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Standard or Customised: X-Ray Imaging Phantoms by QRM

Medical imaging phantoms are an essential tool for the performance evaluation of modern imaging systems. With over 25 years of experience in phantom design and manufacturing, QRM, a PTW company since 2020, offers one of the widest ranges of commercial and custom-designed phantoms for assessing the accuracy of different imaging modalities. QRM phantoms are utilised for routine quality assurance in diagnostic imaging and radiation therapy, for research & development, and for scientific or OEM purposes.

Customised Phantoms for Various Purposes – a Core Competence of QRM

Do you need a dedicated phantom for a specific study, research project, or a new application? Do you want to evaluate a new imaging technique in a controlled, reproducible environment? As a recognised phantom specialist company, QRM's core competence lies in the design, development, and production of customised phantoms for various applications and customers such as manufacturers in medical and industrial X-ray markets, as well as scientists and physicians working on research projects and studies worldwide.

Projects are realized in close cooperation with the customer to create the best solution possible for their specific testing requirements. They usually begin with a detailed customer request for a dedicated phantom. We then contact the customer to learn more about their specific requirements and find the best way to turn their idea into a product. First, the modality in which the phantom will be used must be defined, since phantoms are manufactured for different modalities using different components or materials. Custom-designed phantoms are available for a wide range of imaging modalities, such as CT, PET, SPECT, or radiation therapy. After defining the required modality, we discuss the project in more detail, which helps us to thoroughly understand the purpose of a customer's project and the characteristics of the phantom needed. Following the specification process, we prepare a drawing of the phantom and submit it for approval. Once the design and specifications of the phantom have been approved, we start production – and your idea finally turns into reality.



Custom-designed imaging phantoms for a wide range of imaging modalities by phantom specialist QRM.

A New Phantom for Multi-Energy CT Applications in Diagnostic Imaging

In conventional computed tomography (CT) imaging using a single polyenergetic spectrum, materials with different effective atomic numbers can have the same CT values at the same energy level, making material differentiation difficult. In multi-energy applications, however, it is possible to differentiate materials with different effective atomic numbers because they have different linear attenuation coefficients at high- and low-energy levels. Some substances, such as iodine or calcium, absorb more x-rays at low-energy levels, while substances such as uric acid or adipose absorb more x-rays at high-energy levels. In clinical practice, multi-energy imaging can be performed using different techniques, such as photon-counting detector CT, dual-layer CT, kV-switching or dual-source CT, which allow for material-specific imaging. Unlike other multi-energy imaging techniques, photon-counting detectors convert the absorbed x-rays directly into electrical signals, resulting in higher spatial resolution at lower doses. The new QRM Multi-Energy CT Phantom has been designed for the evaluation and testing of all multi-energy techniques, including photon-counting detector CT.

It is equipped with enriched rods containing several contrast media (water and iodine, adipose and iodine) as well as calcium (water and calcium hydroxyapatite) in different concentrations, which makes this phantom the best solution for testing different types of CT modalities with dual-energy, multi-energy, or photon-counting setups. In addition, water- and soft tissue-equivalent inserts (adipose, liver, brain) are available. Other materials, such as blood and iodine or various ICRU tissues, can be manufactured upon request. Phantom setup and scanner alignment is quick and easy. After the phantom is accurately positioned at isocentre using the CT scanner's internal alignment lasers, it can be scanned at two different energy levels. The images obtained from phantom scanning can then be evaluated for correct material separation and concentration by using various post-processing techniques and algorithms.

For more information on customised and commercial imaging phantoms by QRM, download our catalog or visit www.qrm.de.





QRM Multi-Energy CT Phantom – quick and easy phantom setup and alignment.

The water-equivalent (CTwater) compact body of the phantom consists of a removable head section, allowing stand-alone use of the phantom. **Burcu Hiz Temizer** is a Physics engineer and holds a Master's degree for Medical Physics. She currently works as a product manager at PTW Freiburg. In this role, she is responsible for developing phantom solutions for diagnostic radiology.