Dedicated Surgical Imaging

Siemens Solutions for Surgery

www.siemens.com/surgery

Answers for life.
# Table of contents

The rapidly changing field of cardiovascular surgery ........................................... 4  
Dedicated imaging for cardiac and vascular surgery ........................................... 6  
Dedicated imaging for endobronchial procedures and thoracic surgery ...................... 8  
The novel ways of neurosurgery ............................................................................. 10  
Dedicated imaging for neurosurgery ..................................................................... 12  
Surgical guidance with confidence ......................................................................... 14  
Dedicated imaging for orthopedic and trauma surgery ........................................ 16  
Dedicated imaging for intra-abdominal and urological tumors .............................. 18  
Urology – Navigation in the urinary tract ................................................................. 20  
Artis zeego – the dedicated system for intraoperative imaging ............................. 22  
Integrated surgical tables for hybrid ORs ............................................................... 24  
Hybrid OR – Planning ............................................................................................ 25  
Mobile C-arms for demanding applications in the OR ......................................... 26  
Imaging solutions for urology ............................................................................... 28  
High-performance ultrasound .............................................................................. 30  
CT image guided therapy ....................................................................................... 32  
Challenging the way surgery is done today .......................................................... 33  
The world’s most straightforward solutions for 2D & 3D CT-guided therapy .......... 34  
Our portfolio in CT-guided therapy ...................................................................... 36  
Navigation solutions ............................................................................................. 38  
Education/financial services ................................................................................. 39
The rapidly changing field of cardiovascular surgery

Clearly, the future of cardiovascular surgery is minimally invasive. With the introduction of drug-eluting stents, hybrid revascularization with a MIDCAB (minimally invasive direct coronary artery bypass) to the LAD (left anterior descending) artery and stenting of other vessels have become valid alternatives to conventional CABG (coronary artery bypass grafting).

Structural heart disease therapy has undergone revolutionary changes with the advent of catheter-based techniques for congenital heart and heart valve disease (TAVI). Endovascular therapy has become the treatment of choice for the aorta and peripheral arteries in many indications. New innovative devices, like fenestrated or branched stent grafts, have triggered new surgical techniques and have helped qualify many more patients for endovascular treatments. All of these new surgical therapies require highly advanced imaging systems to perform them.

Think intraoperative imaging. Think Siemens.
“Reliably evaluating small vessel anastomoses is crucial for our procedures.”
Dedicated imaging for cardiac and vascular surgery

Cardiovascular surgery covers a wide range of procedures, each with specific imaging requirements.

System icon overview

The system icons appear from left to right in order of the Siemens system recommended for the respective application.

- Mobile C-arm system
- Fixed C-arm system
- Ultrasound system
- Computed tomography

Please note that regional regulations may limit the choice of systems.

Transcatheter Aortic Valve Implantation (TAVI)

Precise deployment of transcathether valves requires high quality imaging with fixed C-arm systems or CT scanners according to many national guidelines. For pre-operative planning, the syngo.CT Cardiac Function – Valve Pilot allows automated detection of annulus plane and its dimensions. Uniquely, the corresponding angulations are calculated and transferred to the C-arm system. During the procedure, 3D image guidance with syngo Aortic Valve Guide and intraoperative 3D imaging with syngo DynaCT are helpful to support precise deployment of the valve and might improve clinical outcomes.

Hybrid Revascularization

A fixed C-arm is recommended to visualize the coronaries and the bypass in high quality and with a high frame rate during coronary bypass operation.
Device implantation

Mobile C-arms can be used for lead placement for intra-cardiac defibrillators and pacemakers. For the implantation of biventricular pacemakers, 3D image guidance might be helpful for the lead placement at the left ventricle by overlaying the coronary sinus onto the live fluoroscopy.

Congenital heart diseases

Treatment of complex congenital heart diseases like the hypoplastic left heart syndrome sometimes requires a hybrid procedure. Fixed imaging systems can offer 3D image guidance by overlaying preprocedural MRI or CT data onto the live fluoroscopy. Intraprocedural 3D imaging with syngo DynaCT as well as ultrasound can be used to control the result of the surgical procedure.

Endovascular aortic repair (EVAR)

In general, most EVAR procedures can be well managed with a high-powered mobile C-Arm. A large field of view with high resolution is beneficial.

Especially for complex procedures like the implantation of fenestrated/branched stent grafts, 3D image guidance with a fixed angiography system can be helpful to support precise stent deployment.

Fixed imaging systems support image fusion where preprocedural CT images can be overlayed onto the live fluoroscopy image and help the surgeon deploy the stent precisely at the right landing zone. The distortion of the aorta with the stiff catheter remains a challenge.

Intraoperative 3D imaging performed with the catheter in place visualizes the correct anatomy and delivers a more precise overlay.

Carotid artery stenting/peripheral vessels

The carotid artery and peripheral vessels are ideally evaluated by ultrasound with Doppler and a mobile C-arm. A fixed C-arm system offers functional data such as color-coded flow information with syngo iFlow parenchymal blood flow data in 3D.
Dedicated imaging for endobronchial procedures and thoracic surgery

Advances in minimally invasive surgery in the past several years have been nothing short of astonishing. Procedures supported by 2D and 3D interventional imaging have emerged and others have become mainstream. The ability to obtain intra-procedural images now enables physicians to account for anatomical changes as the procedure progresses. This represents a big step forward from pre-operative data. Cancer surgery, particularly for lung cancer, is a field that has embraced this promise for better outcomes.

**Navigation in lung biopsies**

Taking biopsies from small lung nodules to diagnose cancer at an early stage poses an opportunity and a challenge at the same time. Small and peripherally located nodules are hard to identify and reach during biopsies using conventional methods. With both 2D and 3D images being acquired intra-procedurally, and the patient in the same position and the diaphragm still, navigation is highly accurate and false-negative results can be greatly reduced. Intra-procedural 3D imaging with syngo DynaCT makes the tumor clearly visible within just a few seconds. With syngo iPilot, real-time fluoroscopic images can be superimposed during the procedure, facilitating precise navigation of the biopsy forceps within the bronchial tree to even small and peripherally located nodules. In addition, transthoracic biopsies are also supported with the same software.

**Navigation in lung cancer surgery**

While VATS (video-assisted thoracoscopic surgery) has matured to become an established, alternative approach to conventional open surgery, nodules can sometimes be hard to find with a videoscope and no possibility to palpate the nodule. Often, too much healthy tissue is excised to make sure the nodule is definitively removed. syngo DynaCT lets the surgeon obtain intra-procedural 3D images in order to clearly visualize the nodule. With syngo iGuide, our needle guidance software, surgeons can inject contrast medium or micro-coils transthoracically into or next to the nodule with excellent precision, which will then be visible under fluoroscopy. Imaging can substitute the physician's sense of touch and enable excision with greater accuracy, helping to preserve healthy lung tissue.

Think intraoperative imaging. Think Siemens.
Lung biopsies

Interventions with complex anatomies such as lung biopsies are routinely visualized with 3D CT guidance offered with the Adaptive 3D Intervention Suite. It allows to work freely within a 3D volume-rendered spiral or sequential CT dataset. Working in near real-time 3D offers many advantages: you can see the whole organ using a VRT and view the lesion with sagittal, coronal, and axial MPRs. Always be on track with our smart automatic needle detection algorithms and path planning tools.

Alternatively, displaying the nodule in 3D and enabling precise navigation through the lungs into the nodule can be performed with a fixed C-arm with 3D capabilities and advanced software.

Alternatively, displaying the nodule in 3D and enabling precise navigation through the lungs into the nodule can be performed using a fixed C-arm with 3D capabilities and advanced software solutions.

VATS

As for lung biopsies, intra-procedural 3D and advanced software to facilitate precise excision of the nodules can best be accommodated by a fixed C-arm system.

CT-guided lung biopsy
The novel ways of neurosurgery

Advanced imaging and navigation capabilities that enable integrated interventions play a key role in modern neurosurgery. Planning and performing stereotactic procedures with the help of intraoperative 3D imaging, for example, is an increasingly popular practice.

Likewise, stenting intra- and extracranial vessels has become an important adjunct to surgery. The treatment of intracerebral aneurysms has been further improved through the use of flexible endovascular and open surgical approaches. Highly advanced imaging systems make it possible.

Think intraoperative imaging. Think Siemens.
“Imaging systems that support interventional aneurysm treatment are the future.”
Dedicated imaging for neurosurgery

Similar to cardiovascular surgery, neurosurgery comprises a variety of new techniques and procedures with very specific imaging requirements. The following overview is designed to provide assistance in selecting the most suitable imaging modality.

**Aneurysm clipping and coiling**

If coiling of aneurysms is performed, a fixed, preferably a biplane C-arm system is recommended. After surgical clipping completion 2D angiography with mobile C-arms is considered to be the gold standard to assess occlusions in the OR. Fixed C-arms offer the additional benefit of intraoperative 3D angiography.

**Stereotactic surgery**

Fluoroscopic guidance for frameless stereotactic procedures is supported by mobile and fixed C-arm systems as well as CT systems with integrated 3D capabilities. Mobile as well as fixed C-arms are fully integrated with navigation systems for automatic image registration. Advanced imaging with live overlay of 3D structures is provided only by fixed C-arm systems.

**Spine surgery**

Main applications in spine surgery include fusion of vertebrae, kyphoplasty and vertebroplasty. C-arms or CT scanners with high resolution and penetration are essential to monitor correct positioning of screws, instruments, implants and injected cement. Optional 3D imaging with navigation may enhance treatment precision and enable intraoperative evaluation of the surgical procedure. Robotic 3D imaging improves additionally the workflow by moving the C-arm to memorized positions. Furthermore, the large flat panel detector provides an exceptionally large field of view.

---

**System icon overview**

The system icons appear from left to right in order of the Siemens system recommended for the respective application.

- Magnetic Resonance Imaging
- Intra-operative sliding gantry CT
- Mobile C-arm system
- Fixed C-arm system
- Ultrasound system

Please note that regional regulations may limit the choice of systems.
**Pain management**

Interventional procedures typically used for chronic back pain such as epidural steroid injections, facet joint injections and neurolytic blocks are controlled under successive fluoroscopy or sequential CT scanning. Great flexibility of projections along with easy self-controlled handling are essential system features.

**Arteriovenous malformation surgery**

Surgery for AV malformations with coiling of the arterial supply requires a fixed C-arm system. A biplane C-arm system is recommended for these complex procedures. For microsurgical excision of an arteriovenous malformation, fixed C-arms have been used to evaluate for complete extirpation of the lesion and to find missing or hidden feeding vessels.

**Shunt surgery**

To evaluate the correct placement of the shunt in a central vein, a mobile C-arm is sufficient. However, to locate the shunt within the lateral ventricle, 3D imaging with soft tissue contrast, in other words a fixed C-arm, is necessary.

**Tumor surgery**

CT or MR imaging combined with navigation in the OR is a state-of-the-art solution for brain tumor surgery, minimizing the effects of intraoperative brain shift and revealing any residual tumor, thus improving management and outcome of patients. Combining CT or MR imaging with an angiography system may take you to the next level.

**Carotid artery stenting**

The carotid artery and peripheral vessels are ideally evaluated with Doppler ultrasound and a mobile C-arm. A fixed C-arm system can provide additional information, for example, perfusion and vessel quantification.
Surgical guidance with confidence

Minimally invasive procedures are also becoming more and more commonplace in orthopedic and trauma surgery. This is partly due to cost pressures and time constraints, but primarily in an effort to minimize tissue damage and improve patient recovery time.

Advanced imaging tools such as fixed or mobile C-arms offer surgeons ideal support. The use of 3D imaging, laser guidance or the combination with a navigation system can increase the precision of procedures while also saving time and dose. 3D imaging provides excellent support for delicate placement tasks, reduces the rate of second interventions, and has revolutionized the entire workflow.

Think intraoperative imaging. Think Siemens.
“We need real-time imaging for precise fracture identification and repositioning.”
Dedicated imaging for orthopedic and trauma surgery

For years, imaging technologies have played an essential role in orthopedic and trauma surgery. The following overview is designed to provide assistance in selecting the most suitable imaging modality.

System icon overview
The system icons appear from left to right in order of the Siemens system recommended for the respective application.

- Mobile C-arm system
- Computed tomography
- Intra-operative sliding gantry CT
- Fixed C-arm system
- Ultrasound system

Please note that regional regulations may limit the choice of systems.

Fracture treatment
During the osteosynthesis of fractured bones screws, nails and plates are placed under successive imaging control. This can be supported by intraoperative 3D imaging with CT Sliding Gantry. The positioning flexibility of C-arms is an important requirement. Optional 3D imaging enhances the precision of the treatment as well as allows intraoperative evaluation of the surgical procedure. The surgeon finishes the procedure with confidence that all screws are in the right position.

Limb surgery
Surgery of fractured parts of the hand and foot requires high resolution of fine structures and zoom functionalities, as well as an easy-to-adjust system like a C-arm. Intra-articular fractures can be imaged precisely and very small treatment devices like screws can be placed.

Pelvic surgery
Surgery of a fractured pelvis can be a complex challenge. Mobile C-arms readily support bone repositioning and fixation. Intraoperative imaging of the whole pelvis in 3D requires a multi-axis fixed C-arm system or an intraoperative CT Sliding Gantry with large volume imaging. Pelvic fractures in trauma patients are commonly associated with disruption of arteries and veins resulting in major hemorrhage. A fixed C-arm in the OR can greatly simplify the workflow in such emergency cases since angiographic embolization can be performed right on the OR table.
Spine surgery

All levels of the spine can be precisely imaged, even in obese patients in complex positions. Sliding Gantry CT systems and C-arms with high resolution and penetration are essential to monitor correct positioning of screws, instruments and implants. Optional 3D imaging may enhance treatment precision and enable intraoperative evaluation of the surgical procedure. Robot-assisted imaging has the potential to speed up the surgical workflow for spinal fusion.

Osteotomy

Osteotomy is a surgical operation whereby a bone is cut to shorten, lengthen or change its alignment. Conventional 2D imaging with advanced measuring functionalities is suitable.

Prosthesis

In the growing field of artificial hip and knee prosthesis surgery, visualization is usually performed with conventional mobile 2D imaging. Available advanced penetration capabilities are advantageous in hip replacements for obese patients.

Tumor surgery

Intraoperative CT and CT-like imaging with fixed C-arms can visualize tumors involved within the soft tissue or the skeletal system. Also options to fuse preoperatively acquired MR or PET/CT and ultrasound data with the intraoperative 3D volume for precise location and surgical treatment of the patient can be easily achieved in the OR. In individual cases, an advanced 3D C-arm may be considered as an alternative.

Trauma surgery

Mobile C-arms are standard of care in the majority of trauma procedures. In the treatment of complex fractures of joints, intraoperative 3D imaging and evaluation helps to improve correct anatomical repositioning and reduces revision rates. High deceleration accidents or other poly-traumata can occur with severe vascular damage. C-arm systems with high resolution imaging and DSA capabilities can help to treat the patient right in the OR in a one-stop approach. Severe hemorrhage can be detected and treated at the same time, which is often crucial for the survival of the patient. A CT Sliding Gantry solution has the potential to further optimize the use of CT in the emergency room and eliminate the need for multiple patient transfers between different rooms and imaging tables. Moreover the system may also serve two rooms. For example, a diagnostic imaging room and a dedicated OR for trauma treatment. The application of such a solution has shown to save time in the crucial initial phase of trauma treatment.
Dedicated imaging for intra-abdominal and urological tumors

Laparoscopic surgery is common ground for most surgeons. However, the support of intraoperative 3D imaging is a new idea. The possibility to look behind the surface of an organ when anatomy has changed as soon as surgery starts enables the surgeon to gain more information. With the loss of tactile sensing and the natural 3D vision while using the laparoscope, 3D imaging can help to make the invisible visible. Tumors underneath the surface can be detected with an insufflated abdomen and fusion possibilities with preoperative MR, PET/CT or intraoperative ultrasound data can be used. The integration of OR tables allows sophisticated patient positions and the anatomical changes due to surgical manipulation can be taken into account progressively.

Critical structures such as vessels and the tumor are visualized, helping the surgeon to adapt to his surgical plan and saving the patient as much healthy tissue as possible. This is especially critical in patients with multimorbidities.

Think intraoperative imaging. Think Siemens.
Liver tumor biopsy and ablation

The Siemens CT intervention suite offers the ability to guide minimal invasive tumor biopsy, trans aortic chemo embolization (TACE) or ablation. Real-time CT scanning within the operating room can be used during the intervention to provide maximum accuracy of therapeutic procedures. Potential applications for real-time, sliding gantry CT imaging in a surgical setting are substantial and include stereotactic biopsy of suspicious lesions and electrode placement for tumor ablation. CT Perfusion imaging allows to monitor tumor response directly after treatment.

Laparoscopic partial liver resection

Displaying the tumor and critical structures in 3D enabling precise navigation intra-abdominally usually requires a fixed C-arm with 3D capabilities and advanced software solutions. 3D data fusion of preoperatively and intraoperatively acquired volumes can be overlayed in a live fluoroscopy image and can help to guide the surgical instruments.

Minimally invasive surgery for kidney tumors

Nephron-sparing laparoscopic surgery for kidney tumors is challenging. The tumor needs to be precisely located so that only cancerous tissue is excised and not disseminated within the abdomen.

A critical part of this procedure involves clamping the blood supply to the kidney. Leading vessels to the tumor can easily be detected utilizing Perfusion CT or intraoperative syngo DynaCT and the tumor can be resected clamping only the tumor vessels, leaving the healthy remaining kidney perfused and providing the patient better kidney function.
Urology – Navigation in the urinary tract

The majority of urologic procedures, e.g., URS (ureterorenoscopy), PCNL (percutaneous nephrolithotomy) or retrograde pyelography are usually performed with conventional 2D imaging. This field of application can easily be covered by common mobile C-arms or a fully digital X-ray table like the Uroskop Omnia Max.

However, there are two main areas in urology where 3D interventional imaging may challenge current uses and customs. One is in the field of endourology for the treatment of kidney stones and another is minimally invasive surgery for the treatment of renal cell carcinoma.

While the majority of kidney stones can be removed using URS techniques or ESWL (extracorporeal shock wave lithotripsy), stones located deep in the kidney require removal by means of an operating telescope – PCNL. During this procedure the surgeon inserts a catheter into the kidney and stones are then broken up with a laser. A catheter is used to drain the urinary system of the remaining debris. Urological tumors like kidney cancer are covered in the laparoscopic section.

Great imaging solutions let surgeons visualize the entire kidney urinary bladder (KUB) in a single glance and facilitates safe and quick decisions. Excellent support for precise localization is provided.
Stones of the urinary tract

Urinary tract stones are mostly treated transurethrally with a flexible endoscope.

If a stone located within the kidney, the kidney pelvis or the kidney calyx is treated with PCNL, it is difficult to place the catheter in the exact location. Re-interventions can occur or hospital stays can be longer due to the misplacement of the catheter.

In most cases the access to the kidney can be accessed accurately with 2D imaging and ultrasound. However, needle guidance with syngo iGuide can help surgeons place the catheter with excellent precision. In-room 3D imaging with CT Sliding Gantry or syngo DynaCT gives the precise localization of the catheter in the kidney and its calices. It lets the surgeon see the catheter in different planes, ensuring greater safety for the patient and peace of mind for the surgeon.
Artis zeego – the dedicated system for intraoperative imaging

High-end angiography units and fixed C-arm systems in general provide ideal imaging support for complex and delicate interventions. They pave the way for emerging procedures to treat patients previously considered too ill, and thus unsuitable for surgery, as well as patients at very early disease stages for whom surgery had been judged too invasive until now. In many cases, they can help make minimally invasive surgery safer and more efficient.

Siemens offers a broad variety of angiography systems. Across all system families, ceiling-mounted, floor-mounted and biplane stands are available. In addition, Siemens offers a unique robotic system, the Artis zeego, the embodiment of flexibility, designed specifically for surgery.
Artis ceiling-mounted systems
Full patient coverage combined with flexible working positions and easy patient access are just some of the system’s many advantages.

Artis floor-mounted systems
A real space saver in the OR with a small footprint, the system allows for convenient patient access from both sides of the table.

Artis biplane systems
The biplane system offers excellent coverage and flexibility for the complete applications spectrum, including neuro, spine as well as pediatric imaging during surgery.

Artis zeego
The first-ever interventional C-arm system to employ robotic technology. Its exceptional flexibility and unique imaging applications make it an ideal system for the OR across all disciplines and for multi-disciplinary use.

The Artis zeego robotic imaging system gives you maximum flexibility for your hybrid operating room.

The unique mounting of the C-arm on an industry robot provides head-to-toe 3D coverage with ample space for anesthesia and park positions far from the operating field. The motorized system moves to any of those positions at the push of a button.

With installation positions at 0°, 15° and 30°, it makes the best of any room. Being floor-mounted, it combines positioning flexibility and compliance with the highest hygienic standards and frees up space for installation of other ceiling-mounted components, such as OR lights.

The robotic component also enables unique 3D capabilities:

• syno DynaCT Large Volume for larger field of view
• syno DynaCT 360° for quicker 3D acquisitions
• syno DynaCT portrait mode for long fields of interest
• syno DynaCT eccentric run for off-centered 3D

The flexible isocenter furthermore enables 3D imaging in combination with integrated surgical tables by Maquet and Trumpf.
Maquet Magnus and Trumpf TruSystem 7500 for Artis

With the integration of the Maquet Magnus and the Trumpf TruSystem 7500 for Artis systems, Siemens offers you the broadest choice of integrated surgical tables on the market.

Both systems come with one-piece carbon tabletops and with segmented, radiolucent tabletops. These breakable tabletops are highly flexible and the segments are partially motorized. Shuttling allows convenient use of whichever tabletop best matches the requirement of a procedure.

Therefore, the integrated OR tables are optimally suited for multidisciplinary use or rooms with a high percentage of open surgical procedures. Most surgical disciplines require sophisticated patient positioning, among them neurosurgery, urology, trauma surgery, orthopedic surgery, abdominal surgery and thoracic surgery. The integrated OR tables provide the flexibility necessary.

Both integrated table systems are available with Artis systems. However, the benefits of a regular surgical table in the hybrid OR can only be fully reaped with a robotic imaging system that adapts flexibly to height and angulation adjustments of the table and even performs 3D imaging in such sophisticated positions.
Hybrid OR – Planning

Why good planning is vital to your hybrid OR
Adding an angiography system has a considerable impact on your operating room. To fully reap the clinical and workflow benefits it has to offer, careful planning is vital.

The new concept will touch on room layout and in-room workflow, on material logistics, staffing and patient flow. Staff training and data management have to be considered. Numerous technical details will affect the final layout of your room.

This holds true whatever imaging company you choose as a partner for your project, but there is one company that can help you make this a smooth and fruitful process.

What Siemens can do to support you
With more than 500 hybrid ORs installed, we have the experience and expertise needed to make your project a success.

We know how to plan around your surgical workflow while taking complex technical interdependencies, architectural conditions and department logistics into account. As an imaging company, profound knowledge of radiation shielding goes without saying. To make sure all stakeholders are involved in the planning process and share a mutual understanding of the future room, we provide true 3D plans of your hybrid OR for discussion.

Our offerings go beyond classic hybrid ORs with surgical angiography. You may equally trust in our expertise in complex projects, such as entire OR wings and multimodality radiology departments or special solutions such as Miyabi systems.
Mobile C-arms for demanding applications in the OR

Siemens has a broad lineup of mobile C-arms that combine excellent image quality with unique features designed for easy operability, versatility and efficiency. Straightforward functions and excellent ergonomics greatly enhance handling convenience while simplifying overall clinical workflow in many fields of practice.
SIREMOBIL® Compact L
SIREMOBIL Compact L is our compact all-around performer for various surgical applications such as general surgery, orthopedics, trauma surgery, pain management and ambulatory care.

Cios Alpha
Cios Alpha is our high-end C-arm with Full View FD Technology and the Retina Imaging Chain incorporating IDEAL dose reduction (Intelligent Dose Efficiency Algorithm). It provides outstanding image quality very low possible dose and an up to 25% larger* field of view, even during image rotation. This powerful 25 kW** mobile C-arm with an active cooling system and motorization is ideally suited for a vast range of applications, including vascular, cardiac, trauma and orthopedic surgery, gastroenterology, endourology and many other fields of practice.

*Compared to today’s image intensifiers
**Option

ARCADIS® Varic
ARCADIS Varic is our advanced multipurpose C-arm for a broad range of applications like orthopedics, trauma and vascular surgery or urology, for streamlined workflow and outstanding image quality in the OR.

ARCADIS® Avantic
ARCADIS Avantic is our high-end multipurpose C-arm with brilliant image quality for a vast range of applications, including cardiac surgery, vascular surgery, gastroenterology, orthopedics and many other fields of practice where power and a large field of view are required.

ARCADIS® Orbic/Orbic 3D
ARCADIS Orbic/Orbic 3D is our high-end multipurpose C-arm with excellent image quality, isocentric design and 190° orbital movement. The additional 3D functionality of ARCADIS Orbic 3D is best suited for intraoperative use in orthopedic, trauma and spine surgery.

ARCADIS® Varic
ARCADIS Varic is our advanced multipurpose C-arm with Full View FD Technology and the Retina Imaging Chain incorporating IDEAL dose reduction (Intelligent Dose Efficiency Algorithm). It provides outstanding image quality very low possible dose and an up to 25% larger* field of view, even during image rotation. This powerful 25 kW** mobile C-arm with an active cooling system and motorization is ideally suited for a vast range of applications, including vascular, cardiac, trauma and orthopedic surgery, gastroenterology, endourology and many other fields of practice.

*Compared to today’s image intensifiers
**Option
Imaging solutions for urology

**Uroskop Omnia Max**
With 43 cm x 43 cm dynamic flat detector technology you can cover the entire urologic tract with one single image and in exceptional quality – resulting in precious time savings and less patient dose.
Modularis
A therapy unit, patient table, mobile C-arm, and an ultrasound system – Modularis provides leading shock wave technology and the flexibility of a modular system to meet your clinical needs within your budget. For highly efficient stone treatment and true multifunctional use.
High-performance ultrasound

Ultrasound has a vital role in perioperative and intraoperative imaging. Siemens offers a comprehensive range of ultrasound systems to address your needs.

**ACUSON Freestyle™ Ultrasound System**
The ACUSON Freestyle ultrasound system is a high performance, compact and portable ultrasound imaging solution with the world’s first wireless transducers. It delivers exceptional clinical performance across a variety of applications with outstanding image quality. With innovative wireless transducers and wireless real-time system control, the system provides unparalleled advantages for performing ultrasound-guided procedures. The removal of cables and the ability to submerge or rinse off in pre-cleaning solution can improve infection control.
ACUSON X300™ Ultrasound System, Premium Edition (PE)
The ACUSON X300 PE is robust yet flexible. The system’s mobility and rapid 12-second reboot provide instant access when fully featured diagnostic capabilities are needed.

ACUSON X700™ Ultrasound System
The ACUSON X700 system offers precise performance for adult cardiology solutions from TTE to TEE to ACUSON AcuNav ultrasound catheters. Workflow is streamlined with automated features such as TGO(tm) tissue grayscale optimization technology.

ACUSON SC2000™ Ultrasound System
The ACUSON SC2000 system redefines cardiovascular ultrasound by delivering innovative imaging and workflow solutions for the entire cardiovascular ultrasound market. The system enables the first 3D intracardiac echocardiography (ICE) with the ACUSON AcuNav V ultrasound catheter.

ACUSON AcuNav™ Ultrasound Catheters
The ACUSON AcuNav ultrasound catheter enables procedure visualization and device placement monitoring with a 8F or 10F intracardiac transducer. The ACUSON AcuNav V catheter is the world’s first commercial 10F volume intracardiac catheter. It offers real-time 3D visualization of anatomy and devices, as well as seamless integration into EP and structural heart programs.

ACUSON P300™ Ultrasound System
The ACUSON P300 system is a compact and mobile platform with excellent image quality. It offers a full range of transducers to meet the imaging needs in the surgical suite.

ACUSON S3000™ Ultrasound System, HELX™ Evolution
The ACUSON S3000 system, HELX Evolution is the gateway to Siemens pioneering technology. It delivers a new standard in multi-modality imaging with eSieFusion™ imaging which merges CT and MRI with a more practical auto-alignment workflow and reduces risk from 3D navigational guidance for the location and orientation of biopsy and ablation needles.

Shared Services Imaging
Cardiac Imaging
There is an increasing need for CT image guidance in surgical and minimally-invasive interventions. This technology supports guided surgery and the positioning of biopsy needles or treatment catheters. Siemens is the undisputed leader in this area.

Our sliding gantry solutions perfectly complement hybrid ORs. Our Adaptive 3D CT Intervention Suite has the unique ability to work with 3D volume-rendered spiral data sets. This 3D capability allows for fast and accurate positioning in the most complex anatomies, even at difficult oblique angles.

On top of that, the i-Control gives full wireless in-room control of all relevant scan parameters, directly at the table side.

Driving progress in 3D CT-guided intervention.
Challenging the way surgery is done today

Sliding gantry CT scanners play an increasing role in hybrid ORs. Their versatility allows them to be utilized for a variety of minimally-invasive interventions and more invasive surgeries. A two-room configuration makes efficient use of a single CT that can be moved in between a CT intervention room and an angio-surgical suite. This allows for high utilization of the CT scanner. You can also save space with a sliding gantry in a single room that combines an angio and CT system.

Imaging modalities have distinct advantages and combining them offers the best of both worlds. CT imaging excels with low contrast resolution to visualize soft tissues and tumor extension. CT perfusion is better able to quantify blood flow for monitoring of treatment effect. Dual Energy CT offers superior metal artifact reduction. Conversely, angiography systems offer a larger field of view, easier surgical access, and higher spatial resolution for detailed imaging of the vasculature.

Image guided minimally invasive intervention

Interventional radiologists are using so called Miyabi systems to guide the treatment of liver cancer with transcatheter chemo embolization (TACE) and percutaneous radio frequency ablation (RFA). Elegantly, a floor-mounted SOMATOM Definition AS sliding gantry CT with i-Control and Adaptive 3D Intervention Suite can be combined with a ceiling-mounted Artis zee angiography system in a single room making efficient use of costly footprint. Both CT and angiography systems can be moved in and out of the way when needed. In radiation oncology, the use of CT simulators (SOMATOM Definition AS Open) is now being expanded to drive higher patient loads and even more efficient use. Emerging use includes CT-guided biopsies, drainages, and placement of fiducial markers for image guided radio therapy (IGR Tracking fiducial markers can be used to better identify the position of the target during treatment and thus allows for more precise treatment.

Image guided surgery

In trauma surgery, every minute counts. A dual room with SOMATOM Definition sliding gantry CT with Adaptive 3D Intervention Suite and Artis zeeo angio system is the ultimate solution. Using a mobile operating table with shuttle system, you can transfer the patient to the CT and then to the hybrid OR without having to reposition the patient. The integration of operating tables into the imaging systems is unique on the market. Siemens offers not only full integration of these tables into the sliding gantry CT for high-speed diagnostics but also into the Artis zeeo for full functionality in a sterile surgical environment. This saves valuable minutes and minimizes risks associated with patient repositioning.
The world’s most straightforward solutions for 2D & 3D CT-guided therapy

2D CT-guided intervention with the Basic and Advanced Intervention package

For less complex cases such as CT-guided spinal injections, 2D CT guidance offered with Basic three axial images in near real-time over the data set. It supports sequential and spiral modes with quick switching in between for better overview and navigation in the dataset.

With CT fluoroscopy offered with Advanced Intervention you can stay at the table side and don’t have to leave the room in between scans. Using CT fluoro you can scan continuously, view images in near real-time, and hit your target in one go. HandCARE reduces dose to the clinician by switching off the X-ray tube in proximity of the hands.

Offered with the SOMATOM Emotion, and SOMATOM Perspective.
Interventions with complex anatomies (e.g. lung biopsies, liver ablation, spinal surgery) are best visualized with 3D CT guidance offered with the Adaptive 3D Intervention Suite. It allows you to work freely within a 3D volume-rendered spiral or sequential CT dataset. Full wireless control over table movement and software functions is offered directly at the table side with i-Control. Working in near real-time 3D offers many advantages: you can see the whole organ using a VRT and view the lesion with sagittal, coronal, and axial MPRs. Always be on track with our smart automatic needle detection algorithms and path planning tools.

These automatically select the optimal needle viewing plane, select the optimal entry point for you, and determine the angle for needle insertion. This 3D capability allows for fast and accurate positioning in the most complex anatomies, even at difficult oblique angles. The level of intuitive control provided by these solutions is unprecedented in the market place today and gives Siemens a definite edge in CT-guided intervention.

Offered with the SOMATOM Definition family and SOMATOM Force.
Our portfolio in CT-guided therapy

2D CT-guided solutions offered with the SOMATOM Emotion and SOMATOM Perspective

The Basic intervention package
- Suited for non-fluoroscopic guidance
- Biopsy mode based on sequential or spiral scans modes
- Quick switching between scan mode
- Control at the table side with joy stick (or i-control for SOMATOM Perspective)
- Image guidance facilitated by displaying 3 slices simultaneously
- In-room monitors available in various options e.g. on a cart or ceiling mounted

The Advanced intervention package
- CT fluoroscopy with CAREVision allowing for image-guidance in near real-time
- HandCARE™ avoids direct radiation of the clinician’s hand during the intervention by switching off the X-ray exposure for a 100° angle between three possible user positions (10:00, 12:00, and 2:00 o’clock)
- Continuous patient dose monitoring during procedures
2D & 3D CT-guided solutions offered with the SOMATOM Definition family and the SOMATOM Force

The Adaptive 3D Intervention Suite

- Premium solution for 2D & 3D CT-guided interventions that demand precision and speed
- i-Control offers full control of software functionality and table movement at the table side (wired or wireless)
- Full 2D guidance capability
- 3D volume-based interventions
  - Work freely in all dimensions
  - Near real-time reconstructed MPR images
  - MPRs in coronal, sagittal, and oblique planes
- CT fluoroscopy, sequential, and spiral scan modes
- Quickly switch between I-Sequence, I-Spiral, and I-Fluoro modes
- I-Fluoro CT Fluoroscopy displayed in real-time with up to 10 frames/s
- Interventional 3D toolbar available supporting smart algorithms from syngo® 3D tools
  - Automated Path Planning by selecting target and entry points
  - Auto needle detection
  - Switching between patient-oriented view and needle-oriented view
  - I-NeedleSharp to avoid needle artifacts (available for sequential scans or scanners offering gantry tilt)
- Level of intuitive control at the table side is unprecedented in the market place today

The Adaptive 3D Intervention Suite contains Intervention Pro, Adaptive 3D Intervention, I-Fluoro, I-Control plus foot switch for radiation release which can also be purchased separately.
Navigation solutions

Surgical 3D navigation not only increases safety and precision, especially in minimally invasive surgery. It also reduces the average time required for interventions and, by continuous visualization of the instruments, is an effective dose-saving measure.

Navigation with high-end robotic C-arm imaging
Artis zeego comes with the syngo iGuide fluoroscopic needle guidance system that projects a planned trajectory onto the patient with an integrated laser. Alternatively, Artis zeego provides an integrated interface to third-party surgical navigation systems with automatic image transfer and automatic registration.

Precision with 3D navigation for mobile C-arms
ARCADIS Orbic 3D features NaviLink 3D*, an integrated, truly digital 1K² navigation interface with automatic image transfer that is compatible with the navigation systems of all leading manufacturers.

CT sliding gantry offer interfaces for 3rd party navigational systems.

Navigation for intraoperative CT
Our CT sliding gantry systems provide an interface to connect to 3rd party intra-operative navigation systems (e.g. Brainlab). Real-time transfer of device positions enable improved navigation and increased precision for image guided surgical procedures.
Education/financial services

Siemens Healthcare Training Center Learning Platform
Extend your skills – Individually. Practically. Concentratedly. “Training courses at our training centers enable you to use your imaging system to its full potential. Our portfolio of offerings consists of application trainings, clinical workflow trainings, e-learning programs as well as technical training.”

Siemens Financial Services
We create value for our clients by employing a combination of technological and financial expertise. Our response to challenges in the healthcare system is best-in-class financing solutions. As a result, doctors’ offices and hospitals can use the latest medical technology without spending extra money in the process. By intelligently using financing instruments like leasing, lease-purchase or mezzanine financing, you can utilize new technologies without purchasing them – and remain financially healthy as well.
On account of certain regional limitations of sales rights and service availability, we cannot guarantee that all products included in this brochure are available through the Siemens sales organization worldwide. Availability and packaging may vary by country and are subject to change without prior notice. Some/All of the features and products described herein may not be available in the United States.

The information in this document contains general technical descriptions of specifications and options as well as standard and optional features which do not always have to be present in individual cases.

Siemens reserves the right to modify the design, packaging, specifications, and options described herein without prior notice. Please contact your local Siemens sales representative for the most current information.

Note: Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

For accessories see: www.siemens.com/medical-accessories