Design auxiliary components or internal structures
- Cut your model into sections for better internal visualization
- Save time and material by hollowing your parts

*“The 3D-printed aorta model arrived yesterday and I can only say: superb! Brilliant!!!!
It exceeds all of my expectations by light-years! It’s exceptional, how well the model has been done!!!”*

Dr. med. Marcus Treitl, Ludwig-Maximilians-University Munich, Germany

Specific Applications: Targeted Tools



Materialise understands that certain applications require specialized tools. That’s why we are continuously staying ahead of the market by developing exciting functionalities that make your work more efficient, such as semi-automatic segmentation tools for complex anatomies. Many of our innovations come from user requests such as developing wizards that streamline workflows or adding new modalities of interest.

With our wizards and application-specific modules, you can:

- Save time and increase consistency with semi-automated coronary segmentation
- Efficiently segment 4D data using mask morphing technology
- Quantify the pulmonary system by segmenting lobes, defining centerlines, matching airways and modeling
- Import X-ray* images and register them to your 3D plan for post-operative analyses

Other Possibilities: the Sky’s the Limit



Nearly all applications that begin with scanned data benefit from the tools and capabilities of the Mimics Innovation Suite. Whether you’re a veterinarian looking to design implants, an anthropologist who wants to study a mummy without compromising the sarcophagus, a historian researching artifacts, or a curator needing a replica; the Mimics Innovation Suite has the tools you need.

A few example applications include:

- Veterinary science
- Material science and fiber analysis
- Natural sciences and anthropology
- Forensics and facial reconstruction

| Added Value: Above and Beyond Just Software

Maintenance and Annual Subscriptions: Maximize Investment

At Materialise, there's more to a maintenance agreement and an annual subscription than receiving the latest software upgrades. You can participate in update trainings to learn the latest features of our software, receive discounts on Materialise events, enjoy full access to the Mimics Innovation Suite Community and participate in our Beta Programs. Most importantly, our application engineers are at your service to troubleshoot, answer your questions and help you use your software effectively.



Educational Program: Prepare Future Engineers

Materialise is committed to educating the next generation of biomedical engineers and developing skills the industry demands. We offer academic institutions numerous licensing options for research, education, commercial and clinical applications. Our annual University Site License program provides the full functionality of our Research Edition to multiple departments within the same institution.



In addition, the program includes our Student Edition for an easy way to incorporate Engineering on Anatomy into your curriculum. It includes Mimics and 3-matic software, workbooks and corresponding datasets for each student.

Training: Expand Your Skills

To improve your efficiency, we provide comprehensive training on a regular basis at our offices around the world. We can also provide customized training at your facility. Our Innovation Courses and Lunch & Learns are another great way to gain a better understanding of the Mimics Innovation Suite and what it can do for you.



Mimics Innovation Suite Community: Uniting Experts

For additional support, we offer the Mimics Innovation Suite Community. It's an online portal offering FAQs, tips and tricks, tutorials, scientific articles, discussion forums, news, events and much more. You're invited to login and share success stories, seek advice or learn more.



Mimics Innovation Awards: Rewarding Exceptional Users

It is exciting to see how the Mimics Innovation Suite is making cutting-edge research possible. Materialise recognizes the value of this R&D through the Mimics Innovation Awards. High-level researchers from all over the world submit papers and posters to win monetary prizes that support their efforts.

"I was very excited about winning a Mimics Innovation Award. The money allowed me to attend additional conferences and purchase materials for my experiments. I even had the opportunity to present my research at a high-level Materialise event!"

Ellen Roche, MD/PhD Candidate – Harvard University, USA

Why Choose the Mimics® Innovation Suite?

TOP SCHOOLS
& MEDICAL
DEVICE
COMPANIES
USE IT

HIGH-LEVEL
RESEARCH
IS REWARDED
WITH
CASH PRIZES

IT'S EASY TO
ENGINEER ON
ANATOMY

IT'S A
COMPLETE
SOLUTION
FROM A-Z

IT'S FUN!



Developed by Materialise

Materialise is headquartered in Leuven, Belgium and has branches worldwide. We've been playing an active role in the field of Additive Manufacturing (AM) since 1990. In addition to having the largest single-site capacity of AM equipment in Europe, we have a strong reputation as a provider of innovative software solutions.

We strive to use our expertise to create a better and healthier world with 3D Printing and through biomedical and clinical solutions for medical image processing and surgical simulations. Our customers range from large companies in the automotive, aerospace and consumer electronics sectors; to famous hospitals, research institutes and clinicians; to individual consumers interested in bringing their own unique creations to life through i.materialise or by purchasing a celebrated .MGX design.

*Available in Mimics Research only.

Regulatory Information:

The Medical edition of the Mimics® Innovation Suite currently consists of the following software components: Mimics® Medical version 18.0 and 3-matic® Medical version 10.0 (released 2015). Mimics® Medical is intended for use as a software interface and image segmentation system for the transfer of imaging information from a medical scanner such as a CT scanner or a Magnetic Resonance Imaging scanner. It is also used as pre-operative software for simulating /evaluating surgical treatment options. 3-matic® Medical is intended for use as software for computer assisted design and manufacturing of medical exo- and endo-prostheses, patient-specific medical and dental/orthodontic accessories and dental restorations.

The Research edition of the Mimics® Innovation Suite currently consists of the following software components: Mimics® Research version 18.0 and 3-matic® Research version 10.0 (released 2015). Mimics® Research is intended only for research purposes. It is intended as a software interface and image segmentation system for the transfer of imaging information from a variety of imaging sources to an output file. It is also used as software for simulating, measuring and modeling in the field of biomedical research. "Mimics® Research" must not be used, and is not intended to be used, for any medical purpose whatsoever. 3-matic® Research is intended for use as a software for computer assisted design and engineering in the field of biomedical research. "3-matic® Research" must not be used, and is not intended to be used, for the design or manufacturing of medical devices of any kind.

Materialise Belgium – Technologielaan 15 – 3000 Leuven – Belgium

CE 0120 Mimics® Medical and 3-matic Medical are CE-marked products. Copyright 2015 Materialise N.V – L -10088 revision 2, 05/2015

Contact: mimics@materialise.be or biomedical.materialise.com

Materialise
innovators you can count on