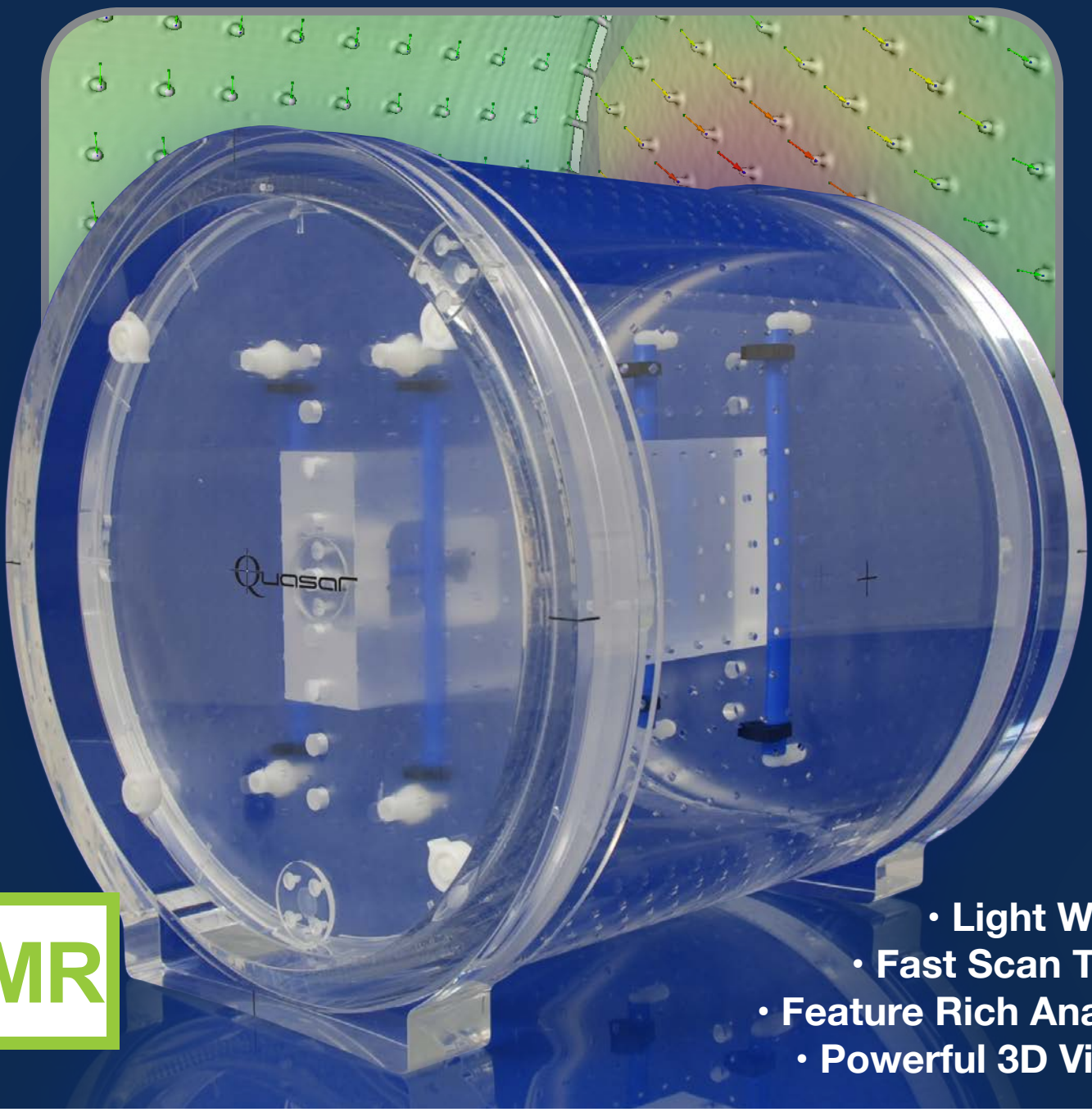
Quasar™

MRID3D DISTORTION ANALYSIS SYSTEM

Quantify Magnetic Resonance Image **distortion** for the entire 3D field of view... **automatically**!



MR

- **Light Weight**
- **Fast Scan Times**
- **Feature Rich Analysis**
- **Powerful 3D Viewer**

modusQA

Accuracy. Confidence.™

QUASAR™ MRID^{3D} is a new, patent pending, cost-effective QA system for quantifying geometric distortion in 3D MR images. Analysis is performed on images for diagnostic and guidance applications.

Unlike other distortion analysis products, which only sample a few imaging planes, QUASAR™ MRID^{3D} analyzes the entire 3D field of view in a single acquisition.

The system, based on the harmonic analysis method, uses 3D Laplace Partial Differential Equations to map the 3D Distortion Vector Field by analyzing the Boundary Distortion Vector Field derived from the location of known surface control points in images of the phantom. The large, lightweight phantom is easy to setup in MRI scanners and comes with quick and easy-to-use image analysis software.

A publication in Medical Physics is available online: **http://dx.doi.org/10.1118/1.4898582**. The QUASAR™ MRID^{3D} Geometric Distortion Analysis System results compare favourably to conventional grid phantoms, which have higher inherent susceptibility/sample distortion.

FEATURES

- Highly refined and robust Control Point Finder algorithm
- Fast T1 weighted 3D isotropic GRE scans
- Rich set of interactive data analysis tools
- Powerful 3D visualization toolkit
- Insightful data displays and export capabilities
- Light weight phantom with large field of view
- Temperature compensating oil expansion reservoirs

BENEFITS

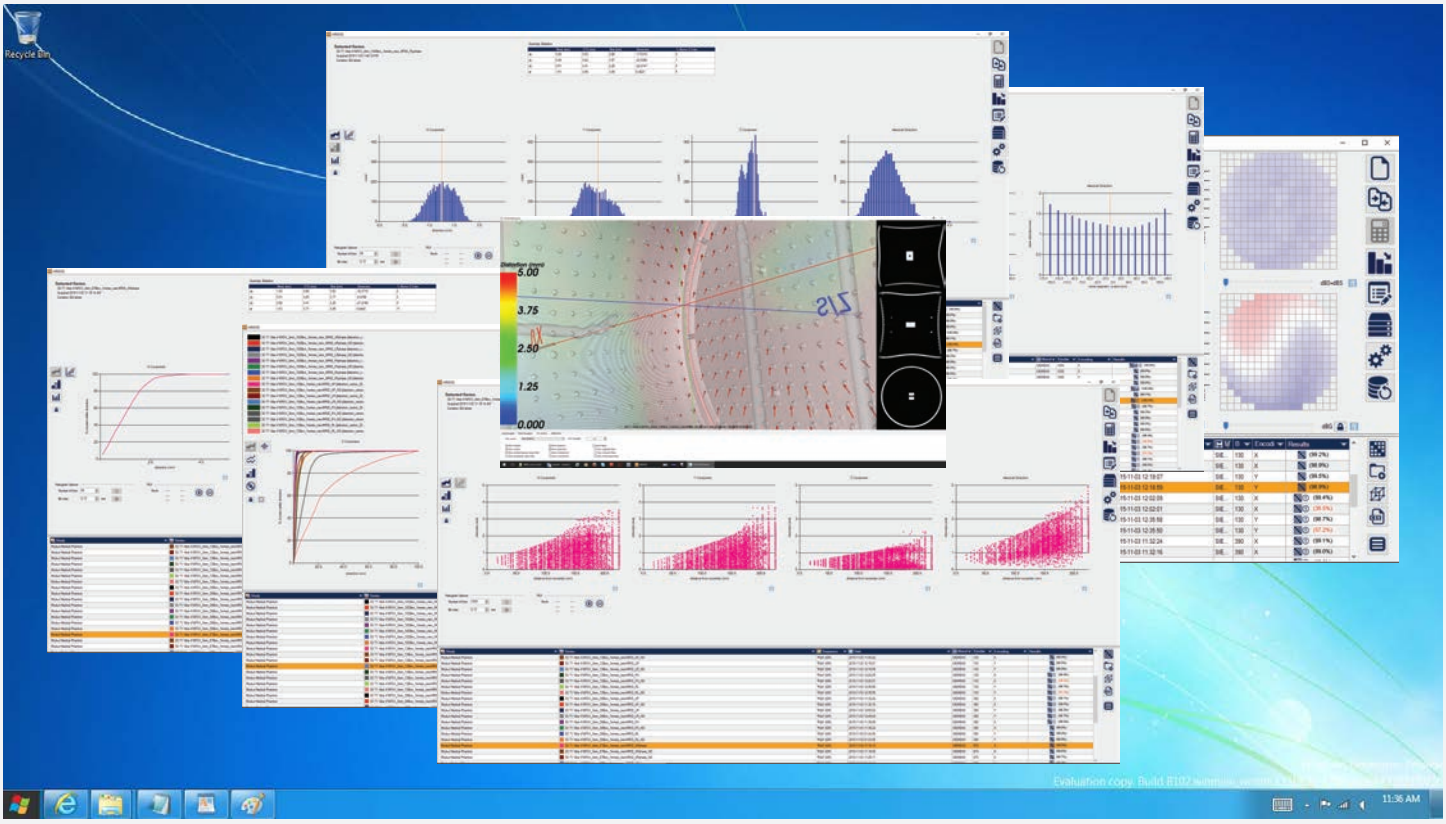
- Able to correctly identify targets at low SNR, as well as very high distortion
- Acquired in as little as 5 minutes at 3T, 10 minutes at 1.5T
- View histograms, cumulative distortion plots, axial plots of X, Y, Z distortion magnitude vs Z position
- Includes ROI Analysis, Synthetic Grid, 3D Distortion Vector Fields and Boundary DVF Colour Plot
- Ability to separate components of system distortion; B0 inhomogeneity distortion and gradient nonlinearity distortion vs bandwidth
- Weighs less than 21 kg compared to 40 - 80 kg for conventional grid phantoms
- Expands and contracts with changes in temperature to maintain geometric dimensional stability

PHANTOM

The QUASAR™ MRID^{3D} Phantom contains an oversampling array of 1502 mineral oil filled control points on the surface of a hollow twin walled closed acrylic cylinder that weighs less than 21 kg. The mineral oil is susceptibility matched to acrylic to minimize susceptibility artefact around the control point. The physical dimensions of the phantom are 39.4 cm diameter by 39.1 cm long – with a hollow internal volume of ~25 liters. A small insert at the center of the phantom includes a 3,4,5 orientation cube to facilitate initial 3 plane MR Image localizing and establish a frame of reference. This central insert can be replaced with task specific objects for image guidance applications.

GEOMETRIC DISTORTION ANALYSIS SOFTWARE

The QUASAR™ MRID^{3D} software automatically identifies the location of the control points in an image of the phantom and uses proprietary algorithms based on harmonic analysis to derive a complete volumetric mapping of the distortion vector field within the phantom boundary control points. The results are shown graphically in a 3D display and numerically in a spreadsheet. The software is compatible with Window 7 or higher operating systems.



WORKFLOW EFFICIENCY

Automated processes are used to identify location of Control Points, calculate Distortion Vector Fields, quantify Geometric Distortion and produce Statistical Analysis.

DATA CALCULATIONS

Complex equations and algorithms are put to use to calculate the phantom Boundary Distortion Vector Field, Volumetric 3D DVF and B0 Distortion vs Gradient Distortions.

DISTORTION RESULTS

Enriched analysis tools make it easier to examine the geometric distortion measurements of a single acquisition or compare the distortion among a collection of images.

REAL-TIME ANALYSIS

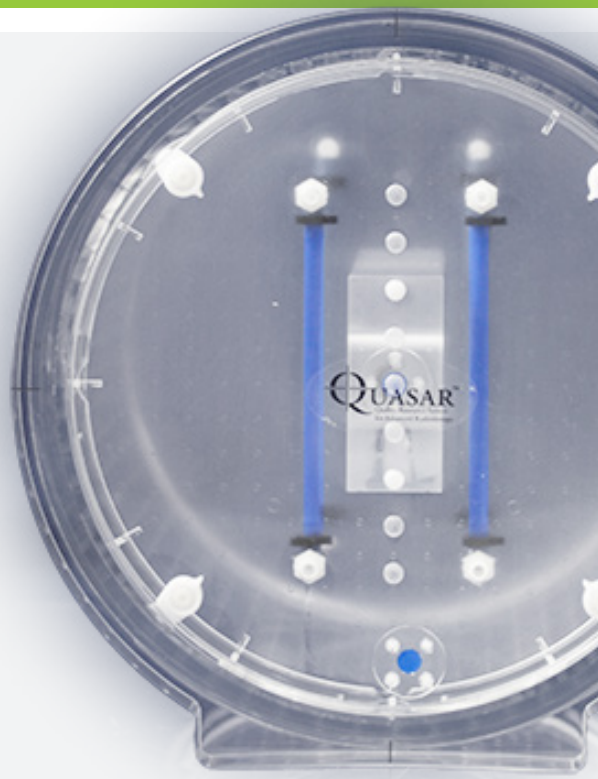
Sophisticated 3D DICOM Viewer with ROI selector takes geometric distortion analysis to a higher level with the ability to update charts and graphs in real-time to gain further insights.

VISUALIZATION TOOLS

Interactive statistical graphics allow users to explore, discover, summarize and visualize quantitative data in the way they see fit to form conclusions and make decisions.

CUSTOM SETTINGS

Control how your data is displayed by adjusting threshold settings, image viewer properties, graphic resolution display, change plot line colours and configure the database path.



PRODUCT SPECIFICATIONS

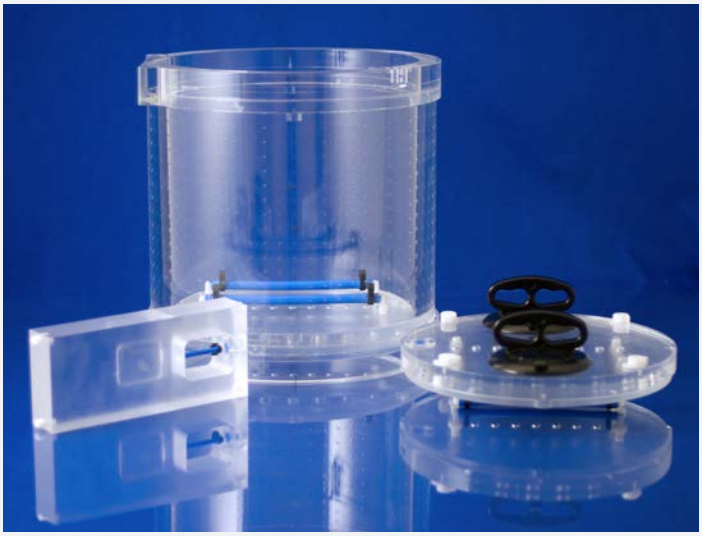
- **Phantom Material**: Acrylic **Density**: 1.18 g/cm³ **Weight**: 21 kg
  Volume Susceptibility: χ_v= -9.01 x 10^{-6} @ 20°C
- **Contrast Media**: 5 liters of high T1 contrast Paraffinic Mineral Oil
  Volume Susceptibility: χ_v= -9.24 x 10^{-6} @ 20°C
  Density: 0.83 g/cm³, T1= ~300ms @1.5T, Dielectric Constant ε_r <3
- **Physical Dimensions**: 39.4 cm diameter by 39.4 cm long
- **Imaging Dimensions**: 36.8 cm diameter by 32.1 cm long
- **Internal Volume**: hollow, 33 cm diameter x 28.8 cm long, ~25 liters

RECOMMENDED SYSTEM REQUIREMENTS

- **Operating System**: Windows 7 or higher
- **Processor**: Intel Core™ i7 or better
- **Hard Disk Space**: 10 GB minimum (64-bit)
- **RAM**: 8 gigabyte (GB) or more
- **Screen Resolution**: 1280 x 720 pixels or higher
- **Graphics Card**: Intel HD Integrated Graphics or Nvidia GeForce GTX 750 or better

MRI DATA ACQUISTION REQUIREMENTS

- 3D T1 weighted sequence (GE - LAVA-XV or SPGR; Hitachi – TIGRE or RF Spoiled SARGE; Philips - THRIVE or T1 Fast Field Echo; Siemens - VIBE or FLASH; Toshiba – 3D Quick or T1-FFE) with 1 NEX, minimum TE and TR, ~ 10 minute acquisition time @ 1.5T, ~5 minute acquisition time @ 3T
- A 40 cm maximum Field of View (FOV) acquired in one continuous Z slab to ensure all control points are located
- 1mm³ Isotropic (cubic) voxels
- Bandwidth Range: 100 Hz / Pixel to 1,000 Hz / Pixel (25KHz to 250 KHz)



ORDERING INFORMATION

100-1018	QUASAR™ MRID^{3D} Geometric Distortion Analysis System Includes: ▶ 1-Software License ▶ 1-Phantom ▶ User's guide
500-5040	Additional Software License
500-5041	Annual Maintenance Contract
500-5042	Extended Hardware Warranty

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