# ■■Artinis Contrast-Detail CDRAD 2.0 Phantom

*... Quality control for radiological system and observer ...*

**Introduction** Most definitions of image quality in radiology are based on characterizing the physical properties of the image chain. However, medical diagnosis is not made by the image alone. The perception by the observer is crucial for the result. A test of the observers perception is possible with so called Contrast-Detail (CD) phantoms. With a CD-phantom it is possible to quantify both, detail and contrast, as observed by the radiologist. The **Artinis CDRAD 2.0 phantom** can be used within the entire range of diagnostic imaging systems, such as fluoroscopy and digital subtraction angiography.

**Construction** The Artinis CDRAD phantom consists of a Plexiglas tablet with cylindrical holes of exact diameter and depth (tolerances: 0.02 mm). Together with additional Plexiglas tablets, to simulate the dimensions of the patient, the radiographic image of the phantom gives information about the imaging performance of the whole system (refs. 1 and 2). The image shows 225 squares, 15 rows and 15 columns. In each square either one or two spots are present, being the images of the holes. The first three rows show only one spot, while the other rows have two identical spots, one in the middle and one in a randomly chosen corner (figure 1). The optical densities of the spots are higher as compared to the uniform background. Due to the (exponentially) increasing depth of the holes in horizontal direction, the image shows 15 columns of spots with increasing contrast. In the vertical direction the diameter of the holes increases stepwise and exponentially from 0.3 tot 8.0 mm. For the image this means 15 rows of spots with increasing spatial resolution.
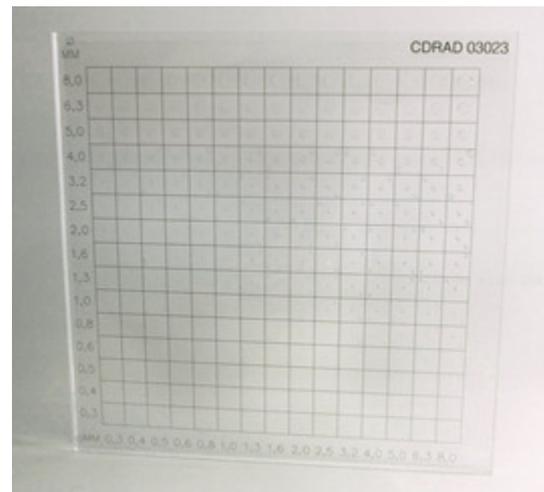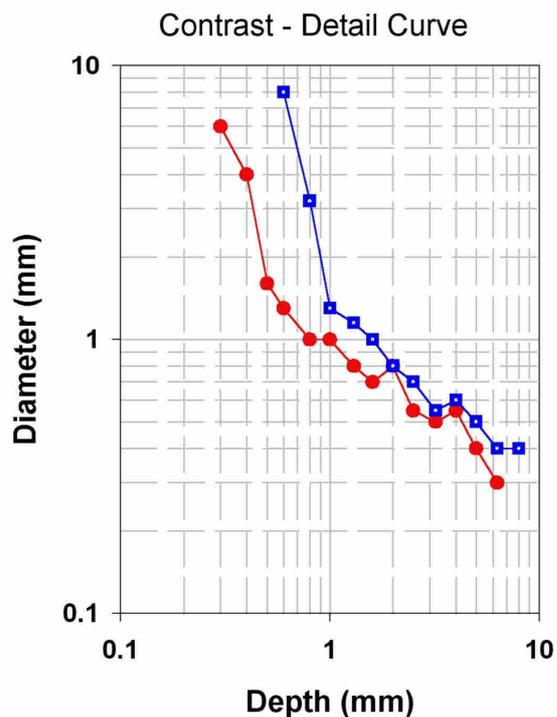




# ■■Artinis CDRAD Analyser

*... Accurate and easy quality assurance ...*

**Introduction** A companion to the Artinis CDRAD phantom is the **Artinis CD Analyser program**. This program has the ability to score the images obtained with the CDRAD phantom automatically, provided a digital image is present. The program is easy to use and gives the user reports of the quality of the mages obtained.

**Characteristics** The characteristics of the Artinis CDRAD Analyser program are:

- Automatic scoring diagram

- Automatic correction scheme

- Image quality figure

- Statistically sound



CDRAD 2.0 x-ray image
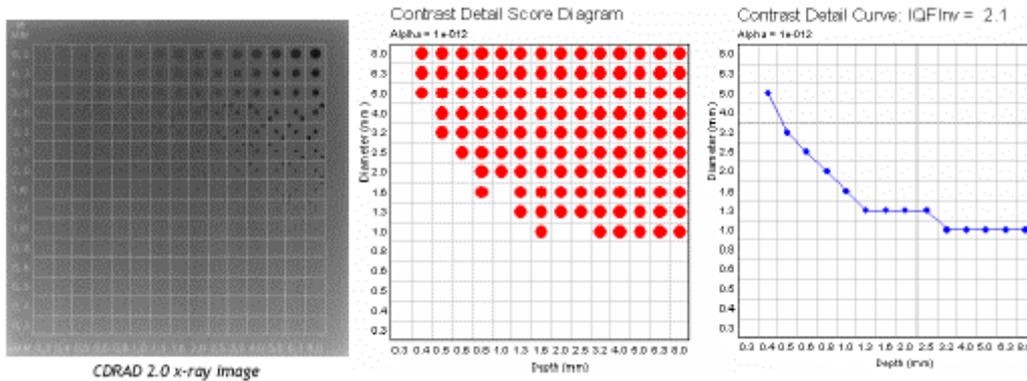
**Requirements**

- DICOM 3.0 format of the images

- Monochrome 1 and 2

- Runs on Microsoft Windows XP™ platforms

- Free USB port (1.1 or higher)

# ▪▪▪Artinis Contrast-Detail Phantom CDMAM 3.4

### ... Quality control in mammography ...

**Introduction** In mammography it is essential that objects with very small contrast and diameter can be distinguished. Therefore the quality of the technical aspects of the mammography equipment should be monitored at regular time-intervals. Usually this is performed by measurement of the physical parameters of the X-ray equipment, screen-film combination, developing process and observation conditions. The main item in quality control however should be the assurance of information transfer from the tissue under examination to the radiologist. Therefore the information content of an image should be monitored. The **Artinis CDMAM 3.4** phantom is specially developed to facilitate this task in mammography systems, i.e.
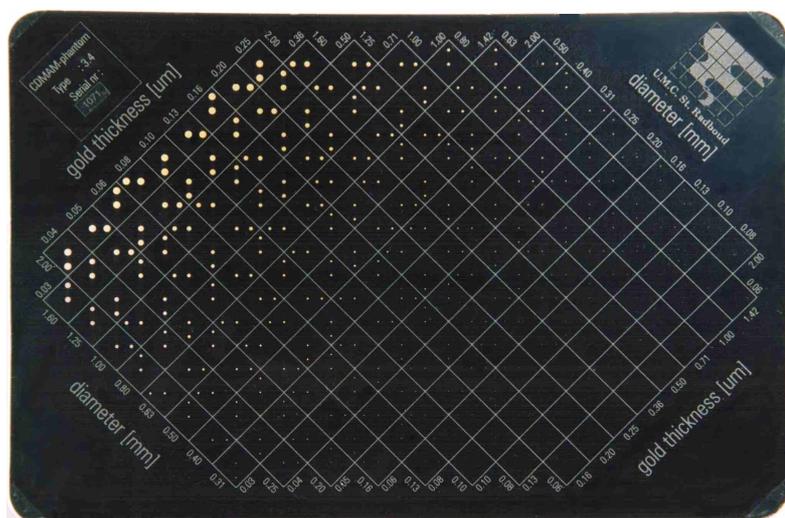
detecting very low contrast and detecting very small details. With the phantom the "threshold contrast" as a function of the object diameter can be determined and plotted in a Contrast-Detail curve.

**Construction** The Artinis CDMAM phantom consists of an aluminum base with gold discs of various thickness and diameter (figure). The aluminium base is attached to a Plexiglas (PMMA) cover. Under normal mammography-radiation conditions (Mo anode, 30 mm Mo filter, 28 kV) the aluminum base and PMMA cover together has a equivalent PMMA thickness of 10 mm. The phantom is delivered with 4 PMMA plates, each 10 mm thickness. Every plate has an engraved marker with lead inlet for identification. The gold discs are arranged in a matrix of 16 rows by 16 columns. Within a row the disc diameter is constant, with (partly) logarithmic increasing thickness and within a column the thickness of the discs is constant and the diameter increases logarithmic. Each square contains two identical discs (same thickness, same diameter), one in the center and one in a randomly chosen corner. Easily recognizable patterns have been avoided. The total matrix is rotated by 45 degrees and the corners of the matrix are skipped. This is done for reasons of getting a better focus on the interesting part (low contrast, small diameter) and making the recognition of the patterns more difficult.

# ◼◼◼Artinis CDMAM Analyser

*... Accurate and easy quality assurance ...*

**Introduction** A companion to the Artinis CDMAM phantom is the **Artinis CDMAM Analyser program**. This program has the ability to score the images obtained with the CDMAM phantom automatically, provided a digital image is present. The program is easy to use and gives the user reports of the quality of the images obtained. The phantom is scored using the CDCOM software from EUREF. More information can be found here.

**Characteristics** The characteristics of the Artinis CDMAM Analyser program are:

- Multiple images

- Automatic scoring diagram

- Automatic correction scheme

- Image quality figure

- Reference curve can be added

**Requirements**

- DICOM format of the images

- CDMAM Phantom type 3.4

- Runs on Microsoft Windows XP™ platforms

- Free USB port (1.1 or higher)