

### Healthcare Sector Imaging & IT Division

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#### **Dual-source technology gains acceptance in computed tomography**

Somatom Definition from Siemens already installed more than 500 times

**Being venturesome in business can pay off. And the Somatom Definition, the world's first CT scanner with two X-ray tubes, has the sales figures to prove it. Since its market launch at the end of 2005, this system has already been installed over 500 times in leading clinics throughout the world. This proves that dual-source technology is in demand not only in research, but in routine diagnostics as well. Siemens is still the only company capable of manufacturing dual-source CTs. Dual-source computed tomography meets the most important demand placed on medical technology by cardiologists and radiologists: To generate the highest quality and most detailed images of quickly or irregularly beating hearts – and to achieve this at only half the radiation dose in comparison to other systems currently available on the market. Moreover, the system can simultaneously generate different energy levels with its two X-ray tubes. This makes it possible to determine the type, composition and perfusion of the tissue concerned also in routine diagnostics. Due to its high scan speed and especially large bore of 78 centimeters, today Dual Source CT is also preferred for emergency care and overweight patients.**

When Siemens Healthcare introduced the first dual-source CT scanner in 2005, this was regarded as a risky venture. Because at that time Siemens was the only company that turned its back on the race for even more detector rows and focused on a completely new technology. The customers demanded new clinical applications for computed tomography and required detailed images of the heart – especially of irregularly or very quickly beating hearts.

"Our goal is to increase the quality of patient care and at the same time lower health care costs. An additional conventional increase in the number of detector rows would not have succeeded in satisfying future clinical requirements," said Dr. Sami Atiya, CEO of Computed Tomography at Siemens Healthcare. "The interaction between manufacturers of medical equipment and experts

who use it is extremely important, especially with regard to innovations in clinical applications. Our close cooperation with users was one of the factors contributing to our success in the development of Dual Source CT."

Siemens developed an innovative solution in cooperation with leading physicians: In order to increase the scan speed for heart diagnosis, two X-ray tube assemblies and two detectors revolve around the patient instead of one X-ray tube assembly and one detector, as was earlier the case. It was previously impossible to place two X-ray tubes in a single CT scanner due to their dimensions. However, at the beginning of 2000 Siemens successfully developed an X-ray tube that is only half as large and, even more important, much lighter: the Straton tube. This made it possible to arrange two X-ray tube assemblies and two detectors in the gantry.

Optimal cardiac imaging is best achieved in the diastolic phase of the heartbeat. The faster the heart rate, the shorter this phase is. When a CT scanner with only a single X-ray source is used, the system must acquire data projections of 180 degrees from the tube and the detector in order to generate a scan within the diastolic phase. With Dual Source CT, the two tube-detector combinations must move only 90 degrees in order to generate an excellent heart scan. Since heart acquisition can thus be performed twice as fast, the dose can be reduced by more than half in comparison to CT scanners equipped with only one X-ray tube. While conventional CTs enabled scans only at low heart rates, the new Siemens system provides highly detailed images of even quickly or irregularly beating hearts and, due to the increased scan speed, achieves this with only half the radiation dose.

And there is also another important advantage: Two X-ray tubes can generate different levels of energy simultaneously. Based on a single data set acquired with two different radiation energy levels, referred to as "dual energy", a variety of information about the type, composition and perfusion of the tissue can be obtained. Previously several examination steps or methods were needed for this. The dual-energy technique spares the patient the need to undergo multiple scans, accelerates clinical workflows and opens up new clinical fields of application for computed tomography. Siemens Healthcare is the only company on the market already offering ten special dual energy applications which, for example, can be used to more easily diagnose diseases of the heart, brain and lungs as well as of the joints in the extremities.

"Siemens was the first company to recognize the enormous potential of dual-source technology and its significance for the future of computed tomography. In the meantime, the trust we placed in this technology has been confirmed by a great deal of convincing results both in research and in

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routine diagnostics," said Sami Atiya. More than 1.2 million cardiac CT scans without beta blockers and some 200,000 dual energy examinations have been performed to date. This technology has thus clearly established itself in leading-edge diagnostics and in patient care.

In November 2008, Siemens extended the premium segment of its portfolio to include the successor unit, the Somatom Definition Flash. This new unit, which is also a Dual Source CT scanner, can scan an image of the entire heart in about one quarter of a second, i.e. less than half a heartbeat. The resulting radiation dose amounts to less than one millisievert (mSv), while the average effective dose for heart scans usually ranges from 8 to 30 mSv.

The **Siemens Healthcare Sector** is one of the largest suppliers of healthcare technology worldwide. The company is a medical solution provider with core competences and innovative strengths in diagnostic and therapeutic technologies as well as knowledge processing, including information technology and system integration. With its acquisitions in laboratory diagnostics, Siemens Healthcare is the first integrated healthcare company that combines imaging and lab diagnostics, therapy solutions and medical information technology and also supplements these with consultation and services. Siemens Healthcare offers solutions for the entire supply chain under one roof - from prevention and early detection to diagnosis and on to treatment and aftercare. In addition, Siemens Healthcare is the world market leader for innovative hearing instruments. The company employs some 49,000 employees worldwide and is present in more than 130 countries. During fiscal 2008 (ending on September 30), Siemens Healthcare achieved a total sales volume of 11.17 billion euro and incoming orders totaling 11.78 billion euro. The Group earnings amounted to 1.23 billion euro. For more information, go to: <http://www.siemens.com/healthcare>