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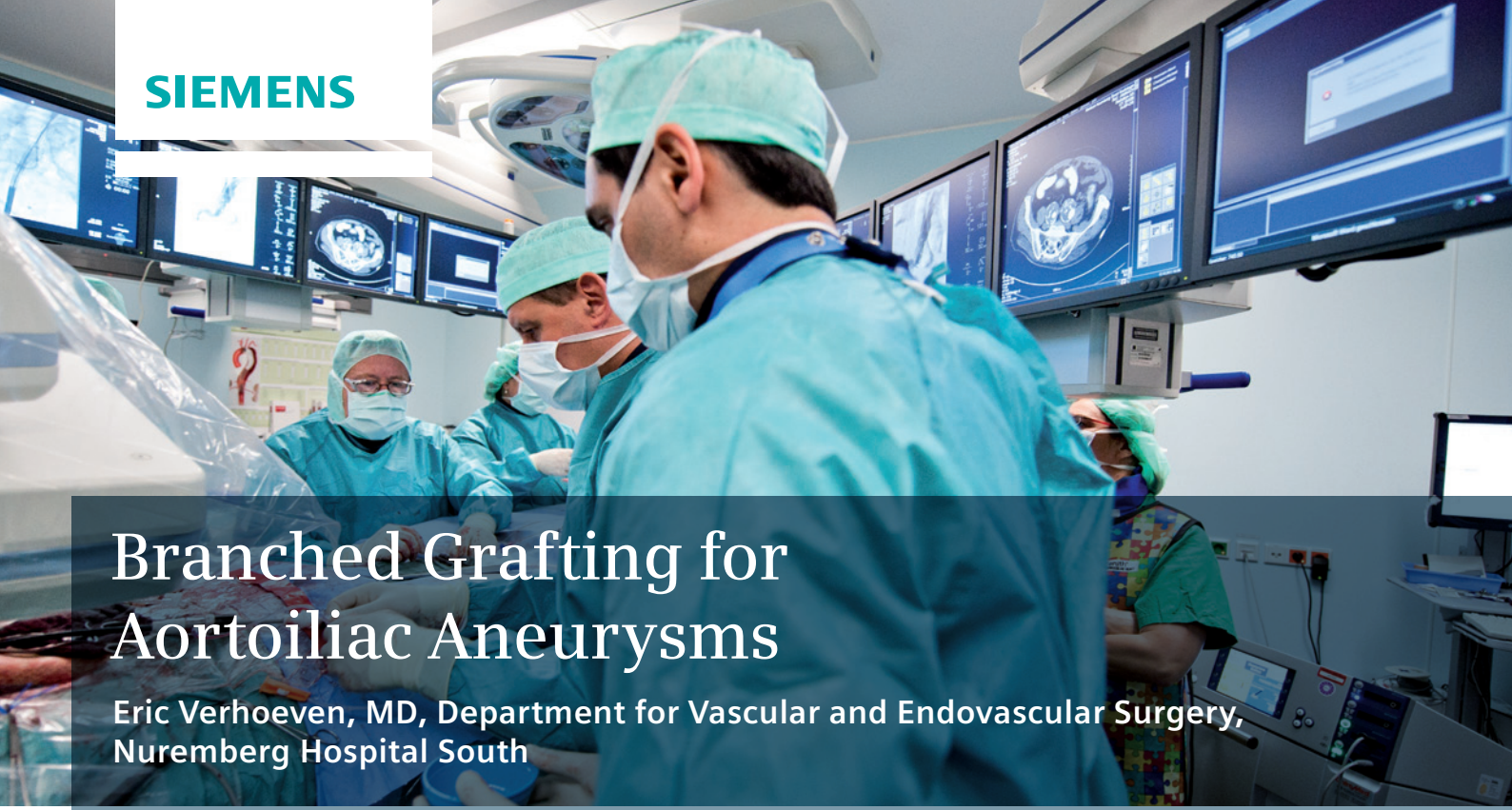

Branched Grafting for Aortoiliac Aneurysms

Eric Verhoeven, MD, Department for Vascular and Endovascular Surgery, Nuremberg Hospital South

Illustrated Workflows in Hybrid Operating Rooms, No.1

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Department for Vascular and Endovascular Surgery at Nuremberg Hospital South

With its 38 specialist departments and over 5000 employees, Nuremberg Hospital is one of Europe's largest municipal hospitals.

Since 2009, Prof. Dr. Verhoeven has been head of vascular and endovascular surgery in the new cardio-vascular center at Nuremberg Hospital South, Germany. His work focuses on the endovascular treatment of ruptured aneurysms, juxta- and suprarenal aneurysms as well as endovascular treatment of thoracic-abdominal aneurysms. Previously he worked at the University Hospital Groningen (Netherlands) and established an endovascular center there.

Dr. Verhoeven (left) and Dr. Renner (right) and their surgical team work in close cooperation with the interventional radiology department headed by Dr. Ritter in the recently established Hybrid Operating Room.

Clinical case

Endovascular bilateral iliac aneurysm repair with branch devices

The 75-year-old male patient presents with an infrarenal aortic aneurysm reaching to the bifurcation of the left iliac arteries. He also suffers from a stenosis of the left external iliac artery.

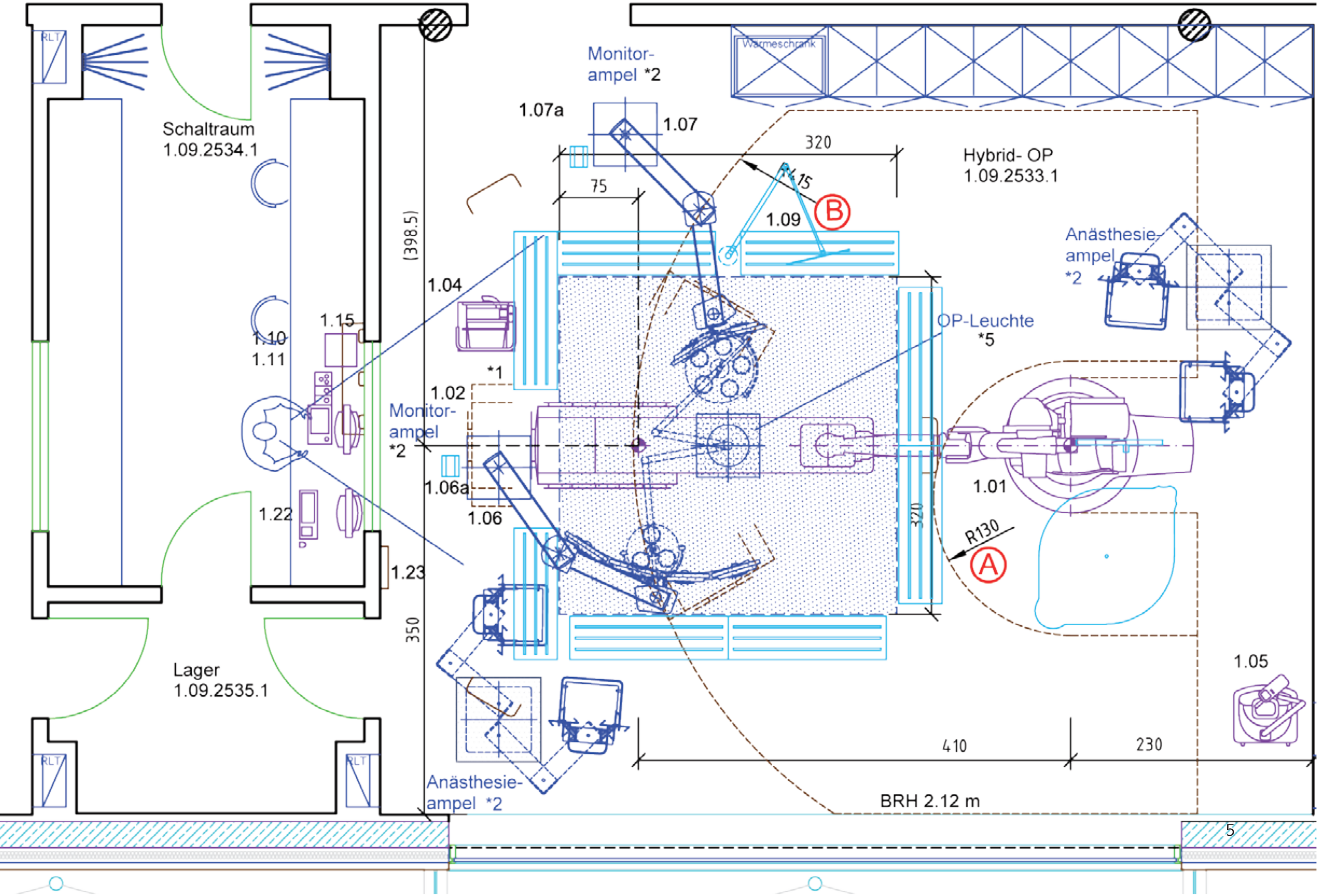
The procedure was planned with stent grafts from the Zenith family from Cook Medical.

Zenith© graft courtesy of Cook Medical

The Hybrid Operating Room

A Hybrid Operating Room combines a traditional OR with an angiographic system enabling high-end imaging during endovascular procedures. The Department for Vascular and Endovascular Surgery is equipped with the newest robot-supported imaging system, Artis zeego. The robot provides the necessary space during patient prep (photo at right) as well as during the actual intervention.

The room size is about 67 m^2 (721 ft^2), excluding the control room, and accommodates two Dräger anesthesia booms, two Trumpf monitor booms, an Artis OR table, and a range of storage shelves. A laminar airflow field is installed above the operating table.



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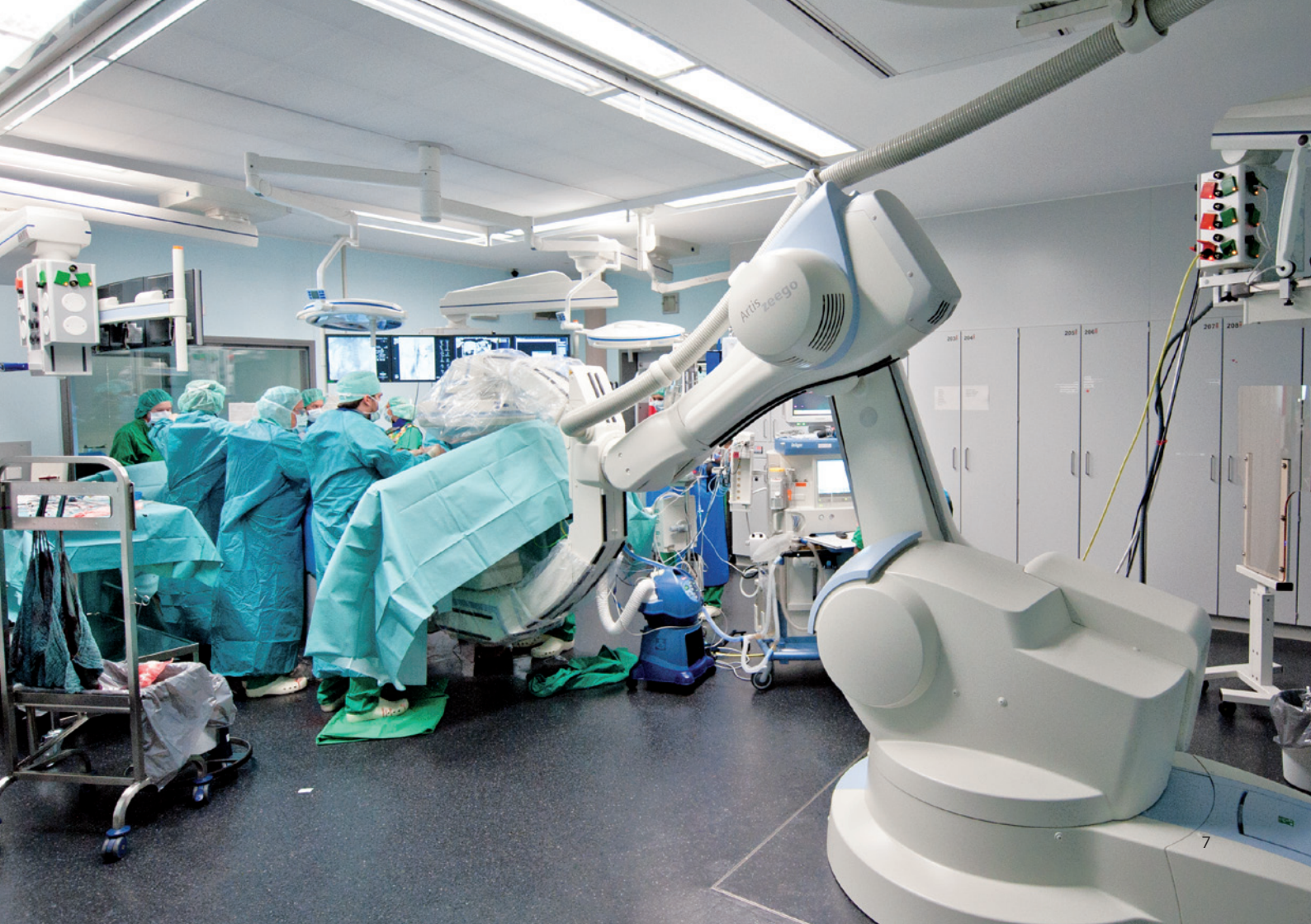
C-arm positioning for infrarenal AAA cases

During imaging, the C-arm is placed into the surgical field from the head side. The Department for Vascular and Endovascular Surgery in Nuremberg chooses this position for cases which do not require full lateral angulations of the C-arm, i.e. in most infrarenal AAA cases, and in suprarenal AAA cases with fenestrations for the renal arteries only.

Both arms of the patient can be placed to the sides on arm rests and do not interfere with the C-arm. The surgical team can work comfortably in their conventional position.


Artis zeego

Teamwork

The endovascular procedures in the Hybrid Operating Room are performed in close collaboration between vascular surgeons and interventional radiologists to ensure the optimal outcome for the patient. The head side position of the C-arm gives both surgeons and radiologists unrestricted access to the patient. Standing face-to-face with monitors on both sides of the table ensures optimal communication during all phases of the procedure.

Anesthesiology has its standard location to the left of the patient's head, unhindered access to the patient, and ample space for equipment.

The robot arm does not interfere with additional equipment (e.g. tables) allowing staff to move freely.

Last but not least, the robot arm of Artis zeego makes it possible to integrate an angiographic system in the OR without mounting any ceiling components in the laminar airflow field. This minimizes interference with the laminar airflow and reduces turbulence above the OR table, thus improving infection control.


Mach LED.3

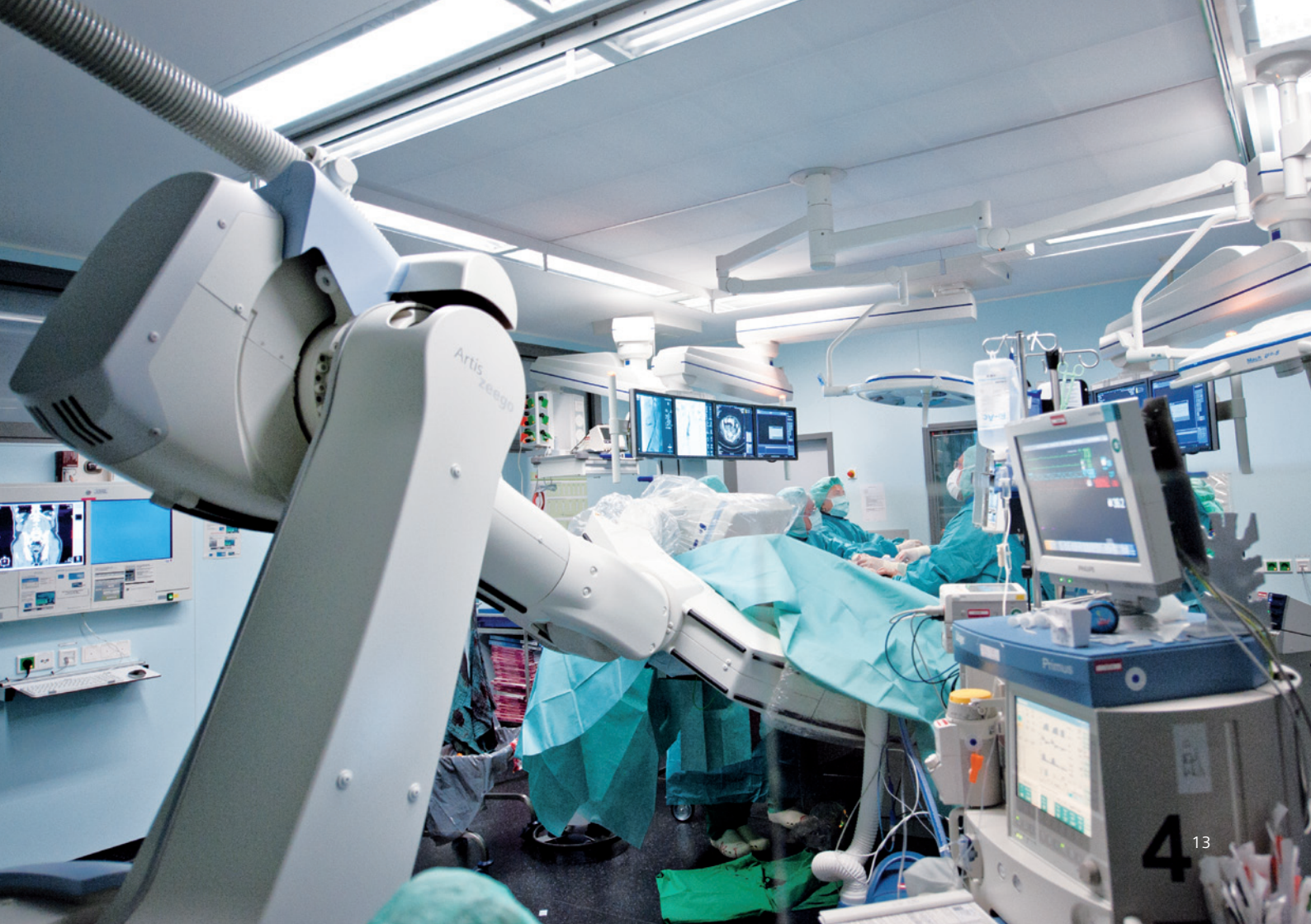
Intra-operative subtraction angiograph

The procedure starts with implanting an Iliac Branch Device (IBD) into the left bifurcation. In this acquisition, the branched Cook Zenith© endo-graft ZBIS 12-61-41 has been placed from the left iliac artery. Intra-operative angiography confirms that the left internal and external iliac arteries are well-perfused through the branched graft. The 30 x 40 cm detector of the Artis zeego system provides a large field of view on the anatomy.

At a later stage, the main body of the endograft is positioned infrarenally in the aorta from the right iliac artery. High-end imaging enables the graft to be placed precisely at the planned landing zone. The angiography at right illustrates the placements exactly beneath the renal arteries, which ensures correct perfusion of those arteries. The entire intervention was performed in 2 hours.

Angulations to image ostia of internal iliac arteries

The curved iliac artery requires a right anterior oblique (RAO) angulation to obtain a perpendicular view onto the ostia. Such angulations help in placing guidewires into the internal iliac artery. The surgeon himself changes the angulations of the C-arm robot using table-side controls. The picture on the right illustrates a very steep left anterior oblique (LAO) angulation. Such steep angulations are possible with the C-arm in the head side position – even with the patient's arms extending outwards on arm rests.


Artis zeego
4

Configuration of the Hybrid Operating Room

Department for Vascular and Endovascular Surgery, Nuremberg Hospital South

- Artis zeego with Automap functionality
- Artis OR table with wide and narrow tabletops
- Additional control panel on separate trolley, equipped with wireless footswitch
- *syngo* MMWP with *syngo* DynaCT, *syngo* InSpace 3D FlashRT, IZ3D, *syngo* 3D Basic, and *syngo* Angio Package
- 2k acquisition with 30 x 40 cm detector, 3D/3D card acquisition including DYNAVISION
- Two Trumpf monitor booms, each equipped with four 19″ screens
- Two Dräger anesthesia booms
- 3.20 x 3.20 m laminar airflow field
- Mach LED 3 OT lamp combination

Your benefits at a glance

- High-end imaging in the OR enables sophisticated endovascular interventions, including branched and fenestrated stent grafting
- No ceiling-mounted components in the laminar airflow, i.e. reduced risk of infection and collision with OR lamps
- Dose-saving functions such as Automap reduce radiation exposure for patients and staff
- Unrestricted access to the patient and ample space for anesthesia
- Artis zeego in head-side position hardly interferes with arm rests
- Large detector for wide patient coverage

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Global Business Unit
Siemens AG
Medical Solutions
Angiography & Interventional
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Siemensstr. 1
DE-91301 Forchheim
Germany
Phone: +49 9191 18-0
www.siemens.com/healthcare

Global Siemens Headquarters
Siemens AG
Wittelsbacherplatz 2
80333 Muenchen
Germany

Global Siemens Healthcare Headquarters
Siemens AG
Healthcare Sector
Henkestr. 127
91052 Erlangen
Telephone: +49 9131 84-0
Germany
www.siemens.com/healthcare

Legal Manufacturer
Siemens AG
Wittelsbacherplatz 2
DE-80333 Muenchen
Germany

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