



Based in Colorado, Boulder Imaging specializes in high frame-rate and high resolution digital image acquisition, processing and storage.

Boulder Imaging's customers implement complex applications involving very high data rate capture by imaging systems that may need to run continuously for long periods of time and transfer huge amounts of error-free data.

Boulder Imaging especially shines at engineering imaging and machine vision systems that are custom-tailored to meet their customer's requirements.

With speed in excess of 400 MB/sec sequential RAID 5 reads and over 110 MB/sec RAID 5 sequential writes — as well as the security of a true hardware RAID architecture — AMCC's 3ware RAID controllers enable a completely new class of SATA RAID storage solutions.



For Super-High-Resolution Images and Continuous Image Recording at Extremely High Data Rates, Boulder Imaging Turns to AMCC

Boulder Imaging, Inc. provides systems for real-time advanced image capture, storage and processing to customers with some of the world's most challenging applications. Organizations from advanced engineering firms to U.S. Navy and Air Force testing programs rely on Boulder Imaging for no-compromise imaging solutions from high-resolution medical imaging and high-speed, error-free machine vision to real-time tracking of test range missile guidance systems. AMCC's 3ware Serial ATA (SATA) RAID controllers enable Boulder Imaging to securely store extreme resolutions with high capture rates using high performance, cost-efficient and reliable SATA network storage.

“Reliable, high capacity, and high performance network storage is the backbone of our imaging infrastructure. We deal with huge amounts of data in unusual circumstances, from a single camera feeding unimaginably huge flows of pixels, to a dozen high-resolution cameras simultaneously capturing a single high-speed event. We rely on 3ware RAID controllers to help us capture and permanently record all that data.”

— Carlos Jorquera,
President and Senior Systems Engineer, Boulder Imaging

The Challenge: Flexibility, Reliability and Performance

Boulder Imaging designs its equipment either as standalone systems or fully integrated into OEM solutions. They can operate under difficult field conditions or in temperature-controlled clean rooms and laboratories. No two projects are identical, so Boulder's designs cannot be rigid or pre-defined, though they must always be exacting. As technology develops, imaging system specifications consistently call for greater speed and higher capture rates. Carlos Jorquera, president and senior systems engineer at Boulder Imaging, acknowledges it is a challenge to keep up with the increasingly massive data transfers involved.

Boulder Imaging's customers require high reliability and sure knowledge that, when something is photographed, the images will be there later, intact and free from any artifacts. For example, one Boulder customer records explosions and then reviews each frame to analyze the mechanics. A system designed for another customer recorded an X-ray movie of a person riding a bicycle, tracking the person's pain level to individual frames at specific points in time.

On a different physical scale, a division of Hewlett-Packard was designing and building a new type of microswitch. The tiny mechanical devices would switch on and off using tubes of mercury, so the engineers needed to see how mercury would actually flow inside such tiny tubes. In order to get the data, HP needed to record images of prototype switches at 1000 fps in extremely high-resolution close-ups.

Systems That Deliver

Boulder Imaging custom-builds high-end digital imaging systems supporting up to 16 cameras per unit, and often captures synchronized supporting data from non-imaging sources, such as velocity, pressure and ambient temperature readings timed to specific digital images or frames.

Though the applications are usually highly customized, the company also currently features a fully functional turnkey system, VisionNow-DVR, and a powerful, flexible toolkit designed to facilitate rapid in-house development of highly customized imaging applications.

“Serial ATA is great! For a long time we’ve battled the problem of capturing these huge data flows, which sometimes need to be recorded for hours or days at a stretch. We tried approaches from RAID-enabled ATA to SCSI, and then we found the AMCC 3ware boards. From the very start, we’ve been impressed with how well they performed.”

— Carlos Jorquera

President and Senior Systems Engineer, Boulder Imaging

The AMCC Storage Solution

Boulder Imaging designers use the AMCC 3ware Serial ATA 8000 and 9000 controller series to transfer up to two terabytes of data per controller, maintaining the necessary sustainable performance without data drops or glitches.

Some applications don't need as high a data rate and others compress the video to be able to write to a single drive — but no matter how new the technology, all require high quality and reliability. AMCC 3ware controllers keep up with the extremely high data rates Boulder Imaging manages, while the controllers' onboard processing allows for multiple points of buffering so that if one off-the-shelf drive fails, there is time to recover from errors before data is lost.

Boulder Imaging tried other approaches and designs, but only AMCC 3ware controllers met its image data capture and storage challenges flawlessly, off the shelf. Now Carlos Jorquera and his Boulder Imaging team can get on with what they do best — design and build digital imaging capture systems for the most challenging projects in the world.

Impacting the Bottom Line

Boulder estimates a savings of 10% per system (or about \$1,200) in its low to mid-range systems compared to using SCSI. In its high-end systems, Boulder Imaging saves about 25% per system (or about \$13,000). These figures do not take into account that in order to achieve the required capacity, it would take twice as many SCSI disks as SATA disks, thus increasing further the savings of high performance SATA RAID over SCSI.

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