



FIBER OPTICS – PROVIDING IMPROVEMENTS TO DIGITAL RADIOGRAPHY

Digital X-ray imaging has become a vital resource in the fight against breast cancer. The primary advantages of digital radiography, over conventional film X-rays, include the speed at which a healthcare provider can analyze the images, the ease with which medical records can be stored and accessed for future use, and the overall image quality.

The growing use of digital X-ray imaging in mammography illustrates a broader trend in healthcare today. Doctors and hospitals, under pressure to move towards electronics-based records systems, are seeking tools that can make it easy to view, share, transmit, and archive patient data. This technology has also allowed for timely diagnoses in those facilities that can no longer afford an on-site radiologist.

As demand grows for digital imaging products, companies like the former London-based Dexela, which was recently purchased by PerkinElmer Inc. of Waltham, Massachusetts, are racing to bring these innovative low-dose X-ray technologies to market. PerkinElmer offers a family of flat panel X-ray detectors that can reliably provide excellent image quality at unprecedented speed. The company built its strong reputation on a suite of digital mammography and breast tomosynthesis applications that include 3-D breast imaging and processing. PerkinElmer has been able to expand the use of its CMOS X-ray detectors for other high quality, low cost X-ray solutions, including CBCT (cone beam computed tomography) and fluoroscopy, providing high-quality solutions at a low cost.

The biggest challenge for a company like PerkinElmer is quickly bringing these innovations to market, without compromising quality. One solution PerkinElmer found was a strategic partnership with Incom Inc., the world's largest supplier of fused fiber optics based in Charlton, Massachusetts. The relationship between PerkinElmer and Incom was founded on

early collaboration between their research and development teams and has extended up through commercial production.

“Our R&D engineers have had an open dialogue with Incom about improvements to products and new product development,” said Ed Bullard, founder and General Manager of Dexela. “Incom is able to manufacture unique optical components, which enable high-quality products that provide the excellent image quality demanded by customers.”

PerkinElmer's experience with Incom reflects the unique position that Incom has created for itself, both from a product and a business perspective, making them an indispensable player in the growth of the digital X-ray imaging industry.

From a product standpoint, Incom's faceplates have become a critical link in the successful application of CMOS technology to digital X-ray equipment. Incom's fiber optic faceplates are placed in-between a scintillator and a CMOS sensor. As an X-ray source emits the energy that passes through the human body, the scintillator converts the rays into visible energy that are then transferred through Incom's fiber optic plates. The CMOS sensor then picks up the transmitted energy on the other side of the faceplate and converts it into an image that can be viewed on a monitor.

Incom's fiber optic faceplates have helped to resolve two key concerns that had prevented medical device companies from adopting this technology. The faceplate acts as a barrier between the scintillator and the CMOS sensor, protecting the sensor from the damaging X-rays that can reduce its lifespan. Additionally, the faceplate reduces “noise,” enhancing the quality of the digital image. Today, the healthcare industry can benefit from the efficiencies that CMOS sensor-based digital products offer, particularly when compared with the more labor-intensive process of traditional film technologies.

“CMOS is the digital technology of choice in the medical X-ray industry today and we are positioned to partner with manufacturers in finding solutions that help them to meet this technological demand,” said Michael Detarando, Incom’s Chief Executive Officer. “At the same time, we can help them make a commercially viable product from a cost standpoint.”

When Incom works with a medical device manufacturer, in many cases the relationship begins at the engineering or development level, where product concepts are discussed. Incom is a privately held company with the agility and flexibility that allow them to move resources around nimbly. Their focus on innovation and customer-based, solution thinking have made them an integral player in this rapidly expanding market.

In order to best serve this market, Incom has embraced the fact that each customer will have unique requirements for X-ray attenuation, contrast, and transmission. Factors such as faceplate thickness and material composition are vital to the overall performance of the end product.

Incom has spent years creating theoretical models to measure X-ray attenuation and MTF (Modulation Transfer Function) based upon the X-ray energy levels used in the customer’s systems.

“Today’s medical device market demands flexibility and customization, but those two things often scare people away because it’s equated with being expensive,” Detarando said. “At Incom, we are able to provide materials that are not only specific to each individual OEM, but are also tailored to optimize the performance of their systems. We are selling our unique capabilities and enabling technologies – not just the products themselves.”

“Incom has a more efficient production process and its products are more accurate with a low level of blemishes and defects,” PerkinElmer’s Bullard said. “We have found Incom to be a good partner to work with. They are a very reliable supplier and their quality standards are consistent.”

Incom attributes their success to the success of their clients. The company’s strategy, to make an often significant front-end investment in development, has led to many successful and long-lasting business relationships. Incom’s goal is to make it easy for customers to test different materials, samples, and prototypes as part of the R&D process so that the customer can reduce their time to market.

As the medical industry continues to adopt the speed, accuracy, and efficiency of digital X-ray technology, companies like PerkinElmer and Incom are good examples of how collaborating in innovation and technology can advance the level of healthcare for everyone.