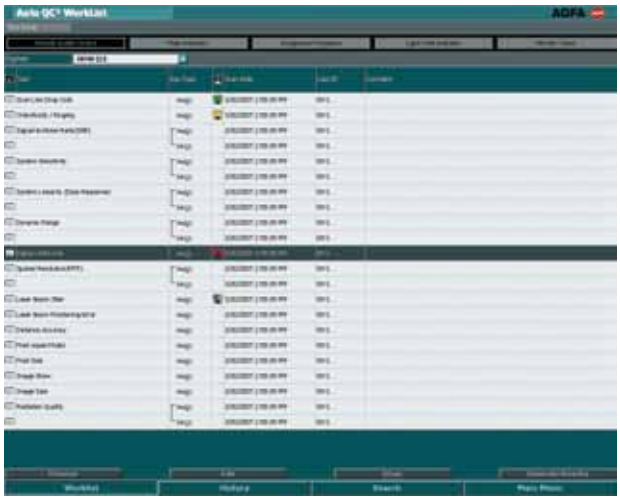
AUTO QC²



INTEGRATED HARDWARE AND SOFTWARE ENABLES AUTOMATED CR QUALITY CONTROL.

- Tests the entire CR system with only two exposures for periodic quality control.
- Complete, automated, easy-to-use program requires less user intervention, from exposures to reporting.

AUTO QC² uses a single phantom for both spatial and contrast tests, improving workflow and results.

AUTO QC²'s exclusive hafnium technology ensures more robust results while eliminating manual tasks.

CR quality control enters the next generation

The rapid growth of Computed Radiography (CR) in medical imaging has increased the need for advanced, comprehensive Quality Assurance (QA) programs to verify that these CR systems function optimally and consistently. To answer this need, Agfa HealthCare has introduced AUTO QC², its second-generation CR QA program, which includes both Agfa HealthCare's unique CR test phantom and the AUTO QC² software. As the pioneer in automated CR Quality Control (QC), Agfa HealthCare has the firsthand knowledge and expertise to develop a cutting-edge program using new technologies in new ways.

Together, the integrated hardware and software tools offer imaging specialists a complete, automated means to control the technical quality of the CR system quickly and efficiently. AUTO QC² has been developed based on American Association of Physicists in Medicine (AAPM) recommendations, to provide a better standardization of quality control.

It is an "all-inclusive" program that helps close the loop in quality control, so that results can actually be used to continuously ascertain the optimal functioning of the CR system. It can thus play an important part in the facility's complete Quality Assurance program.

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A complete and automated program

AUTO QC² is a complete program which includes the innovative phantom, the positioning template, the AUTO QC² software, the filter unit and the light field indicator. These elements are fully integrated to provide an advanced yet easy-to-use quality control process for the entire CR system.

The AUTO QC² software includes a set of automated test procedures, founded on AAPM recommendations and has a user-friendly and intuitive interface based on our NX design. Results are calculated and analyzed, and a full report is generated, all with minimal user intervention.

Acquisition and analysis phases can even be divided, if desired, by installing the software on a separate computer, freeing up the X-ray room. In this case the test images are sent to the seperate PC via network or using the export/ import function. It is thus an ideal solution for both centralized and decentralized environments.

Testing the entire CR system, with only 2 exposures

AUTO QC² is a comprehensive quality control solution that enables both acceptance testing for setting up the CR systems and constancy testing for periodic quality control. In case of a periodic quality control, a maximum of only two exposures is used each time: one using the phantom and the other using a flat-field image.
AUTO QC² provides the user with a pass/fail result, as well as an automatically-generated report and history. A search function is available for finding previous results.

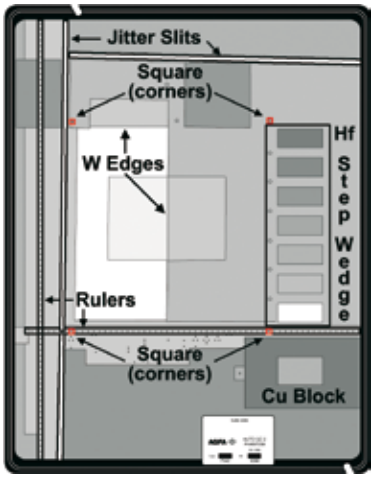
AUTO QC² consists of five functional test groups:

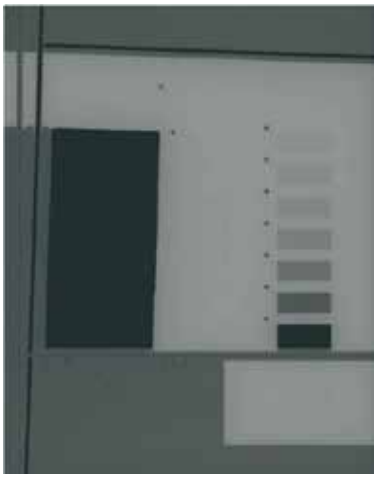
- Acceptance Procedure: used for the initial setup of the CR system and for establishing an operational baseline state;
- Periodic Quality Control: a subset of the acceptance procedure, for monitoring the state of the CR system during regular use;
- Plate Inventory: provides individual and statistical performance data on all image plates;
- Light Field Indicator: for checking the collimation accuracy of the X-ray exposure system;
- Monitor Check: checks the performance of the monitor used when it is necessary to view the QC images.

Hafnium phantom—relaxed parameters, robust results

With the unique technology of a single phantom and an automated workflow, testing CR systems is simple. The exclusive utilization of a rare-earth hafnium step-wedge element in the phantom significantly reduces the exposure control issues that can affect QC tools employing only copper or aluminum. Tube voltage precision requirements are more relaxed, for an easier-to-use package that doesn't need supplementary equipment such as a kV meter. Exact repetition of beam quality and exposure settings is no longer necessary. Once parameters have been established the first time, during set-up, they can be reused for later testing, without requiring further adjustment.

The specialized phantom design requires only a single phantom exposure for both spatial and contrast tests. The phantom, utilized in concert with a flat-field image exposure, contains all the structures necessary to provide every QC measurement for a comprehensive performance analysis (see illustration of the phantom components and phantom radiograph). Overall, results are more robust and reliable, for a better historical context.





A hafnium step wedge and copper block, tungsten (W) edges, rulers, square and jitter slits surrounded by a lead layer.

technical

SPECIFICATIONS

CR TEST PHANTOM

Components

- Hafnium step wedge: six hafnium steps (and one unattenuated step) used to derive signal/contrast data (e.g., linearity, sensitivity, dynamic range, signal/noise ratio)
- Copper block: used with step wedge to derive radiation quality
- Tungsten (W) edges: precisely machined W edges used to measure vertical and horizontal Modulation Transfer Functions (MTF), according to IEC 62220-1-1
- Rulers: precisely positioned holes (horizontal vertical) used to measure laser beam positioning accuracy and image size
- Alignment square: four precisely-positioned corner holes used to measure aspect ratio and directional accuracy (skew)
- Jitter slits: inclined slits used to check laser scanning repeatability:
- Lead shielding layer: used to block unwanted exposure to IP

Dimensions

- 493 x 395 x 13 mm (19.42 x 15.56 x 0.51 inch)

Weight

- Test object: 4570 g (10.14 lbs)

Tolerances

- Copper block (99.9% pure): 4 +/- 0.05 mm
- Hafnium wedge steps (96.5% to 98.5% pure): 1 to 6 x (0.18 +/- 0.01 mm)
- Tungsten MTF-edge targets (99.9% pure): 1.1 +/- 0.1 mm
- Width of both jitter slits: 3 +/- 0.1 mm
- Pitch of both marker rulers: 5 +/- 0.03 mm
- Spatial marker accuracy (both directions): +/- 0.015 mm

FILTER UNIT

Produces RQA5 beam quality with the 21 mm (0.83 inch), 99.99% pure, fixed, aluminum Filter. Equipped with a 7.1 mm (0.28 inch), 99.99% pure, removable Half-Value Layer test device.

Diaphragms

- 4 mm (0.16 inch) lead (99.9% pure) with 48 mm (1.89 inch) aperture

Dimensions

- Rail mount interface: 168.5 x 176.2 x 1.5 mm (6.63 x 6.94 x 0.06 inch)
- Height : 96 mm (3.78 inch)

Weight

- Filter unit : 1465 g (3.23 lbs)
- Half-Value Layer test device (removable): 68 g (0.15 lbs)
- Diaphragms (removable): 660 g (1.46 lbs)

POSITIONING TEMPLATE

Aligns the test object accurately with the 35 x 43 cm (14 x 17 inch) cassette. Provisions for beam-axial placement of smaller CR cassettes. Back-scatter shield incorporated: 0.5 mm lead (99.9% pure).

Dimensions

- 493 x 395 x 35 mm (19.41 x 15.55 x 1.38 inch)

Weight

- 3990 g (8.80 lbs)

LIGHT FIELD INDICATOR

Analyzes discrepancies between light field indication and X-ray irradiated field

- Dimensions 170 x 170 x 5 mm (6.69 x 6.69 x 0.2 inch)
- Weight 100 g (0.22 lbs)

WHEELED CASE

Includes shelves for all parts, for easy and secure storage and transportation.

- Dimensions 680 x 510 x 260 mm (26.77 x 20.08 x 10.24 inch)
- Weight 6830 g (15.06 lbs)

AUTO QC² SOFTWARE

Two software versions

- An integrated version available as an additional component on the NX workstation.
- A stand-alone version, with which image acquisition is done on an NX workstation, but analysis is done on a separate PC.
  PC requirements are:
  - Microsoft Windows XP / Vista
  - Intel Pentium IV-based processor or higher
  - AMD Athon64 or higher
  - Minimum: 512 MB RAM; recommended: 1 GB
  - Recommended screen resolution: 1280 x 1024; Minimum 1280 x 768 (using scroll bar)
  - 2 GB free space available
  - 1 available USB port for dongle

DOSE METER

As a well-calibrated dose meter is required in order to perform all the tests described, Agfa recommends the Unfors Dosimeter 577L. Other dose meters meeting the following specifications can also be used:
Range (auto): 8 μGy- 9999 Gy.
Energy dependence: < 5 % at 2.5 mm Al, (50 - 150 kVp).

REFERENCE

AAPM – American Association of Physicists in Medicine – Report No. 93: Acceptance Testing and Quality Control of Photostimulable Storage Phosphor Imaging Systems.
IEC1267 – Medical diagnostic X-ray equipment – Radiation conditions for use in the determination of characteristics.
IEC62220-1-1 – Medical electrical equipment – Characteristics of digital X-ray imaging devices.

INSTALLATION

Carried out by a qualified Agfa engineer.
X-ray tube with external, irremovable Dose Area Product meter (DAP) is not supported because the filter module must be mounted on the collimator rails. Available in combination with NX workstation only.

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