Purpose:
Recently several new digital mammography equipments with different innovative features have been proposed on the market. This work compares 7 different systems with respect to physical characteristics, phantom image quality and dose.

Methods:
The studied units are: Fujifilm Amulet (innovative photoconductive switching read-out), GE Senographe DS, Hologic Selenia (old and new target/filter materials), Hologic Dimensions (new filter, new tomosynthesis modality), Sectra Microdose, Siemens Mammomat Inspiration (new active matrix flat panel imager).
All system detectors have been characterized in terms of MTF, NNPS and DQE according to IEC 62220-1-2. Image quality has been assessed by means of contrast detail evaluation with the phantom CDMAM ver. 3.4 and the software CDMAM Analyser for automated image analysis using the Inverse Image Quality Figure IQFinv. Dose was expressed as average glandular dose (AGD).
Performances have been evaluated in clinical setup using automatic exposure control modality (AEC) and in optimized setup. Optimization was based on contrast to noise ratio (CNR) measurements.

Results:
DQE of all systems ranked between 55% and 80%, being higher in systems applying direct conversion technology. Generally a higher DQE reflected in a higher IQFinv score. Target/filter combinations producing spectra of higher mean energy confirmed better performances than conventional Mo/Mo ones. Photoconductive switching readout exhibited a potential average 20% dose saving; also scanning acquisition showed improved image quality at equal dose compared to standard flat panel detectors. The tomosynthesis modality allowed acquisitions with less AGD than a standard 2-view screening examination for every breast thickness.

Conclusions:
Generally, technological innovations allow better image quality with lower AGD.