

Development of RADspeed Pro EDGE Package

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1. Introduction

RADspeed Pro series has been made compatible with various system-integrated applications that include radiography technique integration, exposure field integration, and auto-positioning, as well as together with FPDs for automated auto-stitching radiography.

The RADspeed Pro EDGE package has been developed to bring improvements as a general radiography system to provide superior images for clinical diagnostics by incorporating tomosynthesis and dual-energy subtraction techniques.

2. System Structure and Basic Specifications

An external view of the RADspeed Pro EDGE package is shown in **Fig. 1**.

The 5 different portable FPDs available offer a system that can be used in combination with a wide variety of FPDs. Combining the system with the 17 × 17 inch (CsI) DR-ID 911SE FPD also makes the system compatible with tomosynthesis and dual-energy subtraction applications.

Also, the supine radiography table incorporates FPD movability through a wide range, which has expanded the range of supine auto-stitching radiography.



Fig. 1 System External View

3. Features of the System

3.1 Tomosynthesis (Option)

This is the first general radiography system capable of performing tomosynthesis to be developed by a Japanese manufacturer. Tomosynthesis can be used as part of the normal flow of general radiography in both the standing and supine positions.

Radiography conditions, including SID and tomographic angle, can be preset for each part of the body, in both the standing and supine positions. This allows for the use of optimal radiography conditions based on the area of the patient being imaged, and allows any tomographic image height to be captured in a single scan.

The main tomosynthesis specifications are shown in **Table 1**.

Table 1

	Standing	Supine
Radiography Method	FPD fixed during radiography	FPD moved during radiography
Radiography Distance	100 to 180 cm	100 to 150 cm
Tomographic Angle	20, 30, 40 degrees	20, 30, 40, 60 degrees
Interval Between Exposures	200 msec	
Number of Radiographic Images	60 max.	

The features of this system are:

1) Easy positioning

Radiography can be performed while standing in a loaded state or lying on the table in a supine position (**Fig. 2, Fig. 3**).

When standing, tomosynthesis imaging is performed with the FPD in a vertically-fixed position during radiography. This allows tomosynthesis imaging to be performed during the normal workflow of standing radiography and so removes the need for use of a screen partition. When supine, similar to the workflow of normal radiography, the floating tabletop allows fine positioning adjustments to be made.



Fig. 2 Tomosynthesis Operation



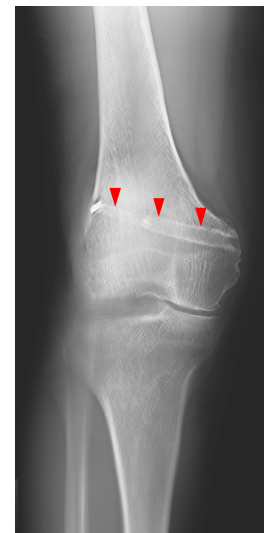
Fig. 4



Fig. 5



Fig. 6 a) Before Oblique Cross Section



b) Oblique Cross Section

2) Fewer metal artifacts make tomosynthesis useful for orthopedics.

One of the strengths of tomosynthesis is that tomographic images can be viewed with fewer metal artifacts. This is useful for follow-up examinations after surgery in the field of orthopedics that uses embedded metal objects. This makes the evaluation of bone fusion and other matters easier in the area around a metal object (Fig. 4). Tomosynthesis is also useful for the diagnosis of microfractures of the wrist and ankle that normal plain radiography has difficulty depicting (Fig. 5).

3) Display of oblique cross sections

The tomosynthesis transverse section can be tilted for image reconstruction (within ± 20 degrees). This allows observation of the spine, hip joints, and other areas that are not parallel to the tabletop by creating an image that has been reconstructed along the optimal angle of cross section (Fig. 6).

4) Parallel processing

After radiography is completed the radiographic data obtained is sent to a dedicated workstation

(Side Station RAD) and image reconstruction is performed automatically. The next image can be captured as soon as data transfer has been completed by the imaging console. Furthermore, the workstation allows for radiography parameters to be changed and image reconstruction to be performed in parallel, so tomosynthesis reconstruction processing can be continued during imaging of the next test subject.

3.2 Dual-Energy Subtraction (Option)

High voltage images and low voltage images can be taken successively with a between-exposure interval of less than 500 msec with the press of a single switch. Automated arithmetic processing performed by the imaging console then generates soft-tissue images and bone images. For chest radiography, this allows shadows of nodes obscured by ribs to be rendered in soft-tissue images, and calcification to be rendered in bone images in order to determine tumors (Fig. 7).

3.3 Auto-Stitching Radiography (Option)

Requests have been made to extend the area of auto-stitching radiography. RADspeed Pro EDGE package extends supine auto-stitching radiography area by 1.5 times (80 cm to 120 cm) (**Fig. 8**). This allows for long view imaging of the entirety of the lower limbs in the supine position, and easy acquisition of broad area images while both standing and supine.

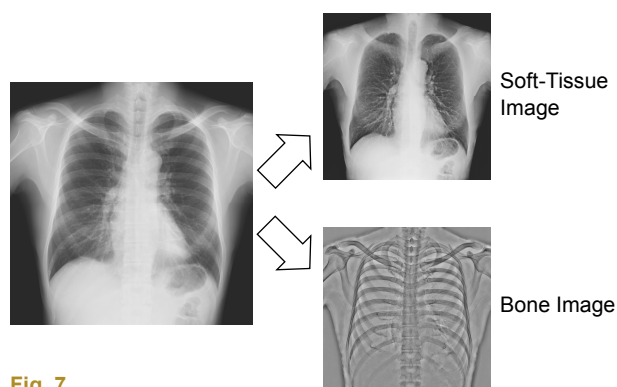


Fig. 7

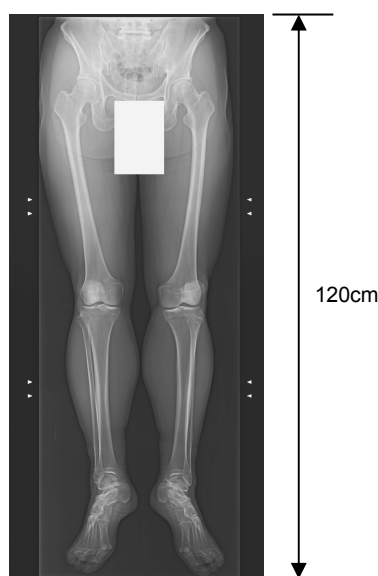


Fig. 8

3.4 Other System Integration Functions

The integrated functions of the system have been enhanced on top of existing auto-positioning, radiography technique integration, exposure field integration, and vertical positioning integration while standing.

1) Radiography technique buttons

The radiography technique buttons for tube number, selection of standing/supine position, and the FPD to be used allow for selection of preset radiography conditions according to FPD type and AEC settings.

2) Patient information display (Option)

Patient information from the imaging console is displayed on a control panel on the X-ray tube support, which allows for patient confirmation inside the examination room.

3) FPD tray (for DR-ID 911SE)

Loading an FPD into the FPD tray inside the standing stand or supine table delivers power to the FPD with a wired connection (contact connection), so while the FPD is portable low battery levels are never a problem and radiography can be performed continuously.

4. Summary

The RADspeed Pro EDGE package general radiography system includes tomosynthesis and dual-energy subtraction functions in addition to system integration functions, and extending the area of supine auto-stitching radiography now allows for examinations with even greater clinical values. Each of these functions can also be used during the normal workflow of general radiography, so their introduction does not reduce workflow efficiency during general radiography.