Maximize Outcome. Minimize Dose.

SOMATOM Definition AS

Answers for life.
SOMATOM Definition AS
The justification for the existence of the entire medical industry is, of course, better healthcare for all patients. But the realities of clinical practice often make this simple-to-understand goal quite difficult to realize: stay within budgets, reduce hospital stays, speed up time to diagnosis, and deal with personnel issues while maintaining high clinical standards and volume/throughput. At the same time, patients demand better and faster results.

Our approach

In order to meet our share of responsibility in addressing these challenges, Siemens, from the earliest stages of research, product development and design, relies upon the advice and recommendations of external medical experts to determine our focus – and this focus has been on the needs and demands of our end users. Over the years, this focus has been fine-tuned in four key areas:

• to lead technological and medical advancement
• to maximize workflow efficiency
• to make state-of-the-art CT affordable
• to set the standard in customer care.

Today’s reality

The justification for the existence of the entire medical industry is, of course, better healthcare for all patients. But the realities of clinical practice often make this simple-to-understand goal quite difficult to realize: stay within budgets, reduce hospital stays, speed up time to diagnosis, and deal with personnel issues while maintaining high clinical standards and volume/throughput. At the same time, patients demand better and faster results.

Our vision

As a partner of our customers, we create CT innovations, that lift clinical practice to a next level of excellence and enable wide access to better patient care. We believe that even the farthest technical horizons are temporary and can be
surpassed with consistent dedication to improved healthcare. This visionary approach, backed up by the, by far, largest R&D budgets in the healthcare industry, has made Siemens the undisputed innovation leader in CT over the last 35 years. And our ambitious global team continues to set the trend in an always changing environment, providing *Answers for Life*.

**Leading patient care**

More than one thousand institutions worldwide have already decided to bring patient care to a new level by utilizing the fascinating capabilities of the SOMATOM® Definition AS. Minimizing patient exposure in every scan, plus offering new dimensions in CT imaging brings them to the forefront of patient care.

**Patient-centric productivity**

Fueled by the new and unique features of FAST CARE, the new SOMATOM Definition AS now lets customers unleash the full potential of their resources. Imagine a CT system that assists you in every step of the examination from planning to scanning and from reconstructing to evaluating images. Thus giving you significantly more time for what is actually of utmost importance: delivering a precise diagnosis and having the time to interact and take care of your patients. Now for the first time, outstanding image quality acquired at drastically reduced radiation dose is combined with unmatched clinical productivity delivering a new dimension in clinical efficiency and patient care. We call it: patient-centric productivity.
Over the recent years Computed Tomography has found its way into almost every clinical discipline. Especially with the first generation of the SOMATOM Definition AS from 2007, Siemens introduced a scanner that for the first time was capable of adapting to virtually every patient and every clinical question. But with CT not being a trivial examination, it was only natural that the introduction of CT for new medical fields came along with high requirements regarding efforts and expertise of the medical professionals preparing an examination. Unfortunately, the time and resources needed for the preparation are then not available anymore for diagnosis and patient consultations, which in the end should be the main focus for physicists, technical assistants and all medical professionals involved.

Now Siemens is again breaking this barrier: With the new SOMATOM Definition AS with FAST CARE you have the possibility to maximize your clinical outcome – meaning to have best clinical results, but with significantly less resources bound to the CT system. The ultimate goal is to provide you with more time for patients – or patient-centric productivity.

For this Siemens introduced its new FAST (Fully Assisting Scanner Technologies) research and development philosophy. These new FAST features available on the new SOMATOM Definition AS allow to simplify typically time consuming and complex procedures during a CT examination: the scanning process gets more intuitive and the results become more reproducible. Integrating the capabilities of syngo®.via* the complete examination – from scan preparation to data evaluation – is streamlined towards a more reliable diagnosis with less patient burden. Ultimately, the combination of highest image quality and highest patient-centric productivity is the lever to maximize your clinical outcome.

* syngo.via can be used as a standalone device or together with a variety of syngo.via-based software options, which are medical devices in their own rights.
Minimize dose

From the very beginning, one of the most important topics for Siemens CT has been patient safety. And in Computed Tomography, patient safety translates primarily into dose reduction. This is why since decades, Siemens has always been at the forefront to reduce radiation dose to the lowest possible level.

Siemens has developed many significant products and protocols that follow the “As Low as Reasonably Achievable” (ALARA) principle to reduce radiation dose to the lowest possible level. This desire for as little radiation exposure as possible lies at the heart of our CARE (Combined Applications to Reduce Exposure) research and development philosophy. Over the years, Siemens has been highly successful in integrating many innovations into the Siemens scanners that significantly reduce radiation dose in comparison to other systems available on the CT market. For example, the Adaptive Dose Shield, introduced with the first SOMATOM Definition AS in 2007, or IRIS – Iterative Reconstruction in Image Space – in 2009, with the capability to reduce dose up to 60% without loss in image quality.

With the new SOMATOM Definition AS with FAST CARE, Siemens again introduces several innovative CARE features including the first raw-data-based iterative reconstruction SAFIRE* (Sinogram Affirmed Iterative Reconstruction). To give our customers every means to minimize dose and consequently take best care of their patients well-being.

* The information about this product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.
Single-click readiness
Every CT examination poses individual and specific requirements to achieve the optimum clinical outcome. These vary from institution to institution, from user to user, from patient to patient. The challenge is to find and apply the ideal settings for every individual examination, but at the same time achieve a high degree of reproducibility for the same type of examination when done by different operators.

The new SOMATOM Definition AS with FAST CARE now introduces Siemens’ unique FAST (Fully Assisting Scanner Technologies) research and development philosophy to solve this. By automatically suggesting the best set of parameters for every individual examination based on the selected body region, the scan and recon planning becomes as fast as just a single click.
**Introduction**

**Single-Click Readiness**

**FAST – Fully Assisting Scanner Technologies**

Utilizing FAST innovations, typically time-consuming and complex procedures during the scan process are extremely simplified and automated, not only improving workflow efficiency, but optimizing the overall clinical outcome by creating reproducible results. This makes diagnosis more reliable and reduces patient burden through streamlined examinations.

**Efficient scan and recon planning**

Regardless whether you are about to scan, reconstruct or evaluate an image, the right settings are always determined by the organ to be examined. Based on the respective organ, the examination type and the expected image quality, indepth knowledge of the system settings is required from the operator. This becomes even more crucial, when the results need to be reproducible, especially when the system is being operated by multiple users. Unfortunately, this complexity can become a source for inefficiency or, even worse, errors.

The SOMATOM Definition AS with FAST CARE is now the first single source CT scanner that actively assists you in solving this challenge: FAST Planning prepares your scan and recon settings based on the characteristics of the chosen organ. This not only reduces the efforts needed to set up an examination, but makes them highly reproducible and less error-prone. Especially the highly time-consuming preparation of a spine recon, is simplified to ideally just a single click with FAST Spine. At the end of the day, the new SOMATOM Definition AS with FAST CARE helps you to save your highly valuable time and allows you to spend it more for the diagnosis and the interaction with your patients.

**Focus on the examination, not on the system**

But it is not only about choosing the appropriate scan and recon range. Also setting the right system parameters like scan time, pitch or tube current is crucial to achieve best clinical results.
Immediate, organ-based scan and recon range setting with FAST Planning

Precise spine recon preparation with FAST Spine

FAST Adjust allows intuitive scan parameter adjustment with the push of a button.

Higher reliability and reproducibility in cardiac CT with the FAST Cardio Wizard

Image evaluation with a single click with syngo.via.

Guided routine in cardiac CT

Full integrated pre- and postprocessing

For this, the new SOMATOM Definition AS with FAST CARE now offers an amazing solution: FAST Adjust. With an easy to understand and easy to use interface, parameters can be simply adjusted or, when in doubt, defined just with the push of a button.

One of the most sophisticated and demanding examinations in Computed Tomography is cardiac CT. Not only the preparations for the scan demand a high degree of expertise, but also how to prepare the image evaluation is everything but trivial. All the more it is important for the user to feel safe to have done everything correctly in order to achieve the best clinical outcome possible and to avoid any unnecessary radiation of the patient.

Unfortunately, this is not always trivial and especially when working in high-demanding environments like in an ED, time is of the essence.

Therefore, the new SOMATOM Definition AS with FAST CARE introduces the first guided routine in cardiac CT – the FAST Cardio Wizard. It explains on a step-by-step basis how to achieve an optimal cardiac scan, either for training purposes or in a real-life situation, thus setting institutional standards and guaranteeing uniform quality.

And cardiac CT does not end with the acquisition of image data. Especially postprocessing of cardiac datasets was up to now a highly complex procedure consisting of many manual steps, from removing the table or the isolation of the heart to labeling the vessels and calculating all functional parameters appropriately.

With the utilization of syngo.via, this can be reduced to just one single click: Simply choose your patient. All required steps are already pre-procedured by syngo.via so that the reading physician can immediately start with the evaluation of the case.

*syngo.via can be used as a standalone device or together with a variety of syngo.via-based software options, which are medical devices in their own rights.
How it works

FAST Planning

Manually setting the scan range too short in the topogram can cut off relevant parts of the examined organ.

Manually setting the scan range too long in the topogram can potentially over-radiate the patient.

Simplify organ-specific planning

Unfortunately, with conventional planning procedures, errors can happen quickly. Especially when time is short, the wrong scan mode might be chosen, the scan ranges could be set too short or too long or the selected protocol was meant for another organ. This can only be countered by investing an increased amount of attention (i.e. time) and expertise to thoroughly prepare the scan.
FAST Planning focuses explicitly on this critical part of the scan process. Based on the topogram, FAST Planning assists the scan and reconstruction planning to provide an easier, faster and standardized workflow in CT scanning. The user can select the anatomical region of interest (ROI) from a list to define prospectively the scan and reconstruction ranges. The scan ROI(s) are automatically detected based on the characteristics of the organ that is to be scanned. In addition, the corresponding scan range(s) are proposed in the topogram as well. If needed, the lateral field of view can easily be narrowed or widened. In the case of head examinations, the iso-center is automatically adapted according to the position of the patient’s head.

**with FAST Planning**

Direct setting of the scan range with FAST Planning assures covering the entire organ without overscanning.

FAST Planning uses defined anatomical landmarks to set the correct ranges. When applied manually without FAST CARE, only based on the coronal view the lower part of the lung could easily be missed (indicated by the reference line).
Step-by-step cardiac exam

Among the most complex examinations are cardiac scans. A lot of parameters and settings have to be taken into account and precisely matched to the individual condition of the patient. Consequently, the procedure to set up the scan is highly complex and requires a lot of expertise. Here the FAST Cardio Wizard is an amazing assistant: It is an intuitive guidance, fully integrated in the cardio workflow. The FAST Cardio Wizard permits training the workflow and provides guidance and support during the examination. This is done, by giving the user step-by-step explanations for cardiac examinations directly in the user interface while preparing the scan. The content is based on the latest cardio application training material and provides helpful tips to avoid common problems and pitfalls. But, of course, the workflow and its description can be fully adjusted to the individual workflow of the user, allowing to fully customize texts and images. This allows institutions to create their own quality standards.
Especially in case of the spine, recon preparation can easily take up to half an hour or more when the slices have to be oriented manually and individually along every vertebra and disc of the spine. FAST Spine now solves this time-consuming situation by providing various modes that automatically create anatomically orientated spine recon ranges. FAST Spine delivers an automatic segmentation of the spinal canal and automatic labeling of the vertebrae. When certain parts of the spine – or maybe the complete spine – are to be reconstructed, the Spine multimode provides anatomically oriented slices that are orthogonal to the spinal canal and all vertebrates are labeled. The rotation of each single slice refers to the curvature of the spinal column. With the spine disc mode a reconstruction range, placed and oriented on a specific disc is provided. Of course, the final decision is always done by the clinical expert. Therefore all modes offer the possibility to adapt the results manually, if needed.

**How it works FAST Spine**

**Single click spine**

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The rule out of Coronary Heart disease has become a common routine procedure in many institutions because of the high negative predictive value of up to 99% with Siemens SOMATOM CT Scanners. A time saving reliable rule-out and reporting therefore can leverage efficiency significantly. syngo.CT Coronary Analysis* that supports the robust and intuitive VesselSURF tool, allows for immediate 3D vessel assessment of axial slices, even without the existence of centerlines or in occluded vessels. The Single Click Stenosis function gives you all relevant information at a glance, such as the diameter and area stenosis measurements, the plaque composition, the curved length for stent planning, the profile curve and minimum lumen identification.

*The product is not yet commercially available in the U.S.
Rule-out coronary heart disease in under a minute

The moment you open a cardiac case the Automated Case Preparation has already pre-processed the images and displays them in your appropriate layout together with the adequate evaluation tools. Meaning you can immediately start evaluating the coronary vessels, the functional parameters and the prepared calcium score.

The comprehensive layout for display of multiple CPR’s permits the review of the coronary tree with the blink of an eye. All your findings and key images are collected in the Findings Navigator on-the-fly as you read the case. Your result: rule-out and reporting of coronary artery disease in less than a minute.

The syngo.CT Cardiac Function – as part of the CT Cardio-Vascular Engine – allows you to read and diagnose CT angiography images of the left heart for the evaluation of Ischemia or Cardiomyopathy.

On top the application offers to evaluate the late- or early myocardial enhancement of single energetic CT data which is displayed as color overlay. The Cardio-Vascular Engine’s Pro level provides right ventricular volumetric analysis*, which may have prognostic value for congestive heart failure, chronic pulmonary disease and pulmonary emboli.

Single-click stenosis measurement. Three reference lines are already pre-defined and displayed side-by-side for immediate overview.
Clinical Results

Excellent image quality visualizing even smallest details and with sharp delineation, perfectly adjusted to the selected organ.

Lateral volume rendered view of lumbar spine fused with the multiplanar reformation.
Volume rendered view highlights the main coronary arteries.

Neuro DSA subtracts the bony structures completely. A pure arterial vascular filling can be observed.
Applying the lowest radiation dose possible is of utmost importance for both you and of course your patients. Therefore you always want to be assured that you have taken every means available to you to protect your patient from unnecessary radiation.

This desire for as little radiation exposure as possible lies at the heart of our CARE (Combined Applications to Reduce Exposure) research and development philosophy.

Consequently, with Siemens’ continuing effort, investment and dedication to achieve highest dose protection, the new SOMATOM Definition AS now uniquely combines all features available for single source CT to reduce radiation as low as possible: next to its already outstanding dose protection portfolio from the initial product generation, it now also inherited features from the highly renowned SOMATOM Definition Flash as well as benefits from the new and innovative dose saving features introduced by Siemens with FAST CARE.
Introduction

Your Single Source for Low Dose CT

Organ-sensitive dose protection

Previous attempts at dose reduction were very successful but did not specifically take into consideration highly dose sensitive areas such as women’s breasts or the heart. Now, the SOMATOM Definition AS can selectively reduce the exposure in sensitive areas with Siemens renowned X-CARE.

Low dose cardiac CT

Additionally, to reliably deliver superior image quality while maintaining lowest possible dose especially in cardiac imaging, the SOMATOM Definition AS offers Adaptive ECG Pulsing for low dose spiral cardiac examinations and the Adaptive Cardio Sequence to reduce radiation down to 1–3 mSv in sequential cardiac CT.

Low dose spiral CT

But besides cardiac, many of today’s clinical examinations benefit from spiral acquisition techniques. However, the continuous demand for more coverage and the corresponding increase of detector size has unveiled a new challenge: pre- and post-spiral over-radiation has significantly grown. Introduced in 2007, the Adaptive Dose Shield is Siemens’ answer to the problem of over-radiation in spiral CT. It addresses this important safety issue by dynamically blocking clinically irrelevant over-radiation in spiral scans. But of course, not only pre- and post-spiral matters: one of Siemens’ core dose protection technologies focuses on spiral scanning in general: CARE Dose4D™. The real-time dose modulation guarantees an unparalleled combination of maximum image quality at minimum dose for every patient in every spiral scan and has proven its qualities for many years. Now a new dimension has been added: CARE kV can in addition automatically set the appropriate voltage for the examination and adjust other scan parameters accordingly, thus delivering certainty of having highest dose efficiency in every scan, potentially saving up 60% dose.
Iterative reconstruction

One of the most promising approaches for the future of CT presents itself with iterative reconstruction. This method uses multiple iteration steps in the reconstruction of CT data, with every step further eliminating image noise and artifacts and improving image sharpness. In doing so, the reconstruction outcome can achieve significantly increased image quality, reduced dose by lowering the initial power needed to acquire the raw data – or a reasonable balance of both. But the further integration of raw data beyond the initial reconstruction process posed considerable restraints regarding the computational power available – up to now: With SAFIRE* – Sinogram Affirmed Iterative Reconstruction – Siemens introduces a new and unique approach to iterative reconstruction. For the first time, raw data information is actually utilized to enhance the image quality or reduce dose. This is made possible by a new reconstruction algorithm, as well as by the introduction of a new image reconstruction system, delivering the required computational power to achieve this.

Dose visualization and management

Increasing patient awareness and safety requirements in the application of X-ray exposure make it necessary when selecting a CT scanner to consider not only the technical features as they exist today, but also developing conditions for the future. Dose management is therefore important to both you and your patients. For this reason, the new SOMATOM Definition AS with FAST CARE actively visualizes dose saving potentials directly in the user interface and gives you the opportunity to manage and analyze the applied dose. This gives you the means to take care of your patients well-being.

- X-CARE protects the most radiation-sensitive organs
- Low dose cardiac exams with Adaptive ECG Pulsing and the Adaptive Cardio Sequence
- The Adaptive Dose Shield eliminates unnecessary dose in every spiral scan
- CNR and dose optimized kV settings with CARE kV
- Superior raw-data-based image quality improvement or up to 60% dose reduction with SAFIRE*

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As early as 1994, Siemens introduced CARE Dose4D to actively modulate the applied power for scans depending on the patients anatomy. CARE Dose4D aims to regulate the mAs such that image quality is uniform across the whole scan range. CARE Dose Configurator provides the user the ability to select reference curves for each body region and for each body habitus individually. With the new SOMATOM Definition AS with FAST CARE the configuration options have now been made even more flexible so that they can now be perfectly adjusted for every patient.

But CT scanning, consists not only of adapting mAs values: The right kV settings play an equal if not even more important role to achieve optimal clinical outcome. But changing kV values always comes along with the need to adapt all other values according to the respective patient. Unfortunately, up to now this had to be done manually and required a lot of expertise and experience so that often the full potential for dose reduction remained untapped. Siemens’ unique CARE kV now breaks this barrier: CARE kV, an extension of CARE Dose4D, can automatically suggest kV and eff. mAs to optimize the contrast-to-noise-ratio (CNR) of the image while limiting the applied dose. The system’s proposal is based on the attenuation as measured in the topogram and the user-defined acquisition type (non-contrast, bone, soft tissue, vascular). Reducing the tube voltage helps to reduce radiation exposure to patients. With prior tube technology, the minimum tube voltage setting was 80 kV. With the new improved STRATON tube the voltage range is extended down to 70 kV. This helps to further reduce the radiation dose to small pediatric or neonate patients. These dedicated pediatric scan modes, bundled with specific pediatric CARE Dose4D curves and protocols take care of the well-being of our youngest patients. Overall with these features, an additional dose reduction of up to 60% is possible.

On the other side, the system also identifies bariatric patients and consequently sets the parameters to make full use of the system’s reserves to optimize CNR and acquire the best image quality possible for these patients.

CARE kV is of course fully customizable, meaning that the user cannot only set his individual quality reference mAs, but can also choose the degree of system assistance between none, semi and full.
Example 1: For a vessel examination of a small patient, CARE kV proposes to scan with 70 kV and sets the other values accordingly.

Example 2: For a non-contrast examination of a large patient, CARE kV proposes to scan with 140 kV and sets the other values accordingly.
Eliminating over-radiation in every spiral scan

The SOMATOM Definition AS eliminates pre- and post-spiral over-radiation (marked in red). The Adaptive Dose Shield, is part of the innovative STRATON® X-ray tube design. It automatically moves shields into place to block unnecessary dose. The Adaptive Dose Shield dynamically opens at the beginning of a spiral range and then dynamically closes at the end. Thus clinically irrelevant dose is shielded, not only for dedicated applications, but for all standard spiral acquisitions. Giving you the ability to save up to an additional 25% of dose in routine exams.
SAFIRE* – Sinogram Affirmed Iterative Reconstruction – for the first time allows to utilize the full dose saving potential of the iterative reconstruction in clinical practice. Now, raw-data information (which is visualized in the so-called sinogram) is actually being utilized in the image improvement process.

After the initial reconstruction using the weighted filtered back projection (WFBP) a first iterative reconstruction loop is performed. The CT images are re-transferred to raw-data which models all relevant geometrical properties of the CT scanner. This step re-produces CT raw data like a real scanner does. By comparing this synthetic raw data with the acquired data, differences are identified. A further iteration loop compares the images with homologous reference data. This procedure can be regarded as validating (or affirming) the current images.

An updated image is then again reconstructed, using the detected deviation information. In each iteration a dynamic raw-data-based noise model is applied that allows for reduction of image noise without noticeable loss of sharpness. This optimization process thus makes even better use of the diagnostic information contained in the raw data. Using multiple iterations, geometrical imperfections of the WFBP are corrected in addition to incrementally reducing image noise.

With this, SAFIRE* allows a radiation dose reduction of up to 60% or improved image quality in regards to contrast, sharpness and noise.

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**Achieving low dose in cardiac CT**

Usually the evaluation of the CT Cardiac Function is based on ECG gated spiral CT data which is relatively dose-intensive. Therefore, Siemens introduced Adaptive ECG-Pulsing™, an innovative heartbeat-controlled dose modulation. It can reduce dose by up to 50% in spiral cardiac imaging by only applying the dose required to collect the necessary data during the diastolic phase. Its real-time monitoring of the ECG automatically and instantly reacts to changes and abnormalities of the heartbeat and reduces the dose in phases in which no data needs to be collected. With Siemens’ unique MinDose the pulsing plateau can be reduced to a minimum 4% during this phase, giving additional dose savings.

**Integrating low dose data with syngo.via**

The syngo.CT Cardiac Function’s smart segmentation algorithms can manage this specific MinDose ECG Data which can be used for functional evaluation on top of the coronary assessment. With conventional CT systems, the data acquired during the low pulsing windows is typically discarded without further use, meaning that the patient was unnecessarily radiated. With the integration of MinDose and syngo.via, now this data can be intelligently used, saving up to 50% of dose for full functional assessment through the use of MinDose data.

Additional Benefits with syngo.via

Achieving low dose in cardiac CT

Integrating low dose data with syngo.via
In other words it reduces the dose from 8–12 mSv down to ~ 4 mSv. And with the Automated Case Preparation, all the relevant data for cardiac function is presented when opening the case: including the left ventricular volumetry in all cardiac phases, the ejection fraction and wall motion, the wall thickness and the enhancement color overlay. The results of the myocardial evaluation are presented to you in easy-to-read polar maps and graphs of the ventricular volumes.

Functional evaluation of the heart using data from peak pulsing window (above) and from a 4% MinDose pulsing window (below).
Clinical Results

Excellent visualization of intracranial arteries including cerebral lesions with syngo.CT Neuro DSA. Saving up to 20% dose in head scans with the Adaptive Dose Shield.

Excellent display of the entire thorax including small peripheral lung details with syngo InSpace4D Parenchyma evaluation.
SAFIRE* – Sinogram Affirmed Iterative Reconstruction – helps to lower the dose or improve image quality. The left image shows the original image. The right image shows how iterative reconstruction can improve image quality at lower dose.

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2.5 mSv imaging of the coronary arteries including sharp distal branches with fast 0.30 s rotation time and 0.33 mm isotropic resolution.
Open CT for all Patients

Every patient is different. So is every clinical question. Our goal was to create a new kind of CT that is actually open for every patient and addresses the versatile needs of physicians. The result is a system with an exclusive composition of features and functionalities that make it the perfect fit for your dedicated clinical field: Whether you want to master the toughest battles in cardiac or acute care, want to excel in neurology or oncology or just want to be sure not to exclude any patient from pediatric to bariatric, the new SOMATOM Definition AS with FAST CARE the ideal single source CT for your needs.

With its full on-site upgradability from 20 to 128 slices, it can grow with your demands and can be fully customized to your requirements. And, it supports you in overcoming limitations posed by conventional CT systems with a bore diameter of up to 80 cm* and a table load capacity of up to 300 kg.

The SOMATOM Definition AS with FAST CARE will deliver clinical excellence independent from the given conditions and opens CT for all patients.

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Clinical excellence for every patient

When it comes to mastering your challenges in everyday’s clinical practice, you need to rely on your CT system to deliver clinical excellence in every case without exception. And these challenges are various: cardiac CT requires highest temporal resolution to freeze any motion and make even finest details, like small vessels, crystal clear. In acute care scenarios, the same applies. But here in addition, the coverage speed must be as high as possible to quickly scan uncooperative or unconscious patients with short breath-holds, if needed, over the whole body. The key to this is the unique and renowned STRATON tube.

Next to resolution, neurology also requires a very high gray-white matter differentiation to distinguish precisely the brain tissues. Here, Siemens’ unique Neuro BestContrast is benchmark. By separately processing medium and low frequency information, tissue contrast can be significantly improved without amplifying image noise. This results in a better signal to noise ratio.

But next to the clinical outcome, it is equally important that the CT system is open for all patients. No one should be excluded by limitations of the system. For bariatric patients, patient accommodation and power reserves are key. Here, the SOMATOM Definition AS is the only system offering up 80 cm bore diameter*, 300 kg table load capacity and a 100 kW power generator. For pediatrics, on the other side, the possibility to reduce kV as low as possible is imperative. Again the SOMATOM Definition AS delivers, with industry’s first and only 70 kV scan modes in single source CT. And the unique thing is, that this can all be done without making compromises between image quality, performance or clinical efficiency.

Growing with your clinical demand

Next to clinical flexibility, the SOMATOM Definition AS can be configured and customized to fit virtually any setting.

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Its full on-site upgradability from 20- to 128-slice configuration permits specifying the system precisely to the customer’s clinical requirements and financial situation, and also gives investment protection and an assurance to grow with future demands.

And to offer the best financial solution overall, a high-end CT system must meet the infrastructure of the customer. With a footprint of only 18 m² and flexible air- or watercooling the SOMATOM Definition AS can be fit in environments as small as mobile containers or as complex as multi-room sliding gantry scenarios.

But true flexibility does not end at performance, ergonomics or siting. It also means, crossing borders of conventional CT. Dynamic imaging has become a new dimension in CT over recent years. But the challenge is going beyond a static detector design to cover whole organs, e.g. for whole brain perfusion or long-range CTAs. With the innovative Adaptive 4D Spiral, the SOMATOM Definition AS offers the possibility to cover up to 42 cm which is unique in single source CT. Another example are interventions. With the only 3D guided guidance for minimally invasive procedures, the SOMATOM Definition AS makes interventions more accurate, thus safer and in the end more efficient.

And there are departmental borders: E.g. radiation therapy has different requirements regarding CT than a traditional radiology. And they are met: With the only high-end CT dedicated to RTP – the SOMATOM Definition AS Open.

Managing your daily routine

In addition CARE Contrast III facilitates contrast enhanced clinical workflow by synchronizing CT scan and contrast media injection. The injection parameters are automatically transferred to the patient protocol, the e-Logbook and to MPPS thus completing the data for the examination and avoiding separate documentation. And injector protocols can be managed at the CT console and from there also uploaded to the injector.

- Enough power reserves, large bore, and high-capacity table for bariatric imaging
- Highest spatial resolution to visualize even small details
- Full on-site upgradability from 20 to 128 slices
- Dynamic CT imaging with up to 42 cm coverage using the Adaptive 4D Spiral
- 3D image guidance in minimally invasive procedures simplifies complex interventions
Unique STRATON X-ray tube

The core technology that allows the new SOMATOM Definition AS with FAST CARE to deliver clinical excellence, is the highly renowned STRATON™ tube with z-Sharp™. Its revolutionary design based on a direct anode cooling eliminates the need for heat storage and results in an unmatched compact design thus allowing true temporal resolution of up to 150 ms. Instead of decreasing the detector elements' size to improve spatial resolution, z-Sharp utilizes two overlapping X-ray beams, resulting in significantly increased resolution without a corresponding increase in dose. This provides you with the industry’s highest isotropic resolution of 0.33 mm at any scan and rotation speed, and at any position within the scan field. This for instance allows motion-artifact free imaging of the heart to perform accurate stenosis measurements or stent planning with outstanding precision or fast whole body sub-mm imaging at highest pitch revealing finest details in long-range vascular studies, or polytrauma patients while covering a 2 meter scan range in approximately 10 seconds.

Resolution
Highest spatial resolution

In addition, with the proprietary z-UHR Technology, the system adapts for ultra-high-resolution bone imaging for wrist, joint, or inner ear studies pushing the boundaries of spatial resolution even further by providing unparalleled 0.24 mm isotropic resolution. Neuro exams benefit from an extremely high detail delineation resulting from the 1,472 inplane channels of the detector.
Adaptive 4D Spiral Plus with up to 42 cm dynamic scanning

In 2007, Siemens first introduced the revolutionary scan mode, Adaptive 4D Spiral, overcoming the existing limitations of dynamic CT studies. With conventional CT and its restricted coverage, whole organ perfusion studies or long-range phase resolved CTA studies, were just not possible. The industry’s initial attempts to conquer these limitations focused on detector size but made no significant progress in covering entire organs. Today, the innovative Adaptive 4D Spiral Plus applies a continuously repeated bi-directional table movement, moving the patient smoothly in and out of the gantry over the desired scan range. This way the coverage limitation of a static detector design can be overcome. For example, the new SOMATOM Definition AS can perform a phase resolved CTA study over a length of 42 cm, providing a clear separation of arterial and venous phase. Now for the first time in perfusion studies, you can cover virtually any organ in 4D, such as performing a complete stroke assessment with syngo Volume Perfusion CT Neuro.

4D Noise Reduction

Another exciting further development, 4D Noise Reduction, makes it possible to significantly improve image quality with no increase in dose or, alternately, reduce dose up to 50% without compromising image quality.
Adaptive 3D Intervention Suite

The SOMATOM Definition AS puts you in full control in any plane with 3D-guided interventions. Giving you a more accurate overview of your needle position and surrounding organs during difficult procedures. This is especially helpful when using oblique needle positions, whether you perform fluoroscopic or non-fluoroscopic procedures. And, when it comes to in-room operation, the SOMATOM Definition AS offers the freedom to manipulate the entire procedure with just the touch of a button – without ever leaving your patient’s side. From table positioning, image windowing to remote mouse control. The new SOMATOM Definition AS gives you the opportunity to easily switch between fluoroscopic, sequential, or spiral scanning, with a click of a button right at the scanner. By switching to a short spiral scan, you can extend the coverage to visualize an area larger than a static detector design traditionally allows. Furthermore, the SOMATOM Definition AS eliminates artifacts caused by the needle material. Depending on the size of the needle, the scan will be done in a certain angulation of the gantry. Images will be reconstructed as non-tilted axial slices, giving you the same information but without artifacts. Additional workflow enhancements, such as auto needle tracking, will speed up your workflow by guaranteeing that you always have the right view of your needle. The benefit? As a 3D minimally invasive suite, SOMATOM Definition AS makes your routine and complex procedures easier and more accurate. Adding precision while reducing procedure time. Freeing up the CT suite and bringing you new revenue opportunities.
Cancer threatens the entire body. Fighting it therefore demands a holistic understanding of the disease. Irrespective of whether potential lesions are found in lung, liver, lymph nodes or other organs, and regardless of whether the chest or the abdominal radiologist makes findings, or whether lesions are discovered in CT, MRI or PET: the Findings Navigator collects all findings and measurements related to the individual patient. Everybody involved in early detection, diagnostics and the treatment of cancer can retrieve the most complete information, and can see the whole disease, and hopefully, fight it more effectively.
CT Neuro imaging is very often a matter of life-and-death therapeutic decision-making. From infarctions caused by stroke and extensive bleeding, to subarachnoid hemorrhage and a ruptured aneurysm – seeing them clearly is essential because of the huge difference it makes in determining treatment.

The new CT Neuro Engine provides tools and workflows that help deliver a complete and accurate status of the vascular structures and the brain tissue for these patients – from scanning to diagnosis in less than 10 minutes. Using data delivered by the Adaptive 4D Spiral, perfusion assessment of the whole brain can easily be integrated in the assessment. The CT Neuro Engine also helps identify fractures after an accident and, for instance, uncovers the potential risk of death when looking at the vascularity of the neck, by identifying potential stenoses.

From scan to diagnosis in under 10 minutes

These images will be registered automatically with the CT data sets and displayed to you on up to two monitors at your favorite workplace. The anatomical registration facilitates synchronized scrolling and rotating.

Using the perfusion information provided by the Adaptive 4D Spiral, the tumor can be characterized and treatment response can be evaluated fast and reliably. For this, syngo.via* automatically looks up and aligns data from prior examinations, so that the treatment success can be easily monitored. Additionally, the tumor growth rates and tumor burden can be calculated automatically.

*syngo.via can be used as a standalone device or together with a variety of syngo.via-based software options, which are medical devices in their own rights.
Clinical Results

Abdominal examination of a bariatric patient unveils a kidney stone in the right kidney.

Motion artifact-free imaging of the coronary artery tree including distal branches with fastest 150 ms temporal resolution and 0.33 mm spatial resolution.
Whole brain perfusion study with Adaptive 4D Spiral for comprehensive tissue at risk classification in the entire organ.

Fastest volume coverage for single-source CT of 192 mm/s to examine multi-trauma patients for fractures and vascular injuries in one scan up to 2 meters.

Lung biopsy with 3D visualization of double oblique needle position.
Remain one step ahead and tap the full potential of your Siemens CT system with our customer care program, Life. As a worldwide innovation leader in medical imaging, Siemens has gained an unmatched knowledge in Computed Tomography. You can profit from excellent CT systems and innovative, flexible and comprehensive service solutions that enable you to concentrate on what is most important for you: patient care. The customer care program, Life, is the unique solution from Siemens that helps you to maximize the return on investment throughout the entire life cycle of your system.

**Upgrades and migration: Evolve, Expand, Elevate**

*Stay competitive with up-to-date systems*

Due to increasing healthcare demands you have to stay on the cutting edge to be competitive. We will help you to keep your solutions up-to-date and to keep pace with the latest technological advancements through the syngo Evolve program. syngo Evolve offers certainty in budget planning, feature enhancements for your CT, access to new applications, and lower cost upgrades for your CT system.

**Services and support**

*Feel confident with our proactive service solutions*

High system availability, diagnostic confidence and optimized workflow are crucial for the success of your CT service. To meet your performance expectations, we systematically focus on being proactive. Based on real-time system monitoring we detect system errors and alert you before problems occur. The Siemens Guardian Program™ helps to make unplanned downtime a thing of the past.
Education and training

**Broaden your knowledge and expertise**

Know-how is the key to success. With our extensive portfolio of education and training programs you can deepen your knowledge and clinical expertise. We show you how to maximize the benefits that can be achieved with our advanced technology. This will help you to optimize your workflows so you can offer an even higher quality of care for your patients.

Information and communication

**Be informed – get connected**

To ensure you are always up-to-date on what is happening in the CT world, we offer you a variety of information services including easily accessible information portals, monthly newsletters, our customer magazine SOMATOM Sessions, and the SOMATOM World Summit, our scientific user conference.
# SOMATOM Definition AS

## Configuration Overview

### SOMATOM Definition AS

**20-slice and 40-slice config.**
- All routine and advanced applications for clinical practice
- Industry’s highest spatial resolution
- Pediatric and bariatric CT imaging with virtually no patient exclusion
- Most comprehensive low dose CT portfolio in single source CT, including CARE kV
- Full on-site upgradability up to 128 slices with 18 m² footprint

### Access to:
- Full FAST CARE functionality like FAST Planning to optimize patient-centric productivity
- Iterative reconstruction with SAFIRE*
- 3D guided interventional CT
- Dynamic perfusion imaging beyond detector coverage
- Scanner-injector coupling including injector protocol management

### SOMATOM Definition AS/AS+ Excel Edition

**64-slice and 128-slice config.**
- All routine and advanced applications for clinical practice
- State-of-the-art cardio-vascular imaging
- Industry’s highest spatial resolution
- High-speed whole body coverage at highest spatial resolution
- Pediatric and bariatric CT imaging with virtually no patient exclusion
- Most comprehensive low dose CT portfolio in single source CT, including CARE kV
- Full on-site upgradability up to 128 slices with 18 m² footprint

### Access to:
- Full FAST CARE functionality like FAST Planning to optimize patient-centric productivity
- Iterative reconstruction with SAFIRE*
- 3D guided interventional CT
- Long range dynamic imaging (up to 26 cm) for whole organ coverage
- Scanner-injector coupling including injector protocol management

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*The information about this product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.*

For more details, please also visit [www.siemens.com/fastcare](http://www.siemens.com/fastcare)
All routine and advanced applications for clinical practice

Full FAST CARE functionality like FAST Planning to optimize patient-centric productivity

High performance image reconstruction system

State-of-the-art cardio-vascular imaging with high temporal resolution of 150 msec

Industry’s highest spatial resolution

High-speed whole body coverage at highest spatial resolution

Pediatric and bariatric CT imaging with virtually no patient exclusion

Most comprehensive low dose CT portfolio in single source CT, including CARE kV

Full on-site upgradability up to 128 slices with 18 m² footprint

Iterative reconstruction with SAFIRE*

3D guided interventional CT

Ultra-long range dynamic imaging (up to 42 cm) for whole organ coverage

Scanner-injector coupling including injector protocol management

SOMATOM Definition AS/AS+ with FAST CARE

64-slice and 128-slice config.

Access to:
In the event that upgrades require FDA approval, Siemens cannot predict whether or when the FDA will issue its approval. Therefore, if regulatory clearance is obtained and is applicable to this package, it will be made available according to the terms of this offer.

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