

Digital Angiographic System

AngioSpeed Series Development

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1. Introduction

The spread of intervention has greatly increased and changed the role of angiography, which has moved from being mainly diagnostic into treatment fields. Now digital angiographic systems perform intervention swiftly and safely, and have thus become an indispensable modality.

This report introduces the new digital angiographic system AngioSpeed Series (Fig. 1), developed to provide strong support for intervention. To meet these application objectives, the AngioSpeed comes in four types: VF, VC, HF, and HC (Table 1).



Fig. 1 AngioSpeed Series (Photo is AngioSpeed VF)

Type	Use	C-arm System	I.I.
AngioSpeed VF	Multiple Purpose	Floor mounted	12/16 inch
AngioSpeed VC	Multiple Purpose	Ceiling suspended	12/16 inch
AngioSpeed HF	Heart	Floor mounted	9 inch
AngioSpeed HC	Heart	Ceiling suspended	9 inch

Table 1 System Configurations

The development concept for this system is to boost the efficiency of intervention compatibility and examination services, to incorporate various intervention support functions while speeding up image acquisition and post-processing, and to plan improvements of operability consistent with the work flow.

Fig. 2 shows clinical data acquired by this system.

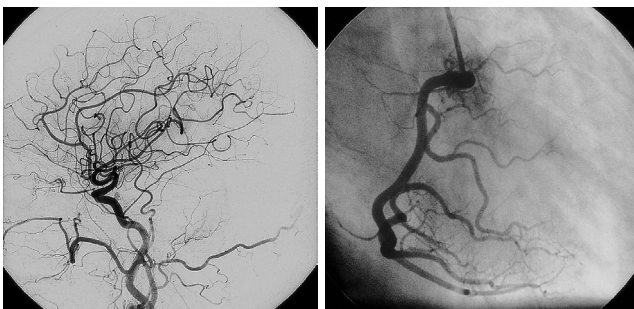


Fig. 2 Clinical Images

2. IVR-Master

During intervention, the doctor performs diagnosis, treatment, and measurement of effects in a short time.



Fig. 3 IVR-Master

For these operations, a bedside controller such as the one installed in this system is indispensable.

This system is also equipped with the IVR-Master image controller in both the examination room and the control room, for powerful intervention support (Fig. 3).

The IVR-Master allows all of the techniques required to do image work, from image replay and pause to multiple display, split display, measurement and comment input. The functions explained in this report are special characteristics of the IVR-Master.

1. Dual Load Mapping

The IVR-Master allows specialized use according to the job as it is equipped with both subtraction MAP, known to be effective for neuro-intervention, and super-impose MAP, known to be effective for intervention in the abdominal region (Fig. 4).

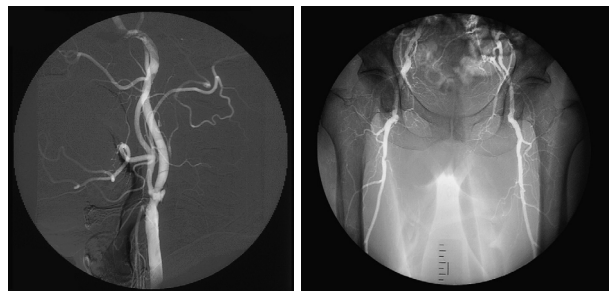


Fig. 4 Subtraction MAP (left) and Super-impose MAP

2. Fluoroscopy-Radiography Mode Settings

The system allows one-touch switching between continuous fluoroscopy and low-dose pulse fluoroscopy. Selection is allowed for 3 modes of continuous fluoroscopy and 4 modes of low dose pulse fluoroscopy. The ability to select the proper fluoroscopy modes according to objective improves to a high order both the effectiveness of operations and radiation dose reduction.

3. Auto Projection

The system is equipped with both an Auto Projection function that automatically reproduces angles with the

C-arm from images taken and, conversely, a Scene function that retrieves images from angle information of the C-arm. This system quickly performs other functions such as displaying reference images and approaches to blood vessels targeted for intervention.

4. Dose Saving Zoom

To effectively reduce the exposure dose, especially in intervention with long viewing times, real-time digital processing enlarges the images. X-ray doses which are equivalent to wide FOV image allow fluoroscopy and radiography of double-sized images.

3. MBH Filter

As intervention reaches higher levels and becomes more complex, the rising trend of scan times makes reduction of radiation doses more pressing topic. Installed on this system are three types of MBH filter (Multi Beam Hardening Filter) and the optimal filter for imaging technique can now be selected automatically (Fig. 5). Switching between filters with different X-ray absorption rates reduces radiation doses and preserves image quality by eliminating the soft X-rays that do not contribute to image quality (Fig. 6).

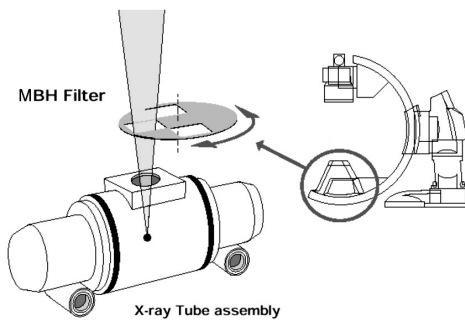


Fig. 5 MBH Filter

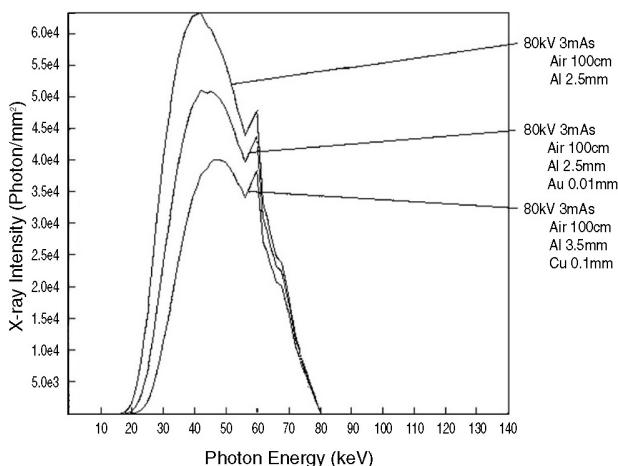


Fig. 6 X-ray Spectra

4. CAT/FMC

To realize a speedy workflow from patient registration to image processing the system introduces these new developments: compatibility with DICOM MWM, the image processing console CAT (Comfortable Angiography Terminal), and FMC, the file management console.

The CAT is a specialized console for performing filming, re-mask, pixel shift and other image processing and assorted measurements. One function per key makes actual operations simple. The console also accomplishes the job of operation guide, and offers work support such as internal back lighting keys for work in dark places. The system can also record data on file with one image, recording data from image processing and measurement done on CAT or analysis results data.

The FMC (file management console) is in charge of image file management. Data is hierarchized by device, patient, examination date, or file. The WINDOWS® base simplifies operations such as search, save, forward, and delete.



Fig. 7 FMC (left) and CAT

5. Conclusions

This report described a summary of the digital angiographic system AngioSpeed Series. While intervention has become a clinical field in its own right, this progress continues and future systems will continue to develop for improved operability and compatibility with new applications.

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