AXIOM Luminos *d*RF

Future-Proof Solution for Workflow Efficiency

The Department of Medical Imaging at the Ziekenhuis Oost-Limburg hospital in Genk, Belgium, acquired the AXIOM Luminos *d*RF in June 2007. After six months, substantial workflow improvements have already been achieved by this fully digital solution for fluoroscopic and radiographic examinations.

Reorganization of the Department of Medical Imaging at ZOL

During the past decade, the Department of Medical Imaging at the Ziekenhuis Oost-Limburg hospital (ZOL), located in the city of Genk, Belgium, underwent major changes. ZOL was established in 1995 after a merger of three hospitals with a capacity of 500, 200 and 150 beds, respectively. It provides healthcare services to about two-thirds of the residents of Genk, which has a total population of 64,000 and the surrounding villages, and is frequented by citizens from neighboring countries such as the Netherlands. ZOL is the second largest provider of jobs in Limburg, a province with about 820,000 inhabitants. With over 2,400 staff and 200 medical doctors, it is one of the largest non-academic hospitals in Belgium. Medical imaging procedures take place at each hospital campus of ZOL and at the emergency ward located at the main Sint-Jan campus.
In 1997, the six examination rooms at the Sint-Jan campus featured four Siregraph fluoroscopy systems, one Vertix wall stand equipped with computed radiography (CR), and one AXIOM Iconos R200 digital fluoroscopy unit. A progressive decrease in the number of X-ray examinations had been observed at ZOL with a concurrent increase in other diagnostic procedures such as magnetic resonance imaging, computed tomography and endoscopy. In 2006, it was decided to implement AXIOM Luminos *d*RF, a hybrid imaging system with flat detector combining digital fluoroscopy and digital radiography, in an effort to ensure a clinically effective and cost-cutting solution to these varying diagnostic application demands. Professor Yvan Palmers, MD, Head of the Department of Medical Imaging at ZOL, explains.
"The best way to manage this evolution is to reduce the number of X-ray rooms and to enhance the workflow and efficiency of the remaining ones. Hospitals in general are under enormous pressure to reduce costs. They have to maximize utilization of available equipment, increase the productivity of their staff, and try to decrease the number of rooms occupied."

Workflow efficiency – doubling patient throughput with half the rooms

In 2007, the main Sint-Jan campus realized a final reduction from six (five equipped with fluoroscopy capabilities) to three examination rooms (two with fluoroscopy capabilities) by replacing four Siregraph D2 systems and the Vertix wall stand with one AXIOM Aristos MX and one AXIOM Luminos *d*RF. As of June 2007, the AXIOM Luminos *d*RF became fully operational.
During two evaluations carried out in April and August 2007 respectively, a comparative study evaluated the exam duration from system set-up through image documentation recorded with the Siregraph versus the AXIOM Luminos *d*RF.
The AXIOM Luminos *d*RF achieved a 43 percent reduction in workflow steps equal to a total exam duration drop of 56 percent relative to the Siregraph system. The elimination of nine out of 21 steps, mainly linked to CR cassette handling, had a major impact on streamlining

workflow efficiency. Easy system positioning, as well as integrated post-processing and image documentation, further added to significantly reducing the patient's turnaround time. Image data management is optimized by seamless integration into the hospital and radiology information system (HIS/RIS) and the picture archiving and communications system (PACS).

Clinical highlights – safe, versatile applications with high-quality images

Ben Welckenhuyzen, a technician in the Department of Medical Imaging, proudly

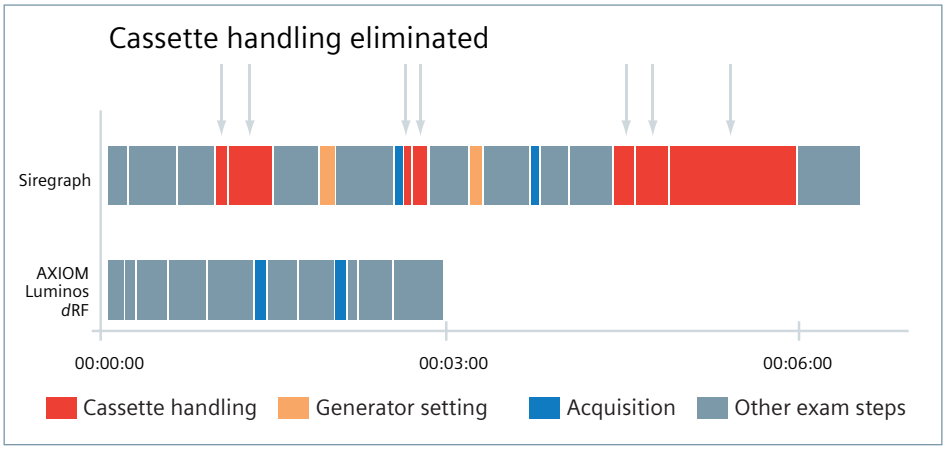
“No more cassettes!”

Ben Welckenhuyzen,
ZOL, Genk, Belgium

stands by the AXIOM Luminos *d*RF. He welcomes the invitation to share his evaluation of six months alongside this high-tech system.
“No more cassettes!” he exclaims. “Actions related to cassette handling and film development are now gone. Then there is the incredible range of high-quality digital images with smooth switching from DFR (digital fluororadiography) to RAD (radiography) mode with excellent detail quality in RAD mode replacing the former cassette radiography. Image quality – resolution, contrast, detail – remains superior even at high magnification and in the remotest corners of the wide 43 cm x 43 cm flat detector. This broad physical coverage allows for a complete thorax or abdomen exam in one take and reduces radiation exposure.”
Welckenhuyzen notes that the real-time availability of the images and instant image quality control further reduces the need for retakes. Other advantages include the many options available through the CARE program (combined applications to reduce exposure) – the system automatically steers optimal radiation dosage. In the organ programs, preset parameters can be easily adjusted for examining different types of patients – thin, obese, children – avoiding unnecessary radiation. “Overall, the AXIOM Luminos *d*RF is very user-friendly and enables me to spend more time with the patient thanks to less time that has to be invested in the system’s handling,” says Welckenhuyzen. “And let’s not forget the easy transfer and positioning of patients. Several positions are preprogrammed, and the lowest table height of 48 cm is ergonomically perfect, especially for handling disabled, heavy or wheelchair patients. The comfort of the patient is much better now. It also means no more pulling or tilting of patients – I can now focus on other patient issues.”
When asked about the impact on administrative workload and post-processing, he explains, “Patient registration takes no time at all. The AXIOM Luminos *d*RF automatically selects the parameters thanks to the DICOM (digital imaging and communications in medicine) modality’s worklist-driven generator settings. The immediate availability of the images speeds up the diagnostic process. In fact, the instant review on the digital imaging system and post-processing is so fast now that the clinical images usually reach the physician before the patient has emerged from the dressing room!”
Adds Professor Palmers, “The strongest impact can clearly be seen for diagnostic procedures that require large views – in particular colon, chest and spinal column exams – or a great number of images (arthrograms), as well as for dynamic studies (cystograms, reflux and swallow studies).”

The AXIOM Luminos *d*RF passes with flying colors

Professor Palmers shares his experiences with the AXIOM Luminos *d*RF as compared to other state-of-the-art systems: “From the first patient cases with the



The number of worksteps and the total examination time are clearly reduced by using a fully digital system.

AXIOM Luminos *d*RF, we were convinced that the average image quality (spatial resolution and contrast resolution) in RAD mode was clearly better than the average quality of our CR systems (corresponding to a 400-speed film screen combination), and the radiation dose was even lower. We found that for all types of contrast studies, images in DFR mode were all of optimal diagnostic quality and could be realized at half to one-third of RAD mode dose. In children, for several indications such as reflux studies or cystograms, radiographic images could even be replaced by storing short fluoroscopic sequences, resulting in a dose reduction of more than 90 percent and with diagnostic image quality. We think that the AXIOM Luminos *d*RF is an optimal tool for radiological studies – also in pediatrics – due to the high spatial resolution and the high DQE (detective quantum efficiency) of the flat detector.
Compared to former fluoroscopy equipment, our first experiences with the AXIOM Luminos *d*RF are that fluoroscopy is better with the flat detector featured on the AXIOM Luminos *d*RF and significantly better in a whole-field view and at higher energy levels. CR phosphor plates are no longer required, even for plain views of colon studies or for PA chest X-rays in large adults."

Future-proof investment

Cost-cutting results already exceed expectations. Total annual costs per year, which were 632,629 EUR before digitization, are calculated to drop by 25 percent to 473,257 EUR after digitization at ZOL. The estimated decrease in costs projected over five years is based on 16 percent lower costs for labor, 40 percent cost savings for rent and maintenance of examinations rooms, 64 percent cost reduction for CR cassette handling, including consumables and maintenance fee for CR readers, as well as reduced costs for filming and printing supplies. Average savings are projected to total 796,860 EUR over five years.
"The added value of the user-friendly ergonomics of the AXIOM Luminos *d*RF has allowed us to employ logistic personnel, who is less costly than nurses or radiographers, for carrying out patient handling tasks," explains Professor Palmers. "This use of logistic personnel also frees up more time for our clinical staff to invest in diagnostic imaging issues, and it fits perfectly into our staff rotation system. It also helped us cope with a shortage of clinically certified staff."
Summarizing ZOL's bright financial picture, Professor Palmers says, "What is important to consider is not the cost of purchase, but the cost of ownership. Investing in the AXIOM Luminos *d*RF has been a cost-effective solution. The purchase cost of the AXIOM Luminos *d*RF will be largely compensated by substantial savings. Thanks to these savings, the investment will pay for itself in three to four years. Add to that fewer work steps, fewer retakes, and more streamlined data integration, and you see that it means not only quicker patient throughput but also less likelihood of human error. The versatility of the AXIOM Luminos *d*RF is central to overall workflow optimization, since this 2-in-1 system can be utilized for general radiographic procedures as well as fluoroscopic exams. It allows flexible adjustment to varying examination mixes," he concludes.

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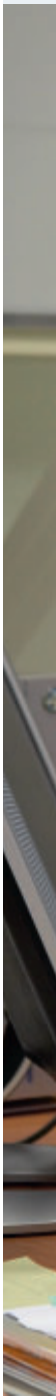

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Prof. Dr. Yvan Palmers, ZOL, Genk, Belgium