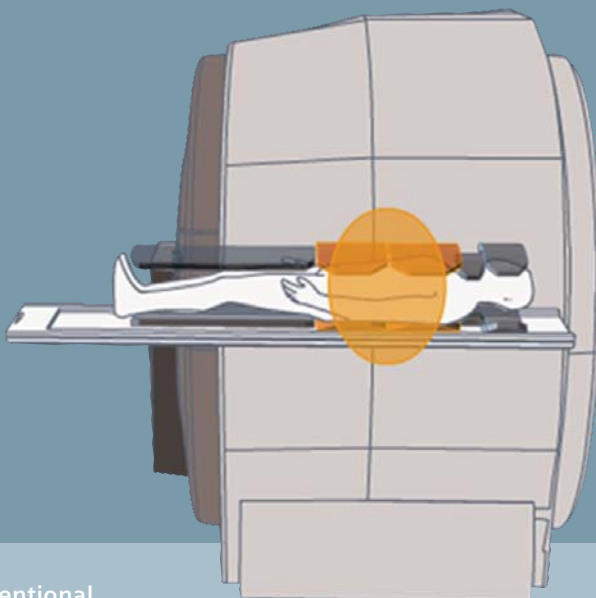
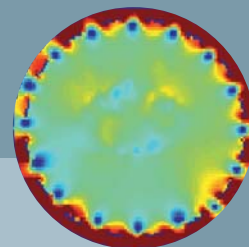
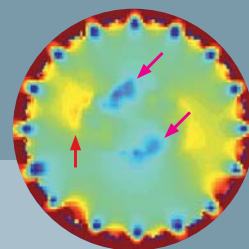


TrueForm



Conventional



# TrueForm™ Design

Imaging to the "true form" of the human body

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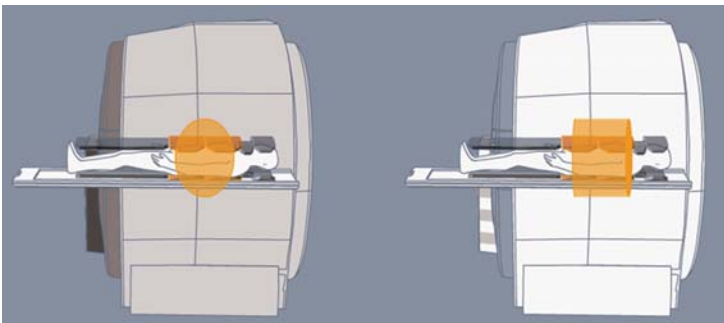
# TrueForm™ Design

Siemens has set a new benchmark in MRI again. MAGNETOM Verio is the shortest 3T system on the market today offering a unique combination of 3T and 70 cm Open Bore. MAGNETOM Verio supports a full range of clinical applications with superb image quality. It is the first 3T system that enjoys the benefits of TrueForm design. TrueForm is a technological innovation introduced to enable full utilization of the 3T power potential without the usual limitations and compromises. TrueForm design has been employed in all field-generating hardware units of the system (magnet, gradients, RF) as well as in the operating software (acquisition, processing).

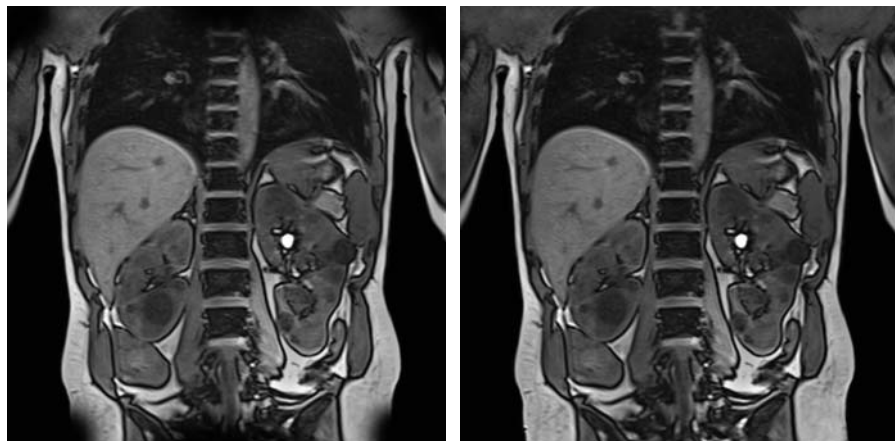
## TrueForm magnet and gradient design:

TrueForm magnet design is an innovation that produces a cylindrically optimized homogeneity volume instead of the conventional spherical or elliptical volume. A cylinder corresponds better to the true form of the human body. TrueForm gradient design also creates a cylindrical shape for the gradient linearity volume. The two combined result in better image quality by reducing the unusable edges in the images as well as better fat saturation for the whole area covered in a scan. TrueForm reduces the overlap needed between steps for large virtual FoV exams and thus reduces the number of steps needed for a given scanning range.

Cylindrically optimized magnets have up to 1.5 times larger homogeneity volume compared to conventional with identical "nominal" specifications. For MAGNETOM Verio, TrueForm magnet and gradient design provide the ability to use up to the full available FoV of 50 x 50 x 45 cm<sup>3</sup>. Whole-body coverage without patient or coil repositioning can be performed in 6 steps\*.



Comparison of usable imaging volume conventional (left) with TrueForm (right) magnet design.



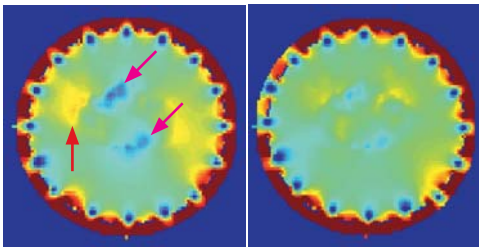
The images visualize the effect of TrueForm magnet design in gradient echo coronal images of the torso (left: conventional, right: with TrueForm). Distortions along the edges of the imaging field are minimized.

\* Results may vary, data on file.

**TrueForm RF design:**

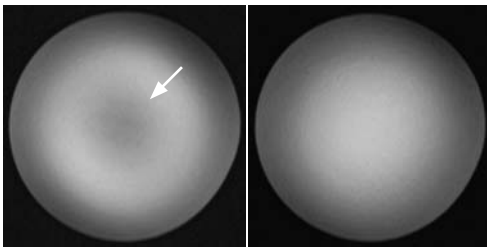
TrueForm RF design includes innovative hardware technology as well as new application and processing features, which provide uniform RF distribution in all body regions. In particular, TrueForm RF for MAGNETOM Verio consists of:

**TrueForm excitation**, which uses optimized amplitude and phase transmission settings. Feeding the 2 ports of the integrated body coil with an optimized weighting yields a homogeneous B1 distribution.



B1 Field Plots for conventional (left) and TrueForm RF design (right). Arrows show areas of B1 inhomogeneity that is corrected with TrueForm RF Excitation design.

**a-SPACE**, which is a version of the SPACE sequence. a-SPACE uses composite adiabatic excitation pulses, which are insensitive to B1 spatial variations.



Phantom image intensity maps acquired with conventional (left) and a-SPACE (right). Part of the TrueForm RF design, a-SPACE improves significantly the homogeneity within the sample.

**B1 Filter**, which is an adaptive inline image filter that reduces any remnant B1 effects without affecting image contrast.

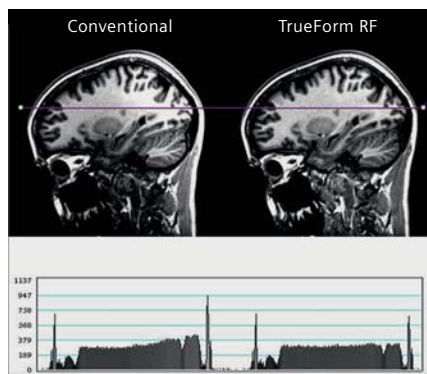
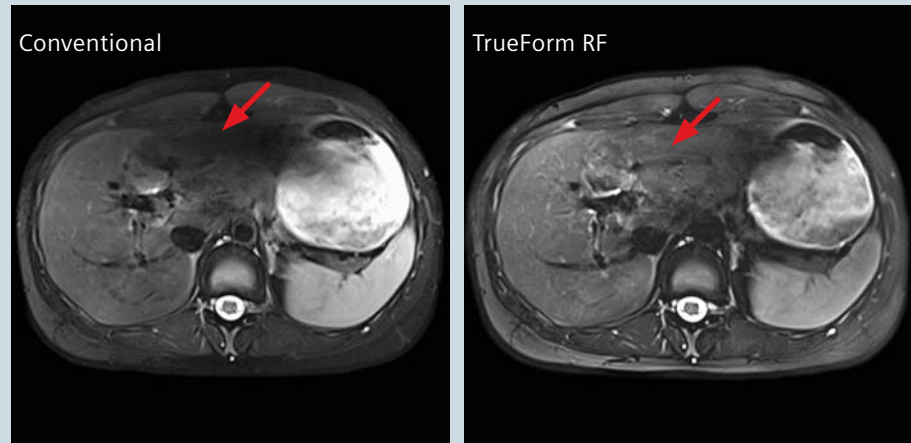
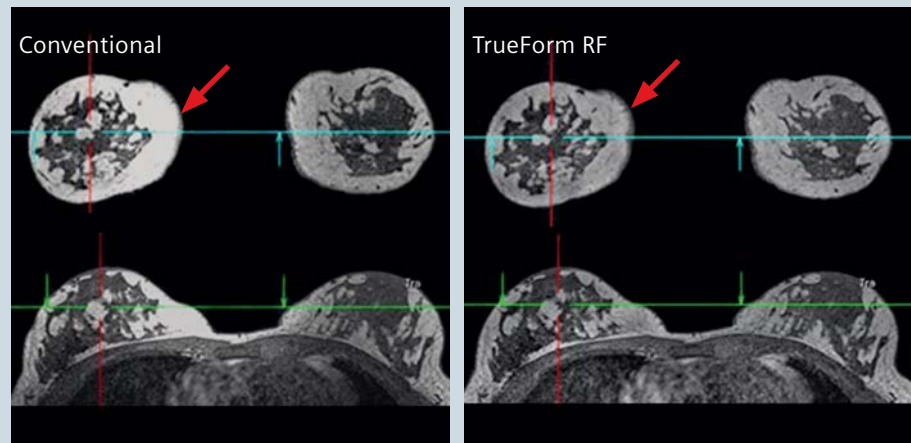


Image Intensity Profile showing the effect of the B1 Filter (right): the signal intensity is much more uniform across the image when using the B1- Filter, part of TrueForm RF design.

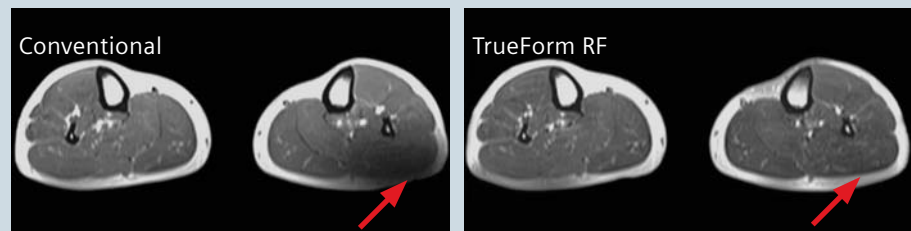
In the clinical examples of the application of TrueForm RF design given below, one can see elimination of B1 artifacts that may appear when imaging different body parts at 3T. In particular the first images show how TrueForm recovers the signal in the anterior part of the liver of a very athletic patient. The second example shows recovery of the uniformity in the image intensity for bilateral breast imaging. The third example shows elimination of the B1 inhomogeneity in the posterior part of the right leg.



Images showing uniform image intensity in the abdomen (right) after application of TrueForm RF design.



Images showing uniform image intensity between the left and the right breast (right) after application of TrueForm RF design.



Images showing uniform image intensity in the lower legs (right) after application of TrueForm RF design.

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