

Unique field-of-view reduces the need for extra views

Philips MicroDose Mammography

Summary

- The Philips MicroDose Mammography system uses a unique field-of-view (FOV) of 24 cm x 26 cm.
- This size was chosen because it allows imaging of over 99% of breasts in a single view, without compromising imaging of the breast to axilla in smaller breasts.
- Hoffmeister's study confirms that the MicroDose system's 24 cm x 26 cm FOV can accommodate different breast sizes in one view, as only 0.57% of women required extra views.¹
- Young's study of film-screen mammography systems showed that with the larger, 24 cm x 30 cm film format, 1.1% of breasts required extra views for oblique projection, and 1.8% required extra views for craniocaudal projection.²

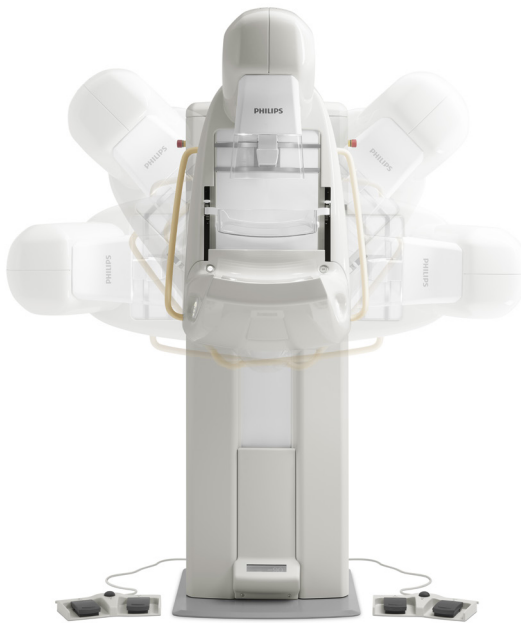


Figure 1: Philips MicroDose Mammography system.

Introduction

Traditional film-screen mammography uses two film-cassette sizes: 18 cm X 24 cm (standard) and 24 cm X 30 cm (large). Accordingly, there are two field-of-view (FOV) sizes. When the cassette cannot accommodate a larger breast in one view, overlapping exposures are required, resulting in mosaic images. Mosaic images involve extra views and, therefore, more radiation exposure than if a single, large film was used.

Because digital mammography systems can only have one FOV size, when digital mammography was developed, the large FOV was chosen by many manufacturers. This FOV of 24 cm (depth) X 30 cm (width) was chosen to reduce additional views that increase radiation exposure for larger-breasted patients, as well as increase imaging times. However, positioning a smaller breast on a large FOV is technically challenging, and can result in retakes that increase radiation exposure.

Rather than choose between FOV sizes that were arbitrarily chosen for film imaging, the developers of MicroDose Mammography chose a unique FOV of 24 cm (depth) X 26 cm (width). This size balances the needs of both larger- and smaller-breasted women.

This white paper explains how the MicroDose Mammography system enables imaging of the entire breast in one view, while also allowing easy breast positioning, especially for smaller-breasted women.

Factors considered in designing the MicroDose FOV of 24 cm X 26 cm

The unique MicroDose FOV of 24 cm X 26 cm was designed based on input from mammography experts. That input indicated that the primary reason for selecting a larger FOV size is because of FOV depth, rather than width. A width greater than 26 cm may compromise the positioning of a higher percentage of smaller-breasted women (primarily breast to axilla distance, rather than actual breast size) compared to the percentage of larger-breasted women who would benefit from single exposure if a width larger than 26 cm were used.

In designing the 24 cm x 26 cm FOV, the following factors were taken into the consideration:

1. Digital systems can only have one FOV size, which will inevitably result in a compromise for screening patients who are larger or smaller than the statistical average.
2. The film format FOV sizes of 18 cm X 24 cm and 24 cm X 30 cm are not clinically significant. These two sizes were defined based on a film manufacturer's ability to supply radiology film and cassettes.
3. The depth of FOV should be as large as physically possible within the technical constraints of the design. When analyzing 24 cm X 30 cm film-screen images, it was found that the number of breasts for which 24 cm was insufficient was statistically so small that it would be irrelevant as a design constraint.
4. A FOV width of 26 cm is effective in reducing the dead space at the edges of the images. A larger FOV width makes it difficult to position smaller breasts.
5. Using a FOV width of more than 26 cm may limit the chest wall visualization on smaller-breasted women, even if offset positioning is possible.
6. Minimum FOV edge to chest wall distance is crucial and must be below 5 mm.

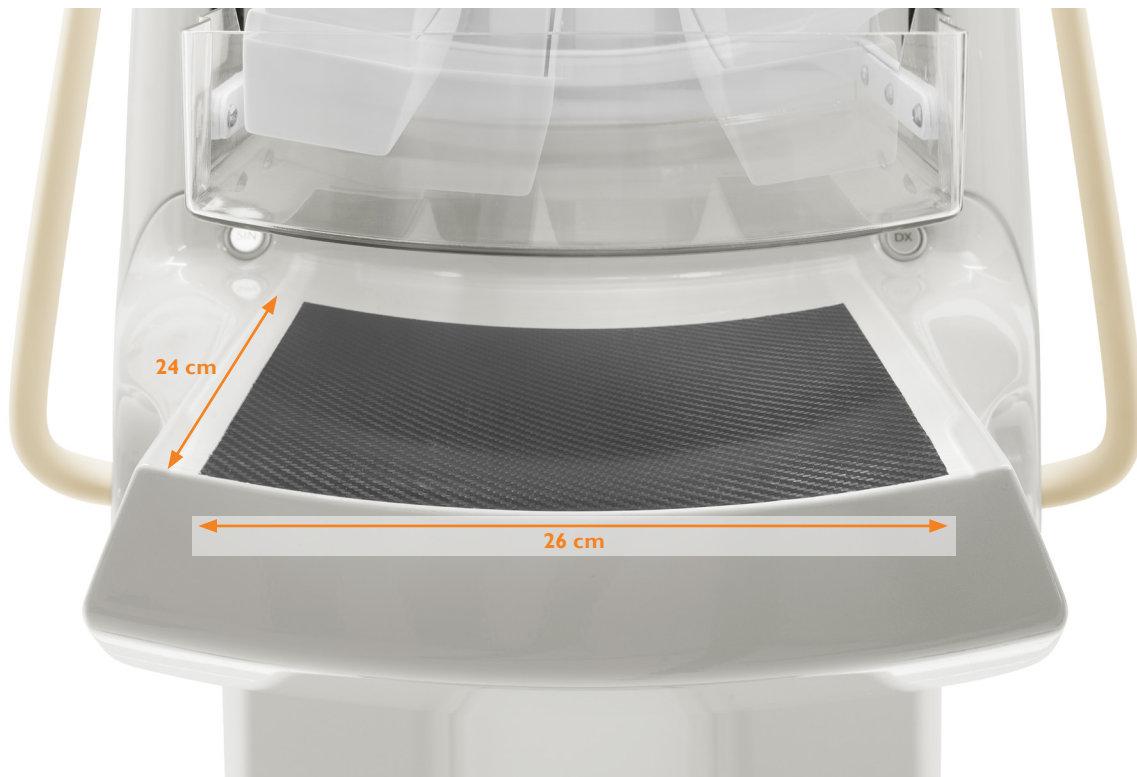


Figure 2: The MicroDose Mammography system is a full-field digital mammography system (FFDM) that uses unique photon counting, multi-slit scanning technology. A small detector inside the patient support moves while scanning to acquire the breast image.

Unique FOV to accommodate larger and smaller breasts: a clinical review by the Warwickshire, Solihull, and Coventry Breast Screening Service

A clinical review of images obtained with the MicroDose Mammography system, using a 24 cm X 26 cm FOV, was undertaken at the Warwickshire, Solihull, and Coventry Breast Screening Service, part of the NHSBSP in England.^{1,a}

In this study, 10,825 women were screened between August 1 and November 5, 2009 at three mobile mammography units and at the George Eliot Hospital. Of the 10,825 women screened at these centers, 62 required extra views for either or both craniocaudal projection (CC) and mediolateral-oblique (MLO) projection, due to their larger breast sizes. This means that the percentage of women who required extra images during this period was approximately 0.57%.

Study of films from NHSBSP in England

Young, et al., reviewed a large representative sample collected during screening for the NHSBSP in 2001 and 2002. The sample included 53,218 films of 16,505 women, obtained from 290 film-screen mammography systems.² The study shows:

- That the number of extra films taken occur when larger films are available, as well as when they are not
- The increased mean glandular dose (MGD), resulting from these extra images

The study indicated that even when the larger film size of 24 cm X 30 cm was available,^b 1.1% of the examined breasts required more than one image for oblique projection (OB)^c and about 1.8% of examined breasts required additional images for CC projection.

Conclusion

The result of the study performed by the Warwickshire, Solihull, and Coventry Breast Screening Service using the MicroDose Mammography system with 24 cm X 26 cm FOV showed that 0.57% of the women screened require extra views for either or both CC and MLO projection.¹ The NHSBSP study shows that even when the larger, 24 cm X 30 cm film was available, the percentage of the examined breasts that required extra views was 1.1% for OB projection and 1.8% for CC projection.² Although the methods employed for these two studies differ, results indicate that the number of women requiring extra views was not decreased by using a 24 cm X 30 cm FOV.

Accordingly, we conclude that the 24 cm X 26 cm FOV can be used for screening, as well as the 24 cm X 30 cm FOV, with little or no difference in the number of women requiring extra views. The unique MicroDose FOV size can accommodate and position both larger and smaller breasts.



Figure 3: MicroDose Mammography unique FOV size is designed to meet breast screening needs.

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References

1. Hoffmeister, S., 2009. Clinical Review of Sectra MicroDose Mammography, the Warwickshire, Solihull, and Coventry Breast Screening Service.
2. Young, K.C., Burch, A., and Oduko, J.M., 2005. Radiation doses received in the UK Breast Screening Programme in 2001 and 2002. *British Journal of Radiology*, 78, pp.207-218.

Footnotes

- a. The study was conducted prior to Philips purchase of the Sectra's mammography operation in September, 2011.
- b. In the United Kingdom, not all screening facilities have large film formats.
- c. OB projection is the same as the MLO projection.

Please visit www.philips.com/microdose



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