See The Seitz As You've Never Seen Them Before:

Customized sensing technology from Teledyne DALSA helps bring digital images alive

It's your first visit to the Grand Canyon, the Taj Mahal or some equally breathtaking location. You take numerous photographs of the place in an attempt to re-capture the awe you felt the first time you saw it. And then your pictures come back dull and flat.

Imagine a photograph that actually captures a place as you experienced it. This was the driving force behind the first camera developed more than 50 years ago by Seitz, a Swiss-based, family-run business that designs and manufactures high-precision cameras for professional photographers and serious amateurs.

Several years ago, the company sought to bring its film-based range of panoramic cameras into the digital age. Working closely with two divisions of Teledyne DALSA, an international leader in high-performance digital imaging, and with partner company Computechnic AG in Switzerland, Seitz has developed a digital scan back and two panoramic cameras that successfully capture the essence of the place in the pictures.

High-performance sensing requirements

The sensing solution behind those realistic images is the result of years of intensive research, design and development teamwork.

"When Seitz started its transition to digital technology in 2003, only Time-Delay-Integration (TDI) technology allowed the high speed and virtually unlimited resolution options required for Seitz' scanning cameras," says Urs Krebs, who heads up Marketing, Sales & Business Development at Seitz. And, at that time, no color TDI sensor was available off the shelf for the company's demanding digital photography requirements, which include:

- Virtually unlimited resolution: vertical resolution of 7,500 pixels x unlimited horizontal resolution
- Very rapid read-out speed of 300 MB per second
- High dynamic range (11 f-stops) to meet industry standards

The Seitz 6x17 digital camera is the result of a collaboration with Teledyne DALSA Corp. and Computechnic AG

Forming a team

While Seitz had extensive camera hardware and software design expertise in-house, the company decided to recruit outside help in order to develop the exceptional digital cameras they envisioned.

Seitz chose to work with Teledyne DALSA for new sensor development because it was impressed with Teledyne DALSA's proven capabilities in this area. "Teledyne DALSA was very responsive to our needs and was keen to initiate a project with us," Krebs comments.

Computechnic AG in Switzerland also was brought on-board to develop electronics and image capture software for ZERMATT, the digital camera development project. At a single point in time, the team consisted of five engineers from Teledyne DALSA's Waterloo (Canada) and Eindhoven (The Netherlands) offices, four Computechnic team members and four Seitz team members, two of whom were responsible for camera hardware design, one for signal processing and one for marketing and overall project coordination.

"We thought that bringing together the best minds in sensor technology, electronics, software and hardware design in a cross-border project was a good set-up for a successful new digital camera," Krebs says. And, as the resulting products proved, it was.

Tackling tough technical challenges

To meet the needs of its customers in a variety of industries—ranging from fine arts photography to CGI/3D modeling to street mapping—Seitz set out to develop a digital platform and scan back that could accommodate two different cameras, allowing users maximum versatility. When engineering the new digital camera system over the course of several years, the Seitz/ Teledyne DALSA/Computechnic team encountered and overcame many minor, and several major, challenges.

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Canary Wharf business district in London, as imaged by David Osborn with a Seitz 6x17 camera. Courtesy of www.britishpanoramics.com

First, the team found that, due to the nature of color TDI imaging, standard ways of working with digital image capture required significant improvements. As a result, processing, calibration procedures and hardware optimization were redesigned practically from scratch to obtain high-quality output. The team worked together intensively by sharing test analyses, setting up new test procedures and having numerous in-person problem-solving meetings. As a result, these issues were eliminated one by one, and the team worked toward a stable and marketable solution that complied with the initial product requirements and high expectations of Seitz' clients.

During this time, Teledyne DALSA successfully redesigned the ZERMATT sensor to improve on some critical performance parameters. For example, antiblooming of the ZERMATT sensor has increased to more than 80 dB, which is the industry's best performance for CCDs. Teledyne DALSA also redesigned the module's electronics, which improved crosstalk among CCD image sensor outputs while reducing the noise.

In addition, the team soon discovered that the project behaved like a saturation curve: the further they progressed, the smaller the incremental progress. "Starting from the day when we shipped the first versions of the cameras, we communicated frequently with our customers and incorporated their feedback into the hardware and software designs," says Krebs. For example, on the hardware side, Seitz developed a more compact and lightweight camera body for the Seitz 6x17 Digital, a more robust motor for the Roundshot D3 (required for very precise gigapixel panoramas and photogrammetry) and new, ultra-fine optical

filters for optimum edge-to-edge sharpness. In software, Seitz implemented advanced functions for image capture for improved camera control, as well as new algorithms and features for raw conversion and color management.

Over the past 3 years, Seitz has released 16 new software versions, free of charge, for its customers.

Based on customer feedback and subsequent improvements, engineers were able to reach the first 80% of their quality goals quickly; however, progress on the remaining 20% of goals has required significantly more time and effort. "A digital camera and associated software can always be further improved - it's a process that never stops," says Krebs. "Today, three years after market inception, we still commit a very large portion of our free cash flow into R&D and product improvement because, in the photography industry, it's do-or-die. On the other hand, our know-how in digital technology helped us to accelerate our product development pipeline.

This is how our newest product, the Roundshot Livecam (a 66 million pixel webcam), took only six months to bring to market, from first design in CAD to final manufacture."

Eye-popping pictures
The results of the team's efforts were introduced to the public for the first time at Photokina, the world's biggest trade fair for the photographic and imaging industries, in 2006, where Seitz showed prototypes of its 6x17 (160 million pixels) digital camera and its Roundshot D3 360° digital scanning camera. Both cameras were introduced to the market the following year.

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Image Parliament – Westminster Palace, also imaged by David Osborn using the Seitz panoramic camera.
Courtesy of www.britishpanoramics.com

With its ability to capture 300 MB per second (several hundred million pixels in a few seconds), the D3 digital scan back is the fastest digital scanning system available. Providing full medium format resolution of 60 mm/7,500 pixels and gigapixel images, the D3 camera system offers unparalleled image definition. And, with its ability to generate vivid colors (16-bit raw, 48-bit tiff) within a high dynamic range of 11 f-stops, the photographic quality, combined with the camera's ease of use, is simply—well, "lovely," says David Osborn, a professional fine arts and corporate photographer based in London.

"Setting up and taking your first picture with the Seitz 6x17 digital camera is as speedy as using a 5x4 camera," says Mr. Osborn. "And the quality is beautiful."

Osborn, who has used a Nikon digital camera in the past, is one of several photographers who provided feedback about the Seitz 6x17 digital camera as it was being developed. "This camera is a perfect match for my subject matter, which is landscapes and architectural portraits," Osborn says. It was such a good match that, in April of 2010, he purchased his own Seitz 6x17 digital camera. Osborn plans to use the camera to carve a niche for himself taking commercial and fine-arts photographs that require high-quality, large format images.

Seitz will exhibit images Osborn has taken with his new camera at Photokina 2010 in September in Cologne. At that time, Seitz will introduce the third generation of the D3 digital scan back with improved filters, a new high-precision motor for the Roundshot D3 to enable gigapixel photography and new raw converter software, a unique tool for rapid processing of high-resolution images.

"Our success with the D3 platform is absolutely a result of our teamwork with Teledyne DALSA and Computechnic," Krebs says. "Teledyne DALSA's expertise in imaging technologies and their ability to work with us to develop a customized, precision imaging sensor made our vision of what the D3 could and should be a reality."

For images taken using the D3 platform, go to:
www.britishpanoramics.com
www.roundshot.ch/xml_1/internet/de/application/f999.cfm

www.teledynedalsa.com

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