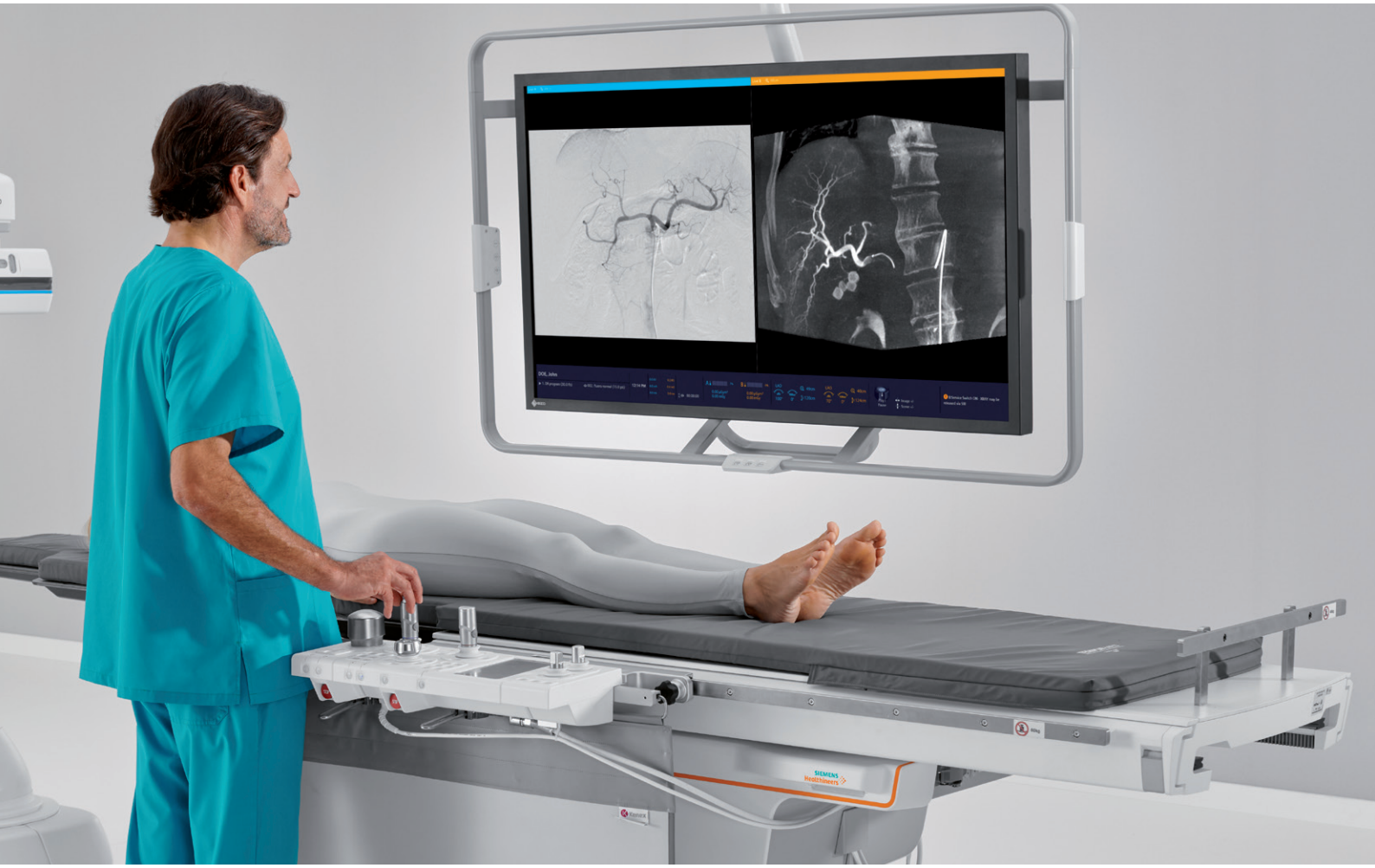
Datasheet

syngo Application Software

Integrated image guidance for ARTIS Systems

siemens-healthineers.com



SIEMENS Healthineers

syngo Application Software

for ARTIS Systems

The *syngo* Application Software includes real-time viewing, image manipulation, 3D-visualization, communication, and storage of medical images and data on exchange media.

It is used for diagnostic image viewing, procedural guidance and post-processing before, after, as well as during interventional and surgical procedures.

Integrated into ARTIS Systems

The *syngo* Application Software is tightly integrated into ARTIS icono.vision, ARTIS icono.explore, ARTIS genio floor and ARTIS pheno.vision.

Dedicated image acquisition protocols implemented on the ARTIS systems are utilized by the *syngo* Application Software to reconstruct CT-like 3D images, or to build enriched color-coded functional images. Continuous data exchange with the C-arm enables fusion of multimodal 3D information with live 2D fluoroscopic images.

Complex interventional and surgical workflows are supported by the *syngo* Application Software through dedicated applications that guide the operator through the procedure.

Dedicated applications

The *syngo* Application Software contains various dedicated applications to serve

- Interventional radiologists
- Interventional neuroradiologists
- Interventional cardiologists
- Pediatric cardiologists
- Electrophysiologists
- Surgeons

Configurable

The *syngo* Application Software can be configured to the needs of the specific disciplines and provides a large range of optional clinical applications, as described on the following pages.

Heads-up Display*

Allows the user to stay focused with context-sensitive on-screen menu

- Intelligent in-room control of the *syngo* Application Software via heads-up display.
- Automatized pre-selection of relevant functions eases your workflow.
- On-screen menu on the heads-up display helps to simplify menu selection and handling.

** ARTIS system*

Table of contents

Basic features

syngo 4D Viewer 9
QuickZoom 9
Bookmarks 9
Heads-up Display 9

Applications for angiography

syngo 3D Roadmap 10
syngo Adjust 3D Roadmap 10
syngo Biplane 3D Roadmap 10

3D / Advanced 3D

3D Wizard 11
syngo Dyna3D 11
syngo DualVolume 12
syngo DynaCT High Speed 12
syngo Dyna4D 12
syngo DynaCT Bone Removal 13
syngo DynaCT 13
syngo DynaCT MORE 14
syngo DynaCT SMART 14
syngo DynaCT Multiphase 14
syngo DynaCT Sine Spin 14
syngo DynaCT Cardiac 14
syngo DynaCT Large Volume 15
syngo DynaCT 360 15
syngo DynaCT Micro 15
syngo DynaPBV Neuro / Body 16

2D processing-Analysis

Quantification 17

3D processing – Advanced tools and workflows

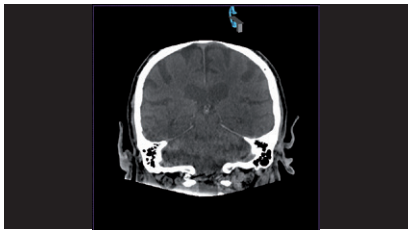
syngo Toolbox 19
syngo 3D/3D Fusion 19
syngo 2D/3D Fusion 20
syngo 3D Segmentation 20
syngo LA Segmentation 21
syngo Congenital Heart Disease Guidance 21
syngo 3D Stenosis Measurement 21

Integrated 3D workflows

syngo Neuro Virtual Stent 22
syngo Aneurysm Guidance Neuro 22
syngo CTO Guidance 23
syngo PCI CONNECT 23
syngo Electrophysiology Guidance 24
syngo TrueFusion 24
syngo Aortic Valve Guidance 25
syngo EVAR Guidance 25
myEmbolization Guide 26
myNeedle Guide 26
myScrew Path Assist 27

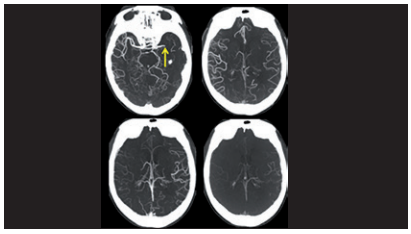
Highlights

Increase your process efficiency in the angio suite, enable your staff members to get the full potential of the system, and expand your clinical capabilities – with an angio system that combines ease-of-use, integrated expert guidance, and specific tools.



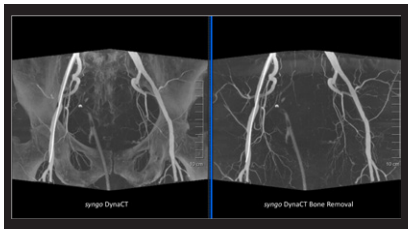
syngo DynaCT Sine Spin

Raising the bar in consistent 3D image quality for whole brain imaging from cranium to basal.



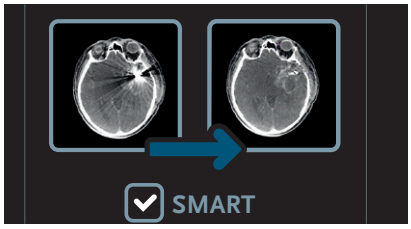
syngo DynaCT Multiphase

Imaging of cerebral collateral vessels in the interventional suite



syngo DynaCT Bone Removal

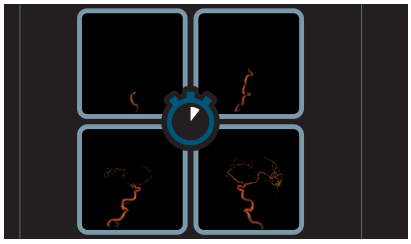
For enhanced vessel visualization and improved workflow by reducing manual cropping of bony structures from *syngo* DynaCT datasets.



syngo DynaCT SMART

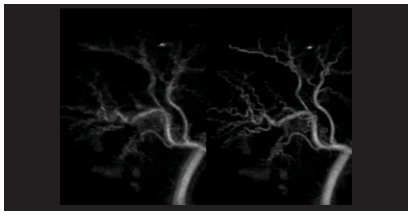
Reduces artifacts resulting from radiopaque materials and devices.

Highlights



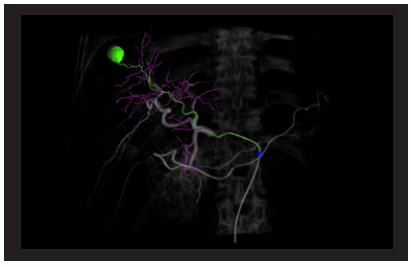
syngo Dyna4D

Welcome the 4th dimension to the angio suite. Adding temporal information to 3D datasets allows to analyze flow patterns in 3D.



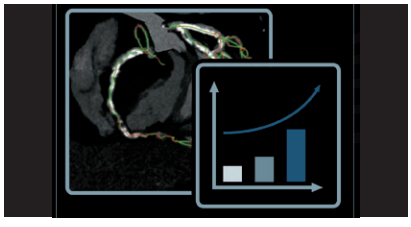
syngo DynaCT MORE

Automatic reconstruction of 3D liver images with non-rigid motion compensation, enhancing the detail visualization of contrast-enhanced vessels and catheters.



myEmbolization Guide

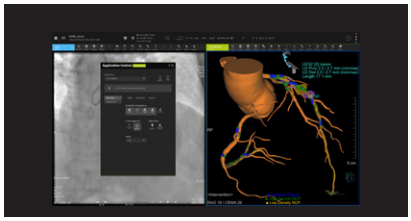
Advanced embolization planning and guidance – featuring AI-powered 3D liver lesion contouring and vessel identification with feeder and non-feeder labeling for liver and prostate.



syngo CTO Guidance

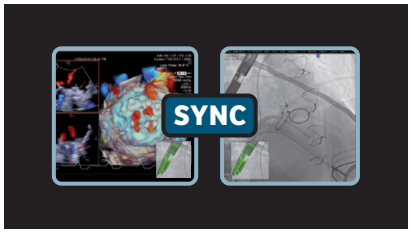
syngo CTO Guidance enables planning based on automatic segmentation of coronary CTAs.

Highlights



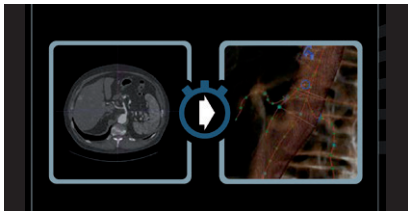
syngo PCI CONNECT

Seamless integration of CCTA information into the cathlab for PCI planning and guidance



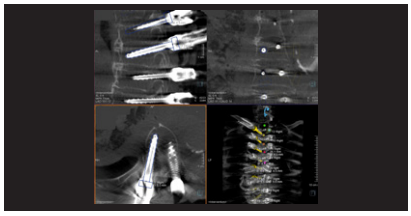
syngo TrueFusion

Advanced image guidance by fusion of trans-esophageal echo images with X-ray fluoroscopy



syngo EVAR Guidance

Support decreasing procedure time using automated vessel wall detection



myScrew Path Assist

A fully integrated software that helps surgeons place pedicle screws precisely.

Basic features

syngo 4D Viewer

Processes volume datasets from various modalities such as *syngo* Dyna3D, *syngo* DynaCT, *syngo* DynaCT Sine Spin, *syngo* DynaCT Multiphase, *syngo* DynaPBV, CT, MR, PET and provides reformatting functions, e.g. MIP, MPR, VRT, for quick and easy routine use.
Provides superimposed datasets from different modalities and loads whole cardiac time sequences.

Bookmarks

Save and recall procedure planning data easily.

Heads-up Display

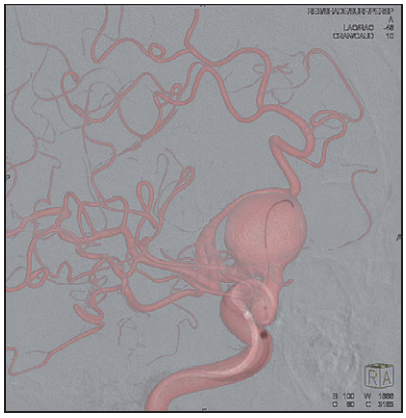
Stay focused with context-sensitive on-screen menu.

QuickZoom

Focus and zoom with just one click –
in the control room or at tableside. Interacting with 3D volumes at tableside can be cumbersome.
Click on your region of interest, and QuickZoom centers and zooms automatically, and even provides high-resolution refinement of your 3D volume.

Not all features shown are necessarily standard and available in all countries.

Applications for angiography

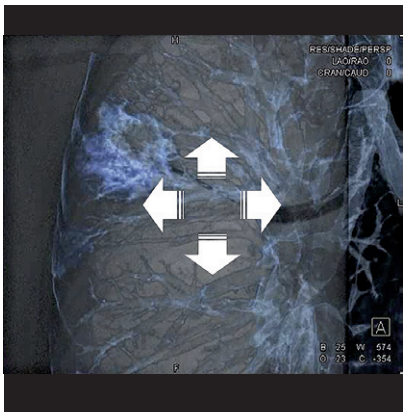


syngo 3D Roadmap

The close integration of the *syngo* Application Software with the ARTIS icono.vision, ARTIS icono.explore, ARTIS genio floor, ARTIS pheno.vision provides an inherent registration of the 3D image with the live 2D X-ray acquired continuously on the ARTIS Systems. Even preoperatively acquired images can be used for 3D Roadmap by image-to-image registration of the preoperative image with an intraoperatively acquired *syngo* Dyna3D or *syngo* DynaCT using *syngo* 3D/3D Fusion or by using only 2 fluoroscopy images and *syngo* 2D/3D Fusion, respectively.

syngo 3D Roadmap superimposes the 3D image color-coded on top of the live X-ray. Any change of the angulations of the C-arm or any change of the table position will cause the *syngo* Application Software to recalculate in real time the view on the 3D image to match the view of the live 2D X-ray image. Without additional contrast agent injection the physician can observe device movements simultaneously with the 3D overlay of the vessel contours in the fluoroscopy image.

The 3D image can be interactively faded in and out of the X-ray image. *syngo* 3D Roadmap provides real-time guidance to the physician to deliver more information in one display.



syngo Adjust 3D Roadmap

Patient movement might cause a mismatch of the 3D image and the live 2D X-ray during *syngo* 3D Roadmap. The *syngo* Adjust 3D Roadmap function re-aligns the 3D image with the X-ray. The realignment can be performed interactively by the operator or automatically based on the image intensities.

syngo Biplane 3D Roadmap

syngo Biplane 3D Roadmap allows for simultaneous overlay of volumes, graphics and segmentation results on both planes (plane A and plane B) enhancing the workflow in complex procedures like device guidance or needle guidance procedures and many more.

Not all features shown are necessarily standard and available in all countries.

3D

3D Wizard

Choosing an optimal 3D protocol is not always easy. For all parts of the body, the 3D Wizard provides a set of example images. When selected, the system loads the corresponding program and provides recommendations for injection parameters.

syngo Dyna3D

The *syngo* Dyna3D acquisition protocol performs a rotation around the patient, acquiring from different angles.

The *syngo* Application Software reconstructs a high-contrast three-dimensional image from these projections, visualizing solid structures like bones in 3D. In combination with injected contrast agents, vessels are clearly depicted in the 3D image, in particular if a digitally subtracted angiography (3D DSA) protocol is used.
Organ-specific visualization presets can be selected from a catalog of default and user-specific settings and linked to the individual acquisition protocol.

syngo DualVolume

Simultaneous visualization of dual-volume imaging (e.g. stent and contrast-enhanced vessels).

The *syngo* Application Software provides a special reconstruction algorithm that takes the mask image as well as the subtracted image into account and displays both 3D images simultaneously. In this DualVolume mode, bones, solid materials (e.g. aneurysm clips, coils, stimulation electrodes, or hooks) and vessels can be visualized in one 3D rendering at the same time.

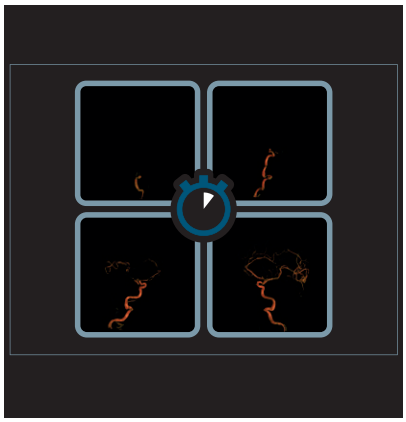
Not all features shown are necessarily standard and available in all countries.

Advanced 3D

syngo DynaCT High Speed [1]

syngo DynaCT HighSpeed provides a fast cone-beam CT protocol.

It permits a short acquisition time of less than 3 s, thus, vessels of moving organs like the lung can be represented with reduced motion artifacts and less contrast media.



syngo Dyna4D

With *syngo* Dyna4D you can now see flow patterns in 3D. Based on this protocol a virtually unlimited number of DSA runs at no additional dose and contrast medium is provided. *syngo* Dyna4D helps you expand your clinical capabilities in the angio suite regarding patient selection and treatment strategies.

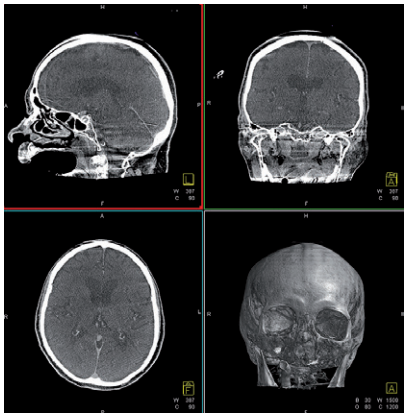
[1] Unique feature of ARTIS pheno.vision

Not all features shown are necessarily standard and available in all countries.

Advanced 3D

syngo DynaCT Bone Removal

syngo DynaCT Bone Removal is intended for improving the workflow by reducing the manual cropping of bony structures from *syngo* DynaCT datasets. It calculates a bone mask with high accuracy and can be applied for a wide range of procedures in thorax, abdomen and pelvis in adult patients.



syngo DynaCT

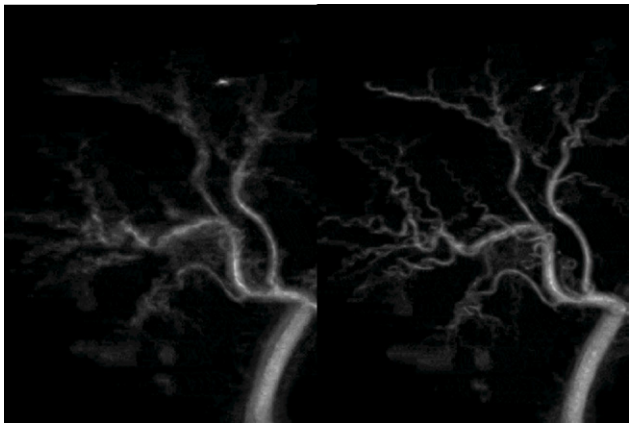
During a *syngo* DynaCT acquisition the C-arm rotates around the area of interest, which is placed in the isocenter. The combination of genererated projections of the patient and dedicated enhanced cone-beam reconstruction algorithms enables the *syngo* Application Software to reconstruct a low-contrast three-dimensional image, visualizing soft tissue.
Various acquisition protocols designed for specific body regions and different dose levels are implemented.
The imaging chain for 3D-imaging enables intra-operative, cross-sectional imaging to visualize object contrast down to 5 HU.

Intraoperative *syngo* DynaCT is the basis for many advanced interventional and surgical workflows.
It has been used, for instance, for procedure planning, for the identification of hemorrhages during intervention and endoleaks after treatment, and for guidance in conjunction with e.g. myNeedle Guide.

ARTIS icono.vision and ARTIS pheno.vision allows up to 2.5 times faster acquisition as compared to the previous versions while maintaining the number of projection images.

Not all features shown are necessarily standard and available in all countries.

Advanced 3D

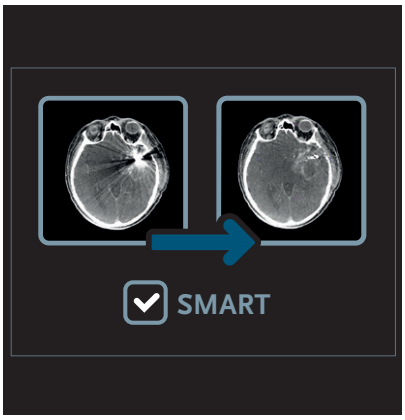


syngo DynaCT MORE

Patient motion during a contrast-enhanced 3D image acquisition, e.g. via *syngo* DynaCT, can cause artifacts such as blurring of small vascular structures, which may impair image quality and limit clinical usefulness.

syngo DynaCT MORE estimates the motion using the acquired image data and compensates the motion during the 3D reconstruction.

It is intended to address sparse anatomical structures in the liver (contrast-enhanced vessels) and catheters for the respective body region.

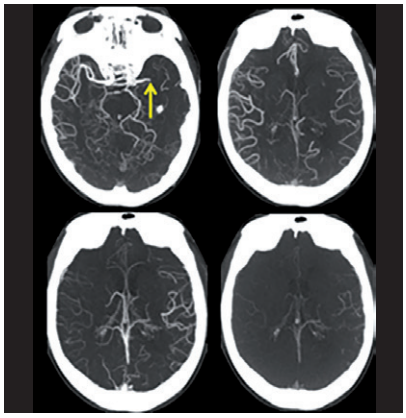


syngo DynaCT SMART

Important diagnostic information can be obscured by metal artifacts.
Reduce these artifacts with *syngo* DynaCT SMART (Streak Metal Artifacts Reduction Technology) through a secondary reconstruction.
This helps to increase diagnostic confidence and increases the chance for visualizing complications such as bleedings close to metallic objects.

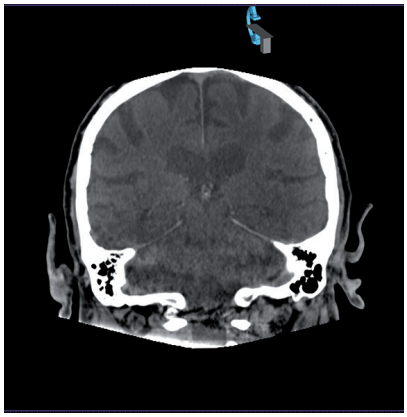
Not all features shown are necessarily standard and available in all countries.

Advanced 3D



syngo DynaCT Multiphase[1]

syngo DynaCT Multiphase allows to visualize cerebral collateral vessels with time resolved DynaCT, depicting 10 different timepoints within a period of 60 seconds.

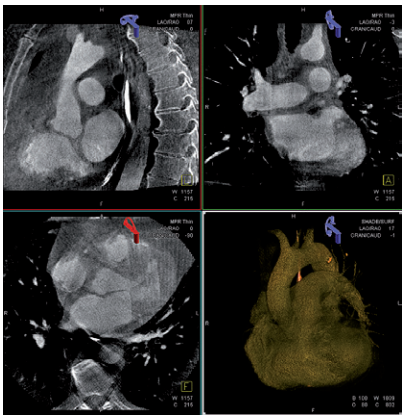


syngo DynaCT Sine Spin

syngo DynaCT Sine Spin is using a new acquisition trajectory adding a CRAN/CAUD movement to the LAO/RAO spin. It reduces cone beam CT artifacts, specifically in the basal part of the brain and close to the skull.

[1] *Unique feature of ARTIS pheno.vision*
Not all features shown are necessarily standard and available in all countries.

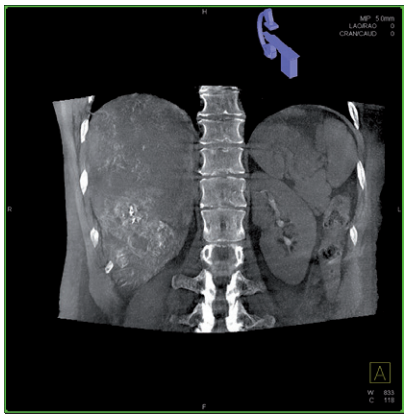
Advanced 3D



syngo DynaCT Cardiac

The *syngo* DynaCT cardiac protocol provides acquisition parameters, with up to 248 projections.

Dedicated injection protocols for applications in electrophysiology, structural heart disease, and congenital heart disease are available.



syngo DynaCT Large Volume*

By rotating twice around the patient with a small shift of the C-arm, ARTIS pheno.vision is able to cover a larger field of view than a standard *syngo* DynaCT protocol. The *syngo* DynaCT Large Volume protocol provides a diameter of 43 cm and 17.5 cm height in landscape mode. Since this extended field covers the abdomen including the skin, *syngo* DynaCT Large Volume has a potential to be useful to treat liver tumors via chemo-embolization, to image obese patients, to plan biopsies and to perform ablations.
In portrait mode, this protocol can acquire volumes with a 32 cm diameter and 23.5 cm height, that in most cases covers the whole thoracic spine. Portrait mode is also a valuable acquisition protocol for carotid stenting, since the cerebral vessels as well as the carotid artery can be seen in one image.

** Unique feature of ARTIS pheno.vision*
Not all features shown are necessarily standard and available in all countries.

Advanced 3D

syngo DynaCT 360*

syngo DynaCT 360 provides a fast large-volume acquisition protocol in only six seconds. Instead of rotating twice around the patient, like *syngo* DynaCT Large Volume, this protocol rotates the C-arm by 360 degrees once along an elliptical path. The reconstructed volume is 32 cm in diameter by 23.5 cm in height.

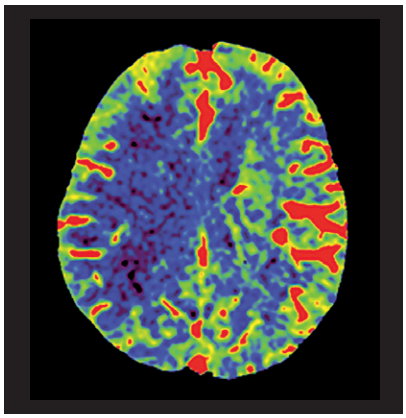
syngo DynaCT Micro [1]

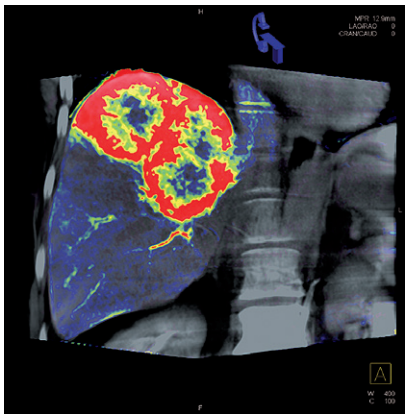
syngo DynaCT Micro provides high spatial resolution 3D imaging, by using each detector pixel.
The 40 % higher resolution compared to a standard *syngo* DynaCT enhances the visualization of small structures like flow diverters or stapes prostheses in order to check correct placement and proper function.
The value of *syngo* DynaCT Micro for wrist arthrography: Improved procedure workflow, avoiding patient transfer to CT. Higher spatial resolution for evaluation of the wrist structure and detection of TFCC (Triangular Fibrocatilage Complex) ruptures. Isotropic data – same resolution and contrast in all views or planes

** Unique feature of ARTIS pheno.vision*
Not all features shown are necessarily standard and available in all countries.

[1] Unique feature of ARTIS pheno.vision

Advanced 3D





syngo DynaPBV Neuro / Body

The DynaPBV applications of the *syngo* Application Software are 3D functional imaging acquisition protocols that provide physiological information of the patient intraoperatively. The software indicates the distribution of blood in lesions and surrounding tissue by means of color-coded cross-sectional blood volume maps. Furthermore, it allows measurements of parenchymal blood volume (PBV) in order to assess changes in perfusion caused by treatment or biological processes such as angiogenesis.

The reconstruction and visualization is automatically triggered based on the acquisition protocol.

Using ROI measurements, the blood distribution in different regions e.g., the left and right hemisphere, can be compared.

syngo DynaPBV Neuro enables intraoperative assessment of the current perfusion status of cerebral blood volume. This supports interventional procedures such as interventional stroke treatment.

syngo DynaPBV Body is an imaging protocol specifically designed for the abdomen and provides functional information before and after interventional therapy. It has potential to identify non-responders directly in the angio suite.

Not all features shown are necessarily standard and available in all countries.

2D processing-Analysis - Quantification

QuantWeb QCA - Scientific coronary analysis for vessel diameters of 0.5 mm - 7 mm*

- Scientific cardiological vascular analysis with stenosis quantification, integrated in the imaging system.
- Scientific measurement program for clinically validated, objective, exact and reproducible evaluation of coronary arteries
- Automatic contour recognition
- Stenosis measurement with geometrical and densitometric calculations
- Automatic and manual determination of reference diameter
- Automatic and manual calibration methods
- Diameter measurement

QuantWeb QCA bifurcation*

- Adds the option of quantifying bifurcations to scientific coronary analysis

QuantWeb QVA - Vascular analysis for vessel diameters of 0.5 mm - 50 mm* (not for coronary analysis)

- Measurement program integrated in the imaging system for exact and reproducible vascular analysis
- Automatic contour recognition
- Stenosis quantification
- Automatic and manual determination of reference diameter
- Automatic and manual calibration methods
- Diameter measurement

** Option*

2D processing-Analysis

QuantWeb LVA - Left ventricular analysis*[1)]

- Scientific measurement program integrated in the imaging system for evaluating the functional efficiency of the left ventricle
- Automatic and manual contour recognition
- Calculation of the ejection fraction, volumes and indices (area-length and Simpson methods)
- Wall motion (centerline, radial, regional and slager methods)
- Automatic and manual calibration
- Distance and angle measurement

QuantWeb LVA Biplane*

- Scientific measuring program integrated in the imaging system for evaluation of the functionality of the left ventricle for Biplane systems
- Automated and manual contour detection
- Calculation of ejection fraction, volumes and indices (area-length and Simpson methods)
- Wall motion (centerline, radial, regional and slager methods)
- Automatic and manual calibration
- Distance and angle measurement.

QuantWeb QCA3D*

QuantWeb QCA3D enables interactive 3D reconstruction and visualization of coronary segments, including bifurcations. The application is especially suited for support in interventional cardiology, especially during stenting procedures. A three-dimensional coronary segment is reconstructed from two 2D X-ray projections.

QuantWeb QVA3D*

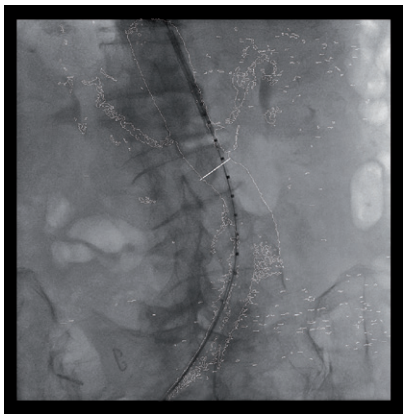
QuantWeb QVA3D enables interactive 3D reconstruction and visualization of vessel segments, including bifurcations. The application is especially suited for support in interventional angiography, especially during stenting procedures.
A three-dimensional vessel segment is reconstructed from two 2D X-ray projections.

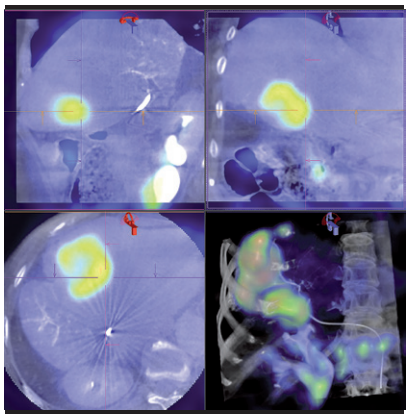
QuantWeb vFFR*

QuantWeb vFFR calculates the pressure drop in coronary vessels without the need of a pressure wire or hyperemic stimulus. QuantWeb vFFR builds a 3D reconstruction out of two angiograms and assesses pressure-drop, resulting in a vFFR value. QuantWeb vFFR is based on a pay-per-procedure model.

**Option*
[1)] Only on cardiac acquisition scenes

3D processing – Advanced tools and workflows





syngo Toolbox

syngo Toolbox is a generic application to interactively mark anatomical structures of interest in a 3D volume, e.g. a *syngo* DynaCT image, using points and lines. Analogously to *syngo* 3D Roadmap, these markings are projected onto the live 2D X-ray illustrating the position of the 3D anatomical structure within the live X-ray. Any change of the angulations of the C-arm or any change of the table position will cause the application to recalculate in real time the projection of the 3D markings to match the view of the live 2D X-ray image.
This function can be used to guide the operator with his or her instruments to a target structure as the markings in the 3D image can serve as a plan that is displayed in the X-ray image during the procedure.

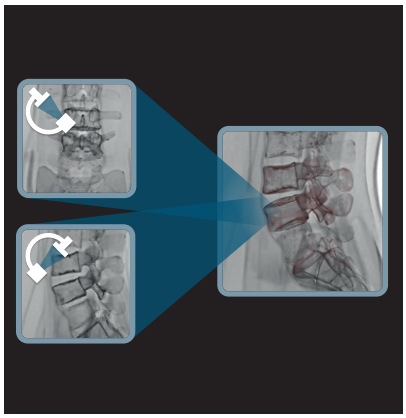
syngo 3D/3D Fusion

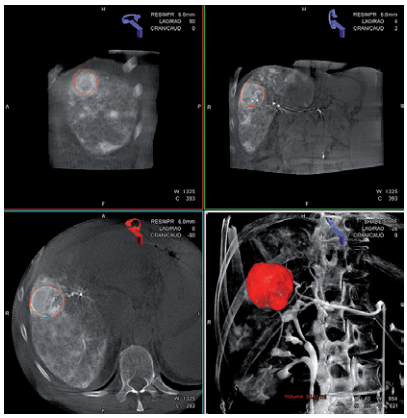
This application spatially aligns two 3D volumes from the same or different modality in such way that the anatomical structures overlay each other. Any *syngo* DynaCT or *syngo* Dyna3D image can be fused with datasets from e.g., CT, MR or PET.

syngo 3D/3D Fusion becomes particularly powerful in conjunction with *syngo* 3D Roadmap or *syngo* Toolbox. For example, a fused CT, MR or PET image can be overlaid with live fluoroscopy in combination with *syngo* 3D Roadmap. If anatomical structures have been marked in the CT, MR or PET image using *syngo* Toolbox, then such markings can be also superimposed on the live X-ray, providing information during endovascular and percutaneous procedures that are available neither in 2D X-ray nor in *syngo* DynaCT images.

Not all features shown are necessarily standard and available in all countries.

3D processing – Advanced tools and workflows





syngo 2D/3D Fusion

Saves 99 % dose when integrating pre-op volumes for live images guidance.[1)]
Pre-op CT, MR or PET data is often available, but remains unused for enhancing fluoro or acquisition projections in the angio suite. With *syngo* 2D/3D Fusion, only two fluoro projections are required to easily fuse 3D volumes for live image guidance.
Expand your capabilities while saving radiation dose compared to 3D/3D Fusion.

syngo Fusion Package including:

syngo Toolbox
syngo 3D/3D Fusion
syngo 2D/3D Fusion

syngo 3D Segmentation

Segmentation is an image-processing algorithm for extraction of anatomical structures.
The *syngo* 3D Segmentation application creates a graphical overlay that represents an anatomy of interest, e.g. soft tissue lesion, fibroid, or tumor, to be overlaid during the intervention with live X-ray, or for computational analysis, e.g., volume measurement.
The anatomy of interest is marked interactively by simple strokes inside and outside of the structure in multiple MPRs.
Based on the coarse strokes the workstation automatically segments the anatomy of interest, e.g. the enhancing part of the tumor tissue. The user can fine-tune the segmentation result by using additional strokes or by a 3D sculpting sphere in an MPR to indicate areas to be included or excluded. This results in a precise segmentation of the structure of interest.

[1)] *This measurement was performed with an Alderson phantom using Fluoroscopy with 10 images per 2D projection and a low-dose 6s DCT Body program. Results in actual clinical practice may vary.*
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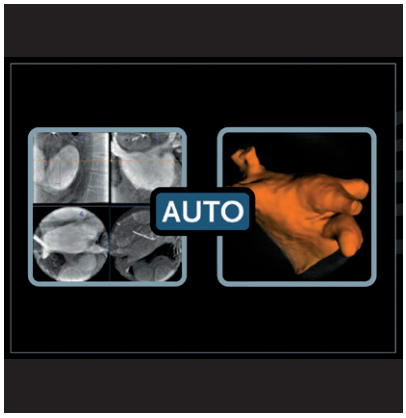
3D processing – Advanced tools



syngo LA Segmentation*

The application *syngo* LA Segmentation is an algorithm specifically designed to segment the left atrium (LA) of the heart. Based on a pre-operative CT, MR, or an intra-operative *syngo* DynaCT Cardiac, the *syngo* Application Software calculates the segmentation automatically. The segmentation can also be performed manually by the user with just one click inside the left atrium. The segmentation might be applied during electrophysiologic procedures and is utilized by *syngo* Electrophysiology Guidance.

syngo Congenital Heart Disease Guidance

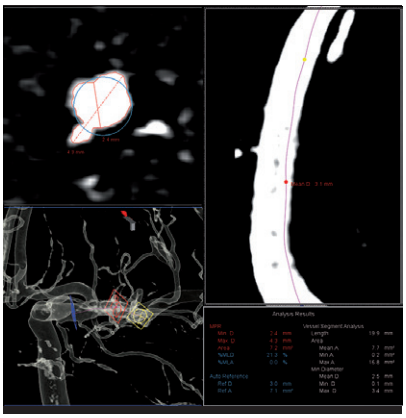
3D module for planning and guidance during congenital heart disease procedures.

syngo Congenital Heart Disease Guidance is an integrated workflow to perform congenital heart disease interventions. The workflow bundles the relevant tools to handle 3D volumes in the context of congenital heart disease interventions. The 3D volume as well as important markings or measurements can be overlaid on the live fluoroscopy image for easier orientation and guidance through the procedure.

** Outcome of segmentation quality is depending on individual image quality of the used DynaCT Cardiac images. Outcome has to be double-checked by the user and can be deleted and/or edited by the user. An alternative grey value based segmentation algorithm may be used instead depending on user's preference.*

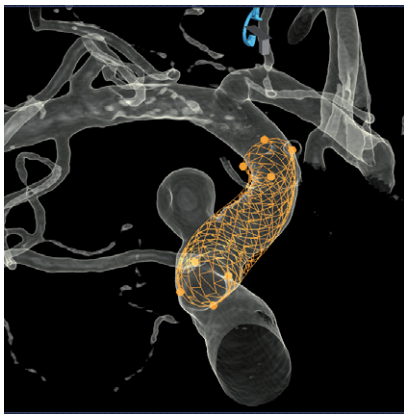
Not all features shown are necessarily standard and available in all countries.

Integrated 3D workflows



syngo 3D Stenosis Measurement

The application *syngo* 3D Stenosis Measurement allows analyzing a vessel segment using 3D views, e.g. MPR, VRT. Based on a 3D volume the user marks the vessel of interest with two mouse clicks. The vessel is automatically segmented and the center-line of the vessel is calculated.
The vessel can be displayed with a curved MPR along this centerline and key stenosis parameters are calculated such as mean, smallest, and biggest area of all cross sections along the vessel's course in the analyzed range. Additionally, the users can "scroll" interactively along the vessel while detailed stenosis parameters are calculated for each MPR such as minimum diameter, maximum diameter, and area of the vessel's stenosis cross-section as well as minimum luminal diameter and minimum luminal area.



syngo Neuro Virtual Stent

The *syngo* Neuro Virtual Stent application is a planning tool that provides a 3D virtual intracranial stent, which can be sized to a vessel during pre-stent deployment and can provide a 3D overlay onto a live X-ray or 2D roadmap image. The live 3D overlay of the stent can also be used post-stent deployment to provide guidance during coiling of intracranial aneurysms.

syngo Neuro Virtual Stent is part of the *syngo* Aneurysm Guidance Neuro application.

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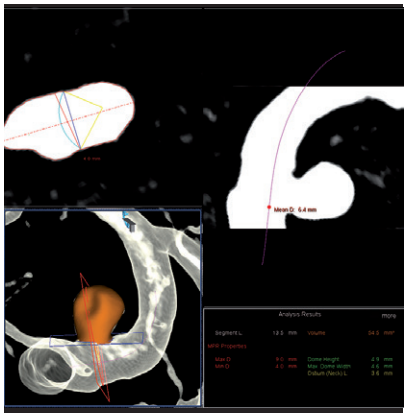
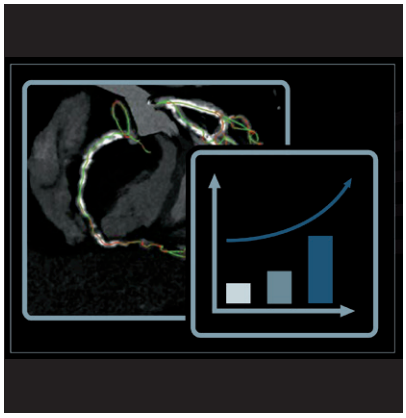
Integrated 3D workflows



syngo Aneurysm Guidance Neuro

With three simple mouse clicks, a cerebral aneurysm and its parent vessel are segmented in the *syngo* DynaCT or *syngo* Dyna3D image. Based on this segmentation, a complex analysis of the aneurysm is performed by the workstation and the aneurysm dome height and width, the ostium neck, angle, and length, as well as the ostium area and cutting plane are measured automatically.
The application also determines the centerline of the parent vessel and displays the vessel as a curved MPR along this centerline.



syngo CTO Guidance

syngo CTO Guidance enables planning based on automatic segmentation of coronary CTAs.

syngo CTO Guidance displays the shape of coronary arteries and their calcifications (from CT** images) next to live 2D X-ray images during CTO procedures.

syngo CTO Guidance provides segmentation of coronary CTAs for planning of CTO procedures.*

The extracted vessel centerlines (result of the automatic segmentation) help to get a better understanding of the length and shape of the lesion.
Furthermore, it provides guidance during the procedure by using COROwave – a color-coded visualization helps the operator to find the best C-arm angulation to avoid vessel foreshortening.

* *Outcome of automatic vessel extraction is depending on individual image quality of the used CT images. Outcome has to be double-checked by the user and can be deleted and/or edited by the user.*
** *Depends on the image quality of the CT acquisition.*

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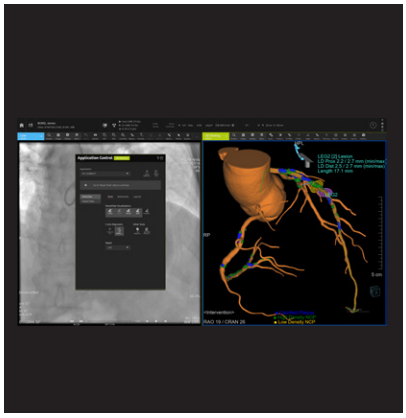
Integrated 3D workflows

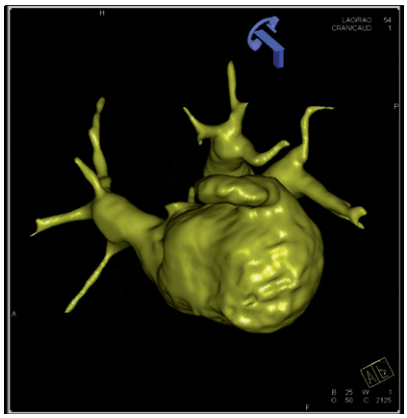


syngo PCI CONNECT

syngo PCI CONNECT is designed to offer new opportunities for precise CT-guided PCI. It helps the user develop an optimized PCI strategy by integrating CT-data derived from *syngo*.CT Coronary

Cockpit seamlessly into the cath lab and providing information on anatomy, lesions, and plaques for pre-procedural planning.

Based on lumen and plaque analysis, *syngo* PCI CONNECT supports to define lesion preparation, stent size and landing zone before the intervention. Staff needs, required materials, and timing can be established in advance, ideally optimizing cath lab utilization. It also delivers optimal angulation support by synchronized movements between the CT image and the C-arm and displays relevant information side-by-side with live fluoroscopy.



syngo Electrophysiology Guidance

Based on *syngo* LA Segmentation, *syngo* Electrophysiology Guidance enables "one-click" and automatic model-based segmentation and provides a virtual endoscopic view of the left atrium based on *syngo* DynaCT Cardiac, CT or MR images for planning of atrial fibrillation procedures in 3D.
Clipping functionality allows a view inside the left atrium.
It provides automized segmentation of left atrium morphology overlayed onto live fluoroscopy to facilitate catheter guidance during Atrial Fibrillation ablations. Ablation points can be marked on the mesh for treatment planning or documentation. The segmentation can be used for superimposition via *syngo* 3D Roadmap and for transfer to electro-anatomical mapping systems.[1]

[1] *Outcome of segmentation quality is dependent on individual image quality of the used raw images. Outcome of the segmentation has to be double-checked by the user and can be deleted and/or edited by the user.*

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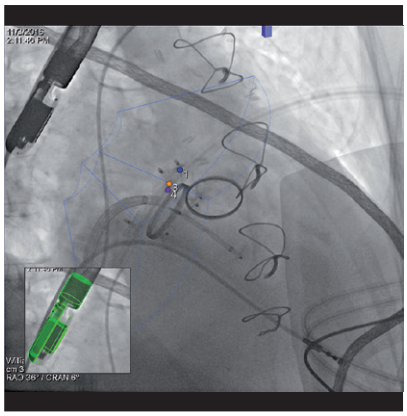
Integrated 3D workflows



syngo TrueFusion

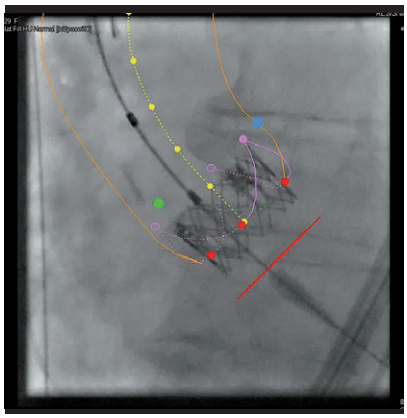
Fusion of structures and images from transesophageal echo (TEE) with live fluoroscopy adds guidance to structural heart disease procedures.

Based on the co-registration of ARTIS angiography system and ACUSON SC2000 PRIME and ACUSON Origin ultrasound system, *syngo* TrueFusion enables fusion of TEE landmarks, valve models and echo images with live fluoroscopy for target-oriented device navigation.

The relevant TEE structures are selected and marked directly on the ultrasound system and overlaid on the X-ray images. The structures can be dots or circular shapes with labels, or valve models automatically generated with the eSie Valves™ analysis tool.

Additionally, the co-registration information can be used to synchronize the image orientation of X-ray and echo images and provide anatomy-specific C-arm angulations.

syngo TrueFusion[2] provides continuous live overlay of ultrasound B-mode and Color Doppler images onto X-ray in order to enhance fluoroscopy by additional anatomical information from echo.



syngo Aortic Valve Guidance

Starting with *syngo* DynaCT Cardiac or pre-operative CT images as the basis, *syngo* Aortic Valve Guidance supports physicians in performing transaortic heart valve implantations (TAVI). The aortic root is automatically segmented in the intra-operative 3D *syngo* DynaCT Cardiac volume or in a pre-interventional CCTA volume and the anatomical landmarks are automatically detected. Based on these landmarks, an angulation of the C-arm is calculated that provides a perpendicular view of the annulus.
The annulus can be evaluated using dedicated annulus measurement. Accordingly to the result of the segmentation and detection the C-arm can be moved automatically to the predefined angulation and the segmented aorta and the anatomical landmarks can be overlayed and superimposed on live X-ray.
Starting with the 3D acquisition, the entire process is automated and the C-arm is positioned in the desired view within seconds.

[2] *The accuracy and the quality of registration of syngo TrueFusion depends on the orientation of the probe, the angular difference between the two projections, the C-arm position, and the zoom stage.*

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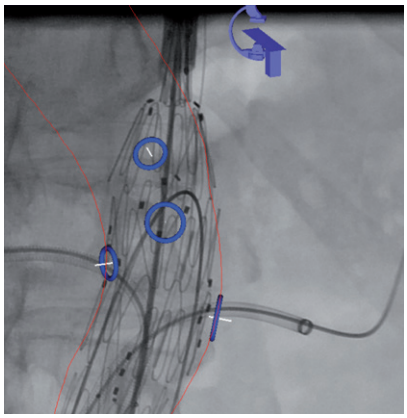
Integrated 3D workflows



syngo EVAR Guidance*

syngo EVAR Guidance automates all steps in the preparation of a pre-procedural CT dataset for 3D guided stent deployment.
Based on an intelligent mesh modeling of the aortic wall, vessel centerlines are calculated automatically.
The ostia of the main branching vessels are visualized and landing zones for the stent are proposed.

Benefits:

- Fast and automated preparation of the CT data set for fusion imaging
- Automated calculation of centerlines with distance marks that allows for sizing of stent length
- Reduce procedure time using automated vessel wall detection

** Outcome of automatic vessel extraction is depending on individual image quality of the used CT images. Outcome has to be double-checked by the user and can be deleted and/or edited by the user.*

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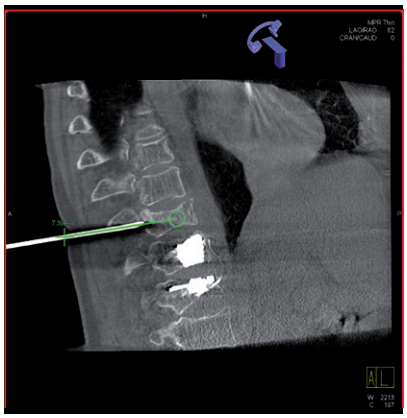
Integrated 3D workflows



myNeedle Guide

myNeedle Guide is part of myNeedle Companion which consists of the planning and guidance software (myNeedle Guide) and the laser guidance system (myNeedle Laser) which is integrated in the C-arm. With myNeedle Guide, the operator can plan needle procedures in a 3D volume by specifying a target and multiple needle trajectories. The planning can be performed based on an intra-operative *syngo* DynaCT image or based on pre-interventional volumetric CT, MR or PET data in combination with *syngo* 3D/3D Fusion or *syngo* 2D/3D Fusion. During the intervention the target and the trajectories are projected and superimposed on the live 2D X-ray aligned with the angulation of the C-arm. Using live fluoroscopy and the corresponding overlaid projections, the operator is able to align the instrument with the planned trajectory and is guided precisely to the target. Control scans are automatically registered with the planning volume without interrupting the needle guidance workflow. The laser crosshair (myNeedle Laser) is automatically positioned along the planned trajectory and indicates the entry point on the patient as well as the planned angle of the needle or instrument for partial needle advancement without imaging. The progression of the instruments can be observed in perpendicular X-ray views.

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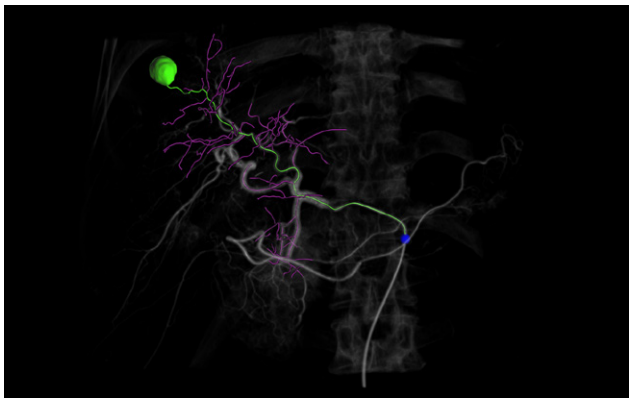
Integrated 3D workflows



myEmbolization Guide

Thorough embolization planning is essential for effective patient treatment. Identifying target structures, understanding their vascular supply, and navigating a catheter through a patient's complex vasculature can be challenging, even for experienced clinicians.

myEmbolization Guide supports this process from exam and control room by combining advanced AI-powered tools with intuitive interaction and flexible visualization, supporting clinicians from planning to precise device navigation. The application is split into three distinct workflows: Liver, Prostate, and Flex.

Liver and Prostate Workflows
For liver and prostate workflows, myEmbolization Guide provides AI-powered vessel identification and enables the user to semi-automatically highlight the vascular supply of the intended target structures, i.e. the feeder and non-feeder vessels, with respect to a distinct catheter position based on a *syngo* DynaCT or CT dataset acquired with intra-arterial contrast enhancement.

For the liver workflow targets can be indicated by an AI-powered 3D lesion contouring or via a sphere and for prostate workflow a sphere can be used to visually hightlight the target. A dedicated measurement support automatically provides diameter and volume information of each target structure.

In the liver workflow, the catheter position is automatically detected, and in the prostate workflow, the catheter position is defined manually by the user.

Independent of the chosen target highlighting, an extended vessel detection zone can be added by the user.

A clear visual distinction between feeder and non-feeder vessels supports accurate navigation with full control over the visualized structures. The user can adjust the display, for example by changing the visible length of non-feeder vessels or showing and hiding target structures.

Flex Workflow
The Flex workflow enables users to visually highlight manually identified vessels based on contrast-enhanced *syngo* DynaCT, CT volumes, or MR volumes.

Independent of the chosen workflow, the ability to graphically overlay the embolization planning - for example, target structures or the vascular supply - onto the current fluoroscopy image helps guide the catheter more precisely in complex situations.

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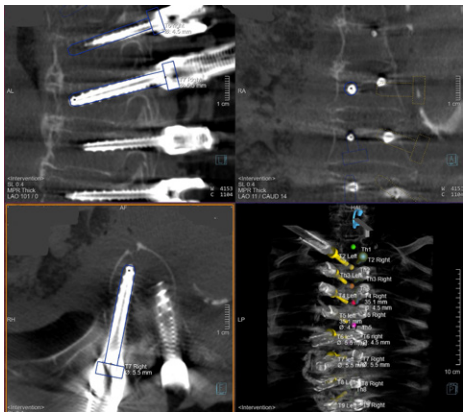
Integrated 3D workflows



myScrew Path Assist

myScrew Path Assist facilitates pedicle screw placement within an ARTIS pheno.vision, encompassing planning and guidance in a seamlessly integrated workflow.

ARTIS pheno.vision with myScrew Path Assist is designed to increase accuracy when placing pedicle screws compared to a freehand technique without the need for any additional equipment.

MyScrew Path Assist offers a guided, intuitive 3-step approach for consistent screw placement on the spine.

Step 0: 3D-imaging with *syngo* DynaCT (3D engine is needed)
Visualize the anatomy of interest using *syngo* DynaCT.

Step 1: Planning
Label and center the vertebrae for better orientation of the spine. Plan one or more screw pathways with simple drag-and-drop in the different cross-sections. Easily adjust the width and length of the screws. The fly-through feature allows surgeons to virtually 'fly along' the planned screw path in axial views, providing a dynamic perspective to ensure accuracy and safety.

Step 2: Incision Guidance
Visualize the planned trajectory with the integrated laser, which automatically aligns to the screw paths.

Step 3: Screw Path Assistance
Overlay the trajectory on live fluoroscopy to verify the progression of the Yamshidi needle and screws. After placing the K-wires, insert the screws.

Optional: Final verification
Surgeons can verify the placed screws with a final *syngo* DynaCT scan.

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