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The Journal of Art, Technique and Technology in Motion Picture Production Worldwide

Journey to Japan
Tour of Sony

Exclusive Look:

New CineAlta F65 >4K Camera

SRMaster, SRMemory Platform

Kumamoto Sensor Manufacturing

Atsugi R&D Center

NXCAM Super35

NXCAM HXR-NX70

Special Reprint





Kumamoto Castle, 3rd largest castle in Japan, built in 1607 on the southern island of Kyushu, was featured in Akira Kurosawa's film *Ran*

About this Issue



A month ago, Sony invited ten industry professionals to visit their facilities in Tokyo and Kumamoto to learn about the philosophy and technology behind the products to be introduced at NAB 2011.

I extended my trip to visit additional companies, and wanted to stay longer. Only the looming deadline of this NAB issue and good fortune got me out before the horrific triad of catastrophes hit.

Calls, emails, and news from friends and colleagues were heartbreaking. The scale of devastation was unimaginable; the tragic loss of life unthinkable. Three quarters of a million people had lost their homes and possessions. Yet through it all, a powerful spirit was evident. A friend wrote, “We Japanese are fighting with a difficulty of unprecedented magnitude.” Another said, “We are trying to lead life as normally as possible. When Japan recovers (we will), please visit soon again.” If this paper page isn’t stained with teardrops, it’s only because they have fallen onto my keyboard first.

Our planet is a perilous place. Man and nature continue to conspire against secure existence. Mother Nature is a Bitch.

I was introduced to Mother Nature as a Bitch during the summer between high school and college. I was on an expedition to Alaska coordinated by the Foundation for Glacier Research, National Geographic and The Explorers Club. It was led by famous explorer and glaciologist Dr. Maynard Malcolm Miller, M³ for short. Many of the scientists and climbers were veterans of Everest, the Himalayas, and expeditions to some of the nastiest places on earth. A few had signed on to commune with nature, others to confront their demons. When things got tough, when avalanches broke loose or ice storms engulfed us, Barry Prather, a bear of a man, would let loose a volley of oaths and shout, “Mother Nature is a Bitch!”

A few men against a mountain is nothing compared to an entire population ravaged by an earthquake, tsunami, and nuclear crisis. Imagine a thirty-foot high wall of water travelling toward you at more than 30 miles per hour. The enormity of this is clearer when remembering that the water in one Olympic swimming pool weighs 5.5 million pounds, and that’s only a fraction of the full devastating force carrying away almost everything in its path.

But, yesterday I received a hopeful message from a filmmaker, “Thanks for your concern about this tragic disaster. Fortunately, we and our families are safe. We have repaired the damage to our facilities. We are doing our best and have begun anew.”



The Great Wave off Kanagawa
Hokusai. ca. 1830–32
Woodblock print, ink and color on paper
25.7 cm × 37.9 cm (10.1 in × 14.9 in)

The Great Wave off Kanagawa was the first of Japanese artist Hokusai’s series of thirty-six views of Mount Fuji.

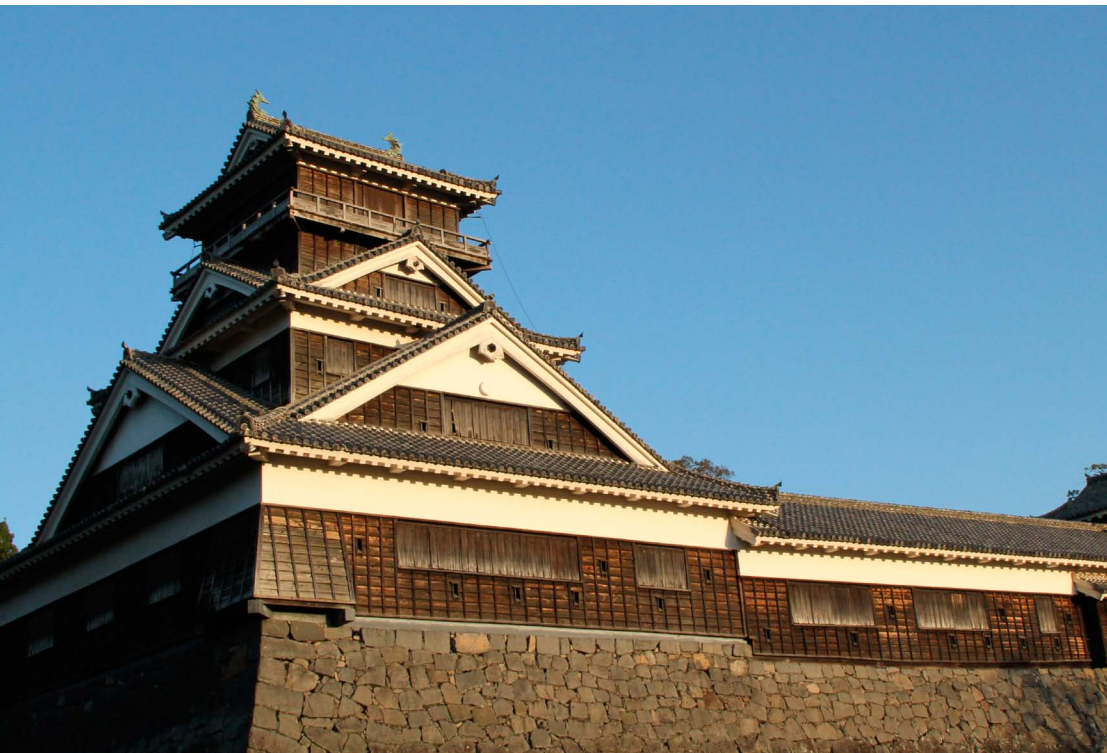
About 5,000 copies were made from the original woodblock. Prints are on display at the Metropolitan Museum of Art in New York, the British Museum in London, and in Claude Monet’s house in Giverny.

French art critic and publisher Edmond de Goncourt, wrote in his 1896 book *Hokusai*, “The drawing of the wave is a deification of the sea made by a painter who lived with the religious terror of the overwhelming ocean completely surrounding his country. He is impressed by the sudden fury of the ocean’s leap toward the sky, by the deep blue of the inner side of the curve, by the splash of its claw-like crest as it sprays forth droplets.”

Hokusai’s giant wave is sometimes thought to be a tsunami since it towers thirty feet over the fragile skiffs. However, the fishermen are probably facing a huge wave in a violent storm, as the title suggests. The title also gives us the location: Kanagawa Prefecture—where Sony’s Atsugi Tech Center is located.

Which brings me to this FDTimes issue, where we start at Atsugi and see the new F65 35mm format 4K+ digital motion picture camera, NXCAM S35, SRMaster, SRMemory, and many other new production tools. Our trip then takes us to the south island of Kyushu, Kumamoto Castle and a tour of the factory where Sony makes imaging sensors. Fujifilm - Optical Devices Division is next, where I’m treated to a cinematographer’s tour of the place where Fujinon lenses are made, including the new 4K+ zooms.

We’re entering a new era well beyond HD, with higher resolution, speed, dynamic range, contrast and practicality. With each exciting new camera that is designed and manufactured, it almost seems as if we are approaching a magical point where “if you can imagine it, we can shoot it.” The tiny array that fits inside a baseball may not have the resolution of a more sophisticated camera. But for a flying POV shot, you can’t beat it. (You hit it.) Each camera is a tool. Each job, script, and concept will define a technique that determines the technology to choose. We may be living in tumultuous times, but as Mt. Fuji symbolizes in Hokusai’s distance, there can be brilliance and creativity amid the storms.



Kumamoto Castle

Kumamoto Castle is the third largest castle in Japan. It was built in 1607 on the southern island of Kyushu, about 880 km south of Tokyo. In the distance, Mt. Aso, one of the world's tallest active volcanoes, is shrouded in snowy clouds.

We're following in the footsteps of Japan's legendary film director Akira Kurosawa, who filmed *Ran* here in 1985. *Ran* is Kurosawa's take on King Lear—greed, lust, and revenge. Lord Hidetora Ichimonji decides to hand over the realm to his three sons. The lord wishes to live out his years as an honored guest in the castle of each of his sons. One of these is Kumamoto Castle.

In the 15th century, two castles stood here. The current Kumamoto Castle was built in 1607 by Lord Kata Kiyomasa, daimyo ruler of northern Higo Province. It took over seven years to construct and is one of the most famous fortresses in Japan. Although Kiyomasa is variously described as “a military man first and last, outlawing even the recitation of poetry, putting the martial arts above all else...” he was also a brilliant architect. Kumamoto Castle is vast, over 5 km in circumference. The engineering skill, stonework, moat, and defence technology are impressive. The un-scalable J-shaped stone walls and wooden overhangs, designed to repel invading warriors, left the castle virtually impenetrable—but not fireproof.

The wooden living quarters of the castle were mostly destroyed by a fire in 1877. This was during the last civil war of Japan, when an army of Samurai rose up against the Meiji Government. This is the story behind the 2003 film *The Last Samurai*, directed by Ed Zwick, shot by John Toll, ASC, starring Ken Watanabe and Tom Cruise.

The original stone walls and some turrets survived. Extensive reconstruction was started in 1960 and completed in 2007 in time for the castle's 400th anniversary.



Tour of Sony in Japan: Atsugi Tech Center



Above: Shoji Nemoto, Senior VP and Co-President of Sony Professional Solutions Group.



Above: Toshihiko Ohnishi, President of Sony Professional Solutions of America. Below: Yasuhiko Mikami, Senior Manager, Content Creation.



Sony's theme at NAB will be "Believe Beyond HD." HD is now 30 years old, and life beyond 2K now extends to 4K and beyond.

Two weeks before the terrible earthquake and tsunami in Japan, I visited Sony's facilities at Atsugi, Shinagawa and Kumamoto. It began like an episode in the TV show "The Great Race." Rush hour in Tokyo. Three minutes to go. Racing through Shinjuku station, trying to find the "Romance Car" to Atsugi. Jump on board as the doors close. The romance of the train comes from earlier years when Tokyo honeymooners headed for the resorts and spas of nearby Hakone. On a clear day, you can see Mt. Fuji. However, it's rainy, cold, and we're not here for romance. We're here to learn what Sony will unleash at NAB 2011.

Sony's Atsugi Tech Center was established in 1960. It's an hour southwest of Tokyo, near the Great Buddha of Kamakura, cast in bronze in 1252. Atsugi is a think tank, research and development facility. Two days of discussions and product previews with Sony's leading talent made it clear how far we're going beyond HD—and how quickly 4K will become mainstream. About 5,700 screens in the USA are now equipped with Sony 4K digital projection systems.

Rumors have been building for some time and it is now confirmed. At NAB, Sony will introduce their next generation CineAlta camera for Motion Picture Production, with an 8K sensor and SRMemory. The camera will handle resolutions up to 4K and beyond, and SRMemory can handle 4K 16-bit RAW files with sustained data rates of 5Gbps.

Engineers and executives explained how this next leap beyond HD and 2K will be applied not just in entertainment, but also in medicine, industry, graphics, education, museums, product design and simulations. I expect we'll see consumer 4K displays at reasonable prices within 3 years. Within 6 years, we'll have 8K displays at home. If you had plans to renovate your home theater, don't even think about hiding the display behind expensive consoles. You're going to want something I saw in Tokyo—entire rooms whose walls were constructed with ultra-high resolution flat panel displays.

Other themes will be clear at NAB. Sony is embracing the single sensor 35mm digital format. F35 was introduced in 2008 and SRW9000PL was released in 2010—using a CCD HD sensor of 6.2 million pixels. Both have PL mounts.

Sony's F3 was unveiled at the end of 2010. NXCAM Super35 NEX-FS100 will be premiered at NAB. Both use the same 3.4 Megapixel Super 35mm single CMOS imager (23.6 x 13.3 mm, 27.1 mm diagonal).

Sony's new F65 camera uses a new 20 Megapixel Super35 single CMOS imager, whose active image area is 24.7 mm x 13.1 mm, 28 mm diagonal.

The PL mount plays a big part on all the new cameras. F35, 9000PL, and the new F65 camera have an integral PL mount. F3 and NXCAM S35 accept PL adaptors. You can be sure that machine shops everywhere are milling multitudes of 35mm lens adaptors in time for Sony's new cameras at NAB.

Sony CineAlta F65 >4K



Sony F65



Sony F65



Sony F65



Sony F65 camera introduced at NAB 2011 Press Conference



Sony F65 Camera

As whispered and predicted a year ago, Sony will show the working prototype of their new high-end, >4K next generation digital motion picture camera at NAB 2011.

Mr. Nemoto, Mr. Mikami, and the entire team behind the new CineAlta camera, currently called F65, showed us the prototype at Sony's Tech Center in Atsugi a few weeks ago.

When NAB 2011 opens at 9 am on April 11, you might want to wear elbow and kneepads as you weave through the crowd trying to catch a glimpse of the new F65 in Sony's booth C11001. What's so interesting about this camera? In two words: 8K sensor.

Behind the PL mount, there's a new Sony 20 Megapixel CMOS sensor. The actual, active 18.3 Megapixel image area is 24.7mm x 13.1 mm, which is 28 mm diagonal. This fits nicely within the ANSI Super35 3-perf size of 24.9 x 13.9 mm, and most PL mount lenses in the world can be used without vignetting.

I can hear the collective sound of fingers tapping on calculators. The 1.9:1 aspect ratio (24.7 ÷ 13.1) is also the DCI projection standard (4096 x 2160 or 2048 x 1080), where the active picture has to fill the screen either vertically or horizontally. Sony's new sensor offers the choice of picture composition as needed: 1.85:1, 1.78:1, 1.66:1, 1.33:1, 2.35 spherical, 1.3x anamorphic, or 2x anamorphic cropped. I think Vittorio Storaro, ASC, AIC may be pleased, as this comes closer to approaching his Univisium format.

The imager contains an active total of 18.3 Megapixels. Half are sensitive to GREEN, and the other half are equally shared by RED and BLUE pixels. The sensor will provide pristine super-sampled HD and 2K images, and this is the first sensor in the industry that provides a dedicated green photosite for each pixel in the 4K (4096 x 2160) output image.

As I understand it, the green channel is the most significant in creating the Y (or Luminance) signal. Having twice the amount of GREEN photosites compared with traditional 4K Bayer pattern sensors provides a significant improvement in image resolution. This should also be helpful for mattes and effects work. As debayering algorithms evolve in the future, it will be interesting to see how the current 20 Megapixel sensor's RAW files can be processed to create presentation formats larger than 4K—perhaps even the NHK UDTV system (7640x4320 59P) where the pixel count is 16 times (4 times horizontal and vertical) greater than today's 1080 HDTV.

F65 design is reminiscent of F35, F23, Panaflex Millennium, Arricam Studio, and Moviecam Compact. The designers have crafted a shape that accommodates an onboard SRMemory "magazine". The bottom of the camera is ready to go from handheld to studio configuration, with a forward flat section where you attach a sliding baseplate, and a sculpted rear section for a comfortable shoulder-moulded cushion. Power is dual 12 volt: the camera runs with 12 VDC, but 24 VDC is available for accessories if you attach two 12 volt batteries. Consumption is expected to be less than a Sony F35.

In normal mode, F65 will shoot from 1-72 fps. In HFR (High Frame Rate) mode, the camera will run from 1-120 fps. An optional rotating mechanical (not mirror) shutter syncs with the frame rate, like a film camera, and eliminates artifacts (jello-cam) when panning past vertical objects at high speeds.

A 1 TB Memory Card recording at 24 fps will store about an hour

of "footage" in 4K 16 bit RAW, and up to 8 hours of HD.

The dockable SRMemory Card Recorder attaches to the camera and records directly to an SRMemory Card—which will be introduced in capacities of 256 GB, 512 GB or 1 TB. I imagine that larger sizes and other recording options will become available, both onboard as an accessory digital "magazine," and tethered by cable to a separate device.

The camera provides live HD-SDI outputs derived from the 18.3 Megapixel sensor's RAW signal. Pre-programmed LUTs can be used on the HD monitor outputs feeding on-set HD monitors and external proxy video recorders creating ready-to-edit files.

What does the image look like? The pictures from the prototype I saw in Tokyo on a large 4K monitor were very detailed, superbly sharp, with rich blacks, even in very low light.

I think what makes this new camera possible is the fact that Sony manufactures the five secret sauces essential for full food-chain 4K and beyond: sensor, storage, software, station, and screening.

Sensor. Sony makes the 20 Megapixel CMOS sensor. That's a significant amount of headroom, and in the future, the F65 camera will be able to derive higher resolutions from the current sensor. We'll visit the factory where Sony makes these sensors on the next page.

Storage. Sony makes the SRMemory Cards that have an impressive 5 Gbps sustained data rate. Native data rate is about 20 Gbps, and can be mildly compressed 4:1 for the SRMemory Cards.

Station. Data from the SRMemory Card can be downloaded, cloned, and copied via Sony's Memory Recorders and Adaptors.

Software. Sony is making their API (Application Programmable Interface) available to third parties, and announced compatibility with major editing and post production systems. This will be a continuing story at NAB. Sony is making the SR codec natively available as a file for post production, which is already supported by FilmLight and Davinci. The Sony files will be supported by Direct-to-Edit and DI post production including Avid and FCP.

Screening. About 7000 screens worldwide now use Sony 4K digital projection systems.

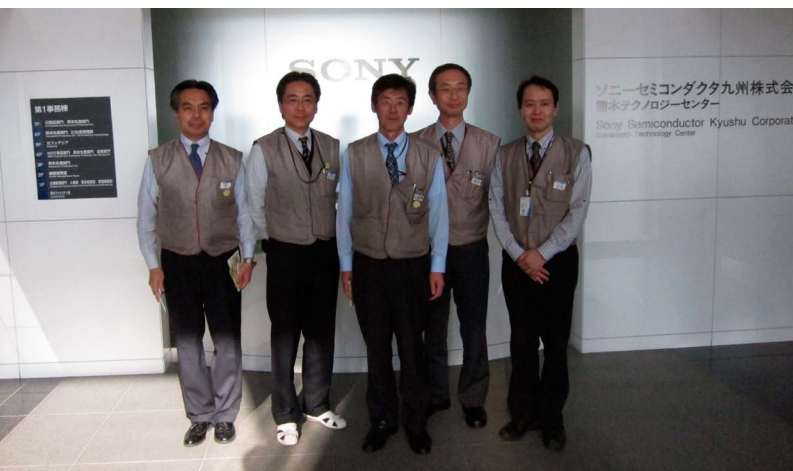
Chris Marchitelli, Sony's Senior Manager, Beyond HD Production Solutions, told us, "As with the previous generations of CineAlta, Sony has worked very closely with the industry. We've been patiently applying our technology and experience in developing the next generation digital motion picture camera and storage system.

"The F65 camera will deliver brilliant HD, 2K, 4K images. It has been designed with practical production setups in mind, including 3D rigs and Steadicam. Looking ahead, the F65 is ready to move well beyond 4K in the future as the industry's needs evolve."

The F65 represents the next generation CineAlta camera from Sony for Digital Motion Picture Production. When will the Sony F65 be ready to roll? Fauer's Law of Camera Delivery is 9 months after first sighting at NAB or IBC. Let the clamoring begin.

www.sony.com/F65

Sony Semiconductor Kumamoto Technology Center



Hot on the trail of Sony's new 8K F65 sensor, we fly one and a half hours south from Tokyo to Sony's Image Sensor Fab Factory in Kumamoto. This is the high-tech facility that also manufactures the sensors for Sony's F3 and NXCAM 35 cameras. In fact, Sony is the leading manufacturer of CMOS and CCD image sensors in the world.

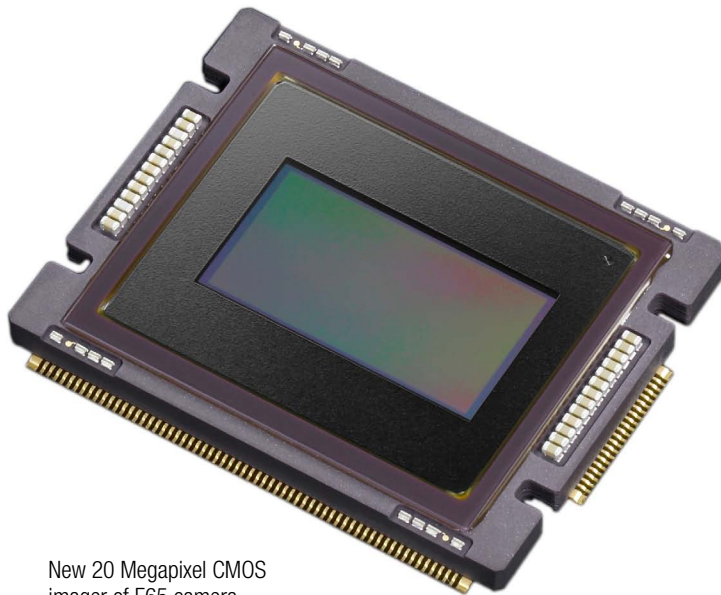
The factory is near Kumamoto Castle, shown on the cover of this edition and where Akira Kurosawa shot parts of *Ran*. It reminds me that the new camera could be called "AKIRA," in honor of the great director. Akira means "bright" or "intelligent." Normally used for males, Akira can be a female name as well.

A short, 15 minute drive from the airport, past fields of green tea that look like rows of pixels, we arrive at two massive buildings that sprawl more than 42,000 square meters (10.3 acres) in size. About 3,000 Sony employees work here.

It's the water—among many other things. Rain and water runoff from nearby Mt. Aso provides a very pure source for manufacturing sensors that use silicon wafers 99.99999% pure.

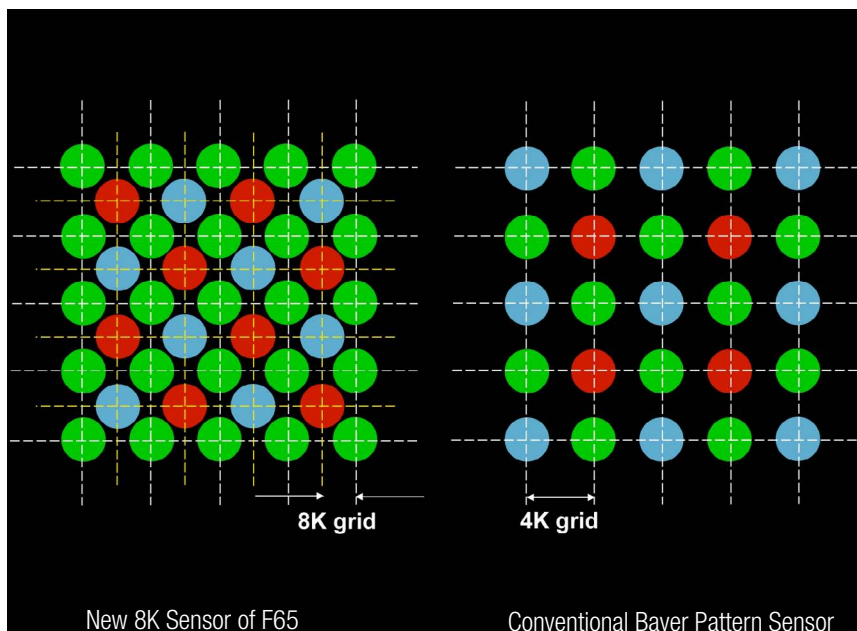
Sensors begin with a single silicon ingot (left), 300 mm in diameter—one crystal. It's sliced, cleaned, and processed in this fully automated facility. The size of the sensor determines how many can be produced on one wafer. Production goes from wafer to testing, assembly and shipment. Accuracy is to the nanometer, and it can take up to 90 days for each sensor to be made.

F65 20 Megapixel Sensor



New 20 Megapixel CMOS imager of F65 camera

F65 Sensor compared with typical Bayer Pattern Sensor



New 8K Sensor of F65

Conventional Bayer Pattern Sensor

In reality each pixel is a square and diagonally rotated by 45 degrees. In order to simplify and graphically compare the new sensor with conventional Bayer pattern sensors, we're showing round dots instead of denser diamond squares, above.

After an extensive tour of the Kumamoto Technology Center, Toshiro Kurusu, Yuji Sugita and the team in charge of Sony's semiconductor center explained some of the technology behind the new F65 sensor. This was followed up by additional clarification from Yasuhiko Mikami, Peter Crithary and others.

F65 has a 20 Megapixel CMOS sensor, as we've described earlier. It has an active image area of 24.7 x 13.1 mm. The diagonal is 28 mm.

Any PL lens with an image circle diameter 28 mm or greater will be compatible. Almost any 35mm format PL mount lens should work without vignetting. That includes most 35mm Academy format (pre-Super35 era) lenses. Whether these lenses will hold up to the scrutiny of 4K imaging is another story, to be investigated another day.

Native data rate from the F65 is estimated at 20 Gbps, which can be mildly compressed 4:1 for the 5 Gbps sustained data rate of the SRMemory Cards. A 1 TB SRMemory Card will store about 1 hour of 4K 16-bit RAW at 24 fps with a dockable SRMemory Recorder. Upcoming external storage devices will be able to record uncompressed RAW from the F65.

Output is 16-bit RAW or RGB. The pixels on the new F65 sensor are arranged diagonally, diamond shaped, and have a unit cell size perhaps 1/5th the size of the F3 pixels. Given the sophistication of the imager, and the implementation of ACES (Academy Color Encoding Specification), we can expect significantly wider color space and contrast than anything we've seen before.

Up to now, it had been drummed into our heads that higher resolution meant lower sensitivity, and the big bucket little bucket analogy would pop up on the Powerpoints. But this sensor and camera are incredibly sensitive. How do they do this?

Take a look at the diagram at left to see how the extra pixels are packed into the same area previously occupied by lower resolution Bayer patterns.

It's helpful to remember that Sony makes millions of sensors for Point & Shoot cameras and cell phones. Sony Ericsson mobile phones can now shoot full HD, and a 16.41 Megapixel Exmor R CMOS sensor was recently announced with 1.12 micron unit pixel size. The technology that improves the imaging performance of tiny cell phone cameras can now be applied to a high-end motion picture camera like the F65, and vice versa.

In the semi-conductor world, there's a saying that quantity defines quality. Smaller pixels may no longer mean inferior sensitivity or dynamic range. I can't wait to see how the F65 behaves in actual production on set and on location.

SRMaster SRMemory

A wise man once said, “No film, video or digital camera was ever introduced without a recognized recording format, storage medium, and post process already established.” Sony’s new 4K camera does just that—with an entire SRMemory Platform, named SRMaster, of SRMemory Cards, Recorders, and Transfer Units.

The memory most remembered at NAB might be SRMemory Cards. Roughly the size and shape of an iPhone, these solid state storage devices will initially come in 256 GB, 512 GB, and 1 TB sizes. They are capable of a sustained, guaranteed data rate of 5 Gbps, made possible by internal



Above: Yoshinori Miyamoto with 1 TB SRMemory Card. Below: Shinichi Tsuda, Sony CCS Planning and Marketing Dept holding SRW9000PL with internal SRMemory Recorder.



memory controller chips and circuits. The SRMemory card format can record and output two data streams at the same time, so it is ready for 3D production

Data security is key to providing master “camera negative” quality recording for HD, 3D, 4K and beyond. By way of comparison, HDCAM SR tape records at data rates of 440 and 880 Mbps with 12 channels of audio. SxS cards can record at up to 1.2 Gbps—but this is not a sustained data rate, and it can drop well below 220 Mbps at times.

A 1 TB card will cost less than the producers’ airline seats from New York to LAX. It’s your “camera digital original,” and every production should have enough memory cards to be sure data is safely stored, cloned and archived before the card is reused.

Various SRMemory Recorders will be available for different cameras:

SR-R4 Memory Recorder attaches directly to the back of the F65 like a film magazine.

SR-R3 Memory Recorder attaches to the F35 camera via its multi-pin connector as an alternative to the HDCAM SRW-1 deck.

SR-R1 attaches to the F3 camera with a bracket and cable to the SDI connector.

Sony’s SRW-9000PL gets an upgrade option with an internal SRMemory Recorder replacing its HDCAM SR tape guts.

Sony’s F900 will accept connection to an attached SR-R1 using a short cable.

To move all this memory from camera to computer, Sony anticipated many scenarios for dealing with data. Their SRMaster series is a one-stop-shopping spree of hardware and software that addresses all the challenges of data wrangling, both on set and in the post production studio.

The SR-R1000 is a deck with 4 slots that can simultaneously download data from up to 4 SRMemory Cards onto 12 TB of internal memory. No computer is necessary.

The SRPC-5 is a 1RU unit that connects to a computer or server via 10 Gigabit Ethernet to quickly move data from the SRMemory cards and into post production. It also has 3G-SDI and HD-SDI outputs, and can backup data to HDCAM-SR digital tape at 2x real time.

Peter Crithary, who spent 20+ years as a DP before joining Sony as Marketing Manager

Production, explained, “The challenge in developing an effective solid state platform is ensuring data integrity, efficiency, security and speed in order to provide a totally reliable system of file management.

“Sony is one of the few companies providing the entire process, end to end—with the introduction of SRMaster and SRMemory. Hardware will include an SRMemory deck that is essentially a server, SRMemory readers and various camera recording options.

“For example, the SR-R1000 can store up to 12TB of data internally. Depending on the type of data, four SRMemory cards can be ingested at the same time. Because a 1TB SRMemory card can store about an hour of 4K 16-bit RAW data, users can offload the data in less than 30 minutes to the internal Memory storage of the unit. This makes the R1000 suitable for efficient data management on the set and in the post production studio.

“The SRMaster, SRMemory platform has the same visually lossless, 10-bit mastering quality HDCAM SR codec that is the industry standard for the HDCAM SR digital tape format used in production, delivery master and archiving. With the SRMaster series of products, professionals will have expanded recording choices that include 10-bit, 12-bit, a new 220 Mbps level of the SR codec, 440 Mbps, 880 Mbps, uncompressed DPX, and all the way up to 16-bit 4K RAW (and beyond in the future). Sony is also increasing the number of uncompressed audio channels to 16. A big benefit for users is the ability to natively access the SR Codec as a file and stay native from acquisition all the way through post production.

“The SR Codec is already supported as a Direct-to-edit process in Apple Final Cut Pro by way of a plug-in from Sony, Avid Media Composer v5.5 via AMA, FilmLight and DaVinci Resolve, to name a few, and the list is growing rapidly.

“The SRMaster product line was carefully designed to address the most demanding production environments—and offer hybrid paths with the existing HDCAM SR Digital Tape system, which is used by almost every major studio and post house in the world. For example, the new SRPC-5 Transfer Station, with its 1U height and 10 GigaBit Ethernet, using standard networking protocol, lets

Saving Memories

users clone their data from the SRMemory card to the HDCAM SR Digital tape at up to twice real time, or transfer the data into their computer environments at faster than real time via a built in web client.

“Sony is the only company that does all this, from start to finish, from shooting with the new F65 CineAlta camera, to recording onto SRMemory, all the way through to 4K projection with our SXR Digital Cinema projectors at a theater near you.”

With Peter’s words in mind, here’s a plausible production scenario.

Data Wrangling

The 1 TB card is full—you’ve shot an hour of 4K at 24 fps.

Donatella the Data Wrangler ejects the “exposed” SRMemory Card and inserts a fresh one into the F65 camera’s onboard SR-R4 Memory Recorder.

She takes the “exposed” 1 TB card to her on-set SR-R1000 Memory Recorder. A 1TB card can be downloaded on the SR-R1000 in less than 30 minutes. While she is cloning a safety copy of the 1TB card, editorial copies with baked-in LUTs are created at the same time and sent to the post house and on-set editor. The SRMemory Card is stored in a safe location for several days until Prunella the post production supervisor signals that all is safe, editable and archived. Only then should the SRMemory card be reused—ready to go back to the camera.

The wise producer has budgeted for enough SRMemory cards to make this feasible. A good new start-up business might be Memory Card rentals. Get good insurance, and treat your data wranglers well.



SR-R4 Memory Recorder, left, for direct docking to Sony F65. Recording format: 4K 16-bit RAW, up to 72 fps; 2K RAW, up to 120fps; Selectable fps



SR-R1 Memory Recorder at left, with brackets to mount on camera support rods of cameras like the F3, connects via SDI.

MPEG4 SsTP (Simple Studio Profile) SR File

- SR-Lite (220Mbps), SR-SQ (440Mbps), SR-HQ (880Mbps)
- Uncompressed DPX recording
- HD-SDI/3G-SDI dual-link In/Out
- 10bit 4:2:2 or 10/12bit RGB 4:4:4 recording
- 4:2:2 1080 50p/60p recording
- 3D stereoscopic (dual stream) recording: 1080 30p 4:2:2 3D and 1080 30p RGB 4:4:4 3D

16 channels uncompressed audio, Timecode In/Out, Remote Control Panel, RS-422 remote control



SR-R1 connects to F900, below, with a short cable



SR-R3 Memory Recorder docks onto F35 with multi-pin connector, left.

Up to 1080 4:4:4 60 fps

- Selectable FPS
- F35: 1 to 50fps
- F23: 1 to 60fps

Supports all SRW-1 signal formats and more:

- SR-Lite (220Mbps)
- Uncompressed DPX recording
- RGB 4:4:4 12-bit recording



SR-R3 Memory Recorder directly connected to F35, above and below.



SR-R1000 Multi-Card Ingest / Multi Channel Server stores 12TB, about 12 hours of 4K content.



Below: SRPC-5 connects to computer or server via 10 Gigabit Ethernet to quickly move data off the SRMemory cards.



SRMemory Recorders on Cameras



SR-R4 Memory Recorder docks directly to Sony F65.



SR-R3 Memory Recorder connects directly to F35, left, below and opposite





SR-R1 connects to F900
with a short cable



Sony F3 Updates



Sony introduced the PMW-F3 35mm format camera in November 2010 as an “affordable 35mm camera.” Small, compact, lightweight (2.4 kg / 5 lb 4 oz), it can run for more than 3 hours using one tiny BP-U90 battery. F3 footage intercuts incredibly well with its bigger siblings: F35 and 9000PL, as has been recently seen on the hit television show *Justified*.

Sony’s F3 Camcorder uses a square pixel array CMOS image sensor: Super 35 3-perf, 16:9, 23.6 x 13.3 mm, 27.1 mm diagonal image area. The recording format (XDCAM EX) and media (SxS cards) are the same as Sony’s EX1R and EX3. SxS Pro memory cards currently come in 8, 16, 32, and 64 GB capacities. A 32 GB card records about 100 minutes of HQ image and sound at 35 Mbps.

At NAB, expect to see RGB 10-bit 4:4:4 over Dual Link HD-SDI and S-Log (Sony gamma curve) output to SR-R1 Memory Recorders using SRMemory cards writing the SR File codec at 220Mbps, 440Mbps, and in the future, 880Mbps. A LUT (Look Up Table) function is also provided for monitoring purposes when using S-LOG output. There is also the option of 3G-SDI output. Your choice will depend on the connecting devices. You’ll be able to connect HDCAM-SR recorders as well.

Two F3 cameras set up for 3D will be able to record to one SR-R1 Memory Recorder up to 1080 30p 4:4:4 for each stream.

Three Sony prime lenses can be ordered with the F3—35, 50 and 85 mm, T2.0. The focus barrels are marked in both feet and meters, but there are no witness marks—just like the 16mm zooms you grew up with. Plan on spending a couple of hours prepping your set of lenses. Go to filmtools.com and order a roll of 1/4” white Chart Tape (Filmtools item #1190). Wrap the tape around the focus ring. Set up a Siemens star focus chart on the wall. Use a tape measure to set the first critical distance from the chart to the image plane: say, 6 feet. Now, focus by eye on the chart. Use a Sharpie UltraFine Point Marker (Filmtools #881) to draw your witness mark. Repeat this for all critical distances.

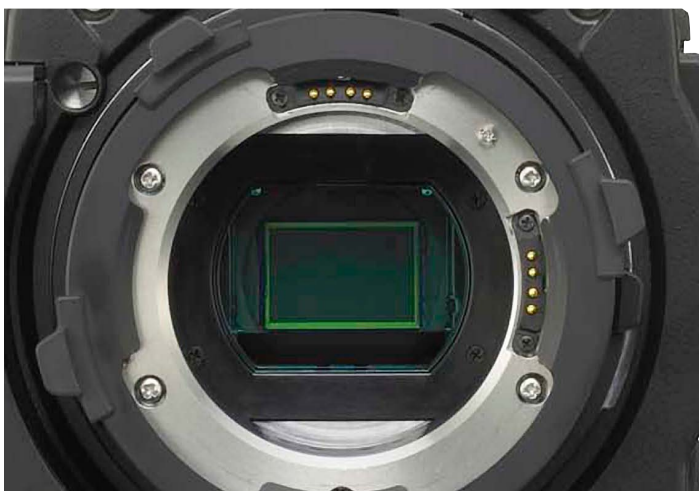
Two new zoom lenses are planned for the F3 camera. Coming in the 2nd quarter of this year will be an 11 – 16 mm T3.0 PL mount zoom. It’s expected to cost around \$7,000.

A second zoom is expected later in the year: 18-180 mm (10x) or 18-252 (14x) mm. Maximum aperture will be around T3.8. Depending on how small it is, there may be some ramping of the aperture. The zoom certainly will be small, taking advantage of the F3’s very short flange focal depth. It will also incorporate electronic contacts and zoom control via the rocker in the F3 handgrip.

The next firmware update of the F3 is expected to be able to handle frame by frame lens metadata of Cooke’s /i Technology System.

Another new feature of the PMW-F3 will be the 3D-LINK option for 3D stereoscopic shooting. Two PMW-F3 cameras can be controlled by one camera remote controller at the same time. The two cameras are connected with a special 10-pin cable that includes genlock, timecode in/out, and potential simultaneous control of the iris and focus functions of both cameras.

<http://pro.sony.com/bbsc/ssr/product-PMWF3L/sony.com/f3>



Sony NXCAM S35



Makoto Kawakami, Marketing Manager of the NXCAM Group with NXCAM S35 at Atsugi Tech Center.



If the F3 has been labelled the “Affordable 35 Camera,” what am I to call the NXCAM Super35? How about “best design of a digital camera this year in a tiny package under \$7,000?”

It fits in the palm of your hand, feels like a Hasselblad, has the same 35mm sensor as the F3, and accepts almost any lens in the universe with its Sony E mount. It looks like a Sony clamshell DSR-V10 recorder sprouting a lens mount. Some will say it looks like a Mamiya 645 Super or a miniature Red Epic. This is the camcorder that takes the DSLR evolution to the next level.

Production models of Sony’s NXCAM S35 will be shown at NAB. The official product name is NEX-FS100. The first mock-ups were shown in New York and LA on November 17, 2010—but they were red herrings without flip-up monitor, eyepiece extender or handgrip.

The team behind Sony’s NXCAM S35 camcorder gets our praise for the refreshingly well-executed design and thoughtful features. The base of the camera has four threaded tripod mounts: two 3/8-16 and two 1/4-20, with lots of anti-twist locating holes. Baseplate manufacturers, DPs and 3D stereographers will love this. Camera assistants and grips will applaud the extra 1/4-20 mounting sockets on the camera right side and top. A handgrip attaches to the camera right side.

The 3.5” flip-up LCD monitor on the top of the camera articulates to almost any shooting position. A removable eyepiece extender with cheek-hugging rubber eyecup, similar to the EX3, snaps onto the LCD monitor. It’s comfortable when shooting on a tripod. Because the camera is so lightweight, the eyepiece extender works nicely handheld at shoulder level and aimed up for low angle shots. A removable handle attaches on top with a shotgun mike. Imagine a Hasselblad style digital motion picture camera with good audio.

As we’ve belabored before, the NXCAM Super35 uses a single Super35 CMOS sensor—the same one as the Sony F3. The NXCAM S35 inserts Timecode and 3:2 Pull Down markers on the HDMI private data (allows simple 24p extraction by external outboard recorders or NLE, since HDMI does not support native 24p signals). Major third party companies are expected to announce support of this by NAB (AJA, Convergent Design, CineDeck, Black Magic, etc).

Interchangeable lenses attach to the camera’s E-mount. This is the same mount as Sony’s NEX-3 and NEX-5 still cameras, and NEX-VG10 consumer camcorder. The very short (18 mm) flange focal depth lets you mount, with adaptors, most 35mm still and motion picture lenses on the planet. Adaptors are available from Sony, MTF, Novoflex, and many others—for PL, Leica M, Sony A (Alpha), Canon, Nikon, etc.

There will be an E-mount option for ZEISS Compact Prime CP.2 lenses. There were sightings of ZEISS Alpha zoom lenses attached with an Alpha to E-mount adaptor, in addition to Sony E-mount zooms and primes.

Images are recorded in AVCHD full HD 1080p (60p / 30p / 24p or 50p / 25p) MPEG4 AVC/H.264. Slow and quick (over and undercranked) is available.

Price will be under \$7000. Shipping probably between April-June 2011.

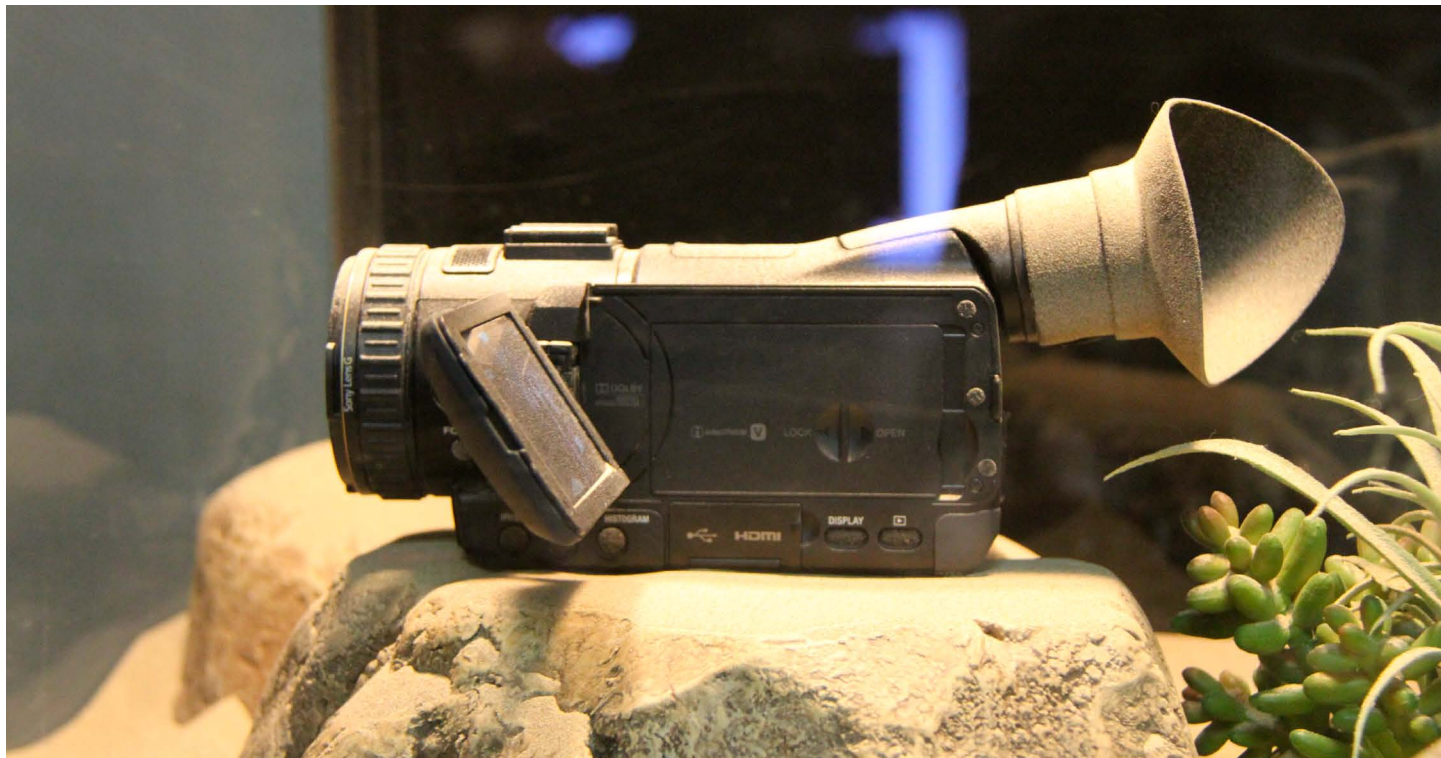
Sony NXCAM S35



NXCAM S35



NXCAM Sand and Spray



NXCAM Spray and Sand



Sony's NXCAM design group has been busy. They showed us additional new compact camcorders to be shown at NAB: one for hostile environments, the other for 3D.

Storm and Sand

Here's a water, spray and sand resistant NXCAM camcorder every sailor, watersports coach, boater, documentary or news crew has wanted for years: the first Broadcast and Industrial grade rain-proof, spray-resistant, dust-proof, sand-proof camera. It's officially called HXR-NX70. I heard that the networks were influential in development—this was a camera they really wanted. I want one too. The sensor is 1/2.88". The wide-angle 10x zoom is the 35mm format equivalent of 26.3-263 mm.

Now you can shoot from your Zodiac inflatable RIB in spray and rain without a bulky underwater housing or spray bag. Disclaimer: this camera has not been tested yet for salt water, but if you wash it in the shower or under a garden hose with fresh water, it should be fine. The camera's IP54 compliance (www.fdtimes.com/go/ip) is similar to the image stabilized binoculars you're used to using. It is not meant to go underwater.

The Storm and Sand camera will also become the darling of the 40 million boaters, fishermen, waterskiers, kayakers and other water enthusiasts who need a camera with high power zoom, excellent image stabilization, and best of all, a good eyepiece with cheek-hugging eyecup to help keep stray light and spray out of your eyes.

The HXR-NX70 camcorder is dust and sand proof, which should be perfect for trips to the beach, shooting in the rain, or expeditions into hostile environments. Anything that opens is sealed with O rings: flip-out mini monitor, battery compartment (conveniently located beneath the monitor), and an SD card slots. It comes with a detachable handle with 2 XLR audio inputs, audio controls and shotgun mike (supplied). The audio module and shotgun mike in the top handle are not waterproof—take them off or wrap them in a plastic bag before heading out to sea or into the Sahara.

This NXCAM is compact and lightweight. Its 96 GB internal memory can record 8.8 hours of AVCHD at 24 Mbps. There's also an SD slot. Price: under \$3500, shipping between April – June 2011.



NXCAM 3D

The third interesting camera coming from the busy Sony NXCAM group is the HXR-NX3D1 compact 3D camcorder. It's the first 3D Broadcast & Industrial Handy-as-in-Handycam—hold it in your hand—style camcorder we've seen.

Its shape is similar to the Hostile Environment NXCAM described previously—but it shoots 3D and isn't spray or sand resistant. The 3D images look good, it's easy to use, and the 3.5" glasses-free 3D LCD panel is a pleasure to use.

The MOD (Minimum Object Distance) in 3D is just under one meter.

The detachable top handle and audio module with 2 XLR connectors and shotgun mike supplied is the same one used on the water resistant NXCAM NX70, and it has the same 96GB internal memory.

The 3D NXCAM records at 24p, 50i and 60i in 3D and all the way up to 1080 60P in 2D. Stereoscopic 3D is double full HD, providing frame packing or side by side output through the HDMI connector. "Frame Packing" records the full left and right images at twice the normal bandwidth. "Side-by-side" 3D halves the horizontal resolution of the left and right images for each frame.

Price will be under \$3500. Shipping later this summer.



The camera will automatically adjust parallax (equivalent to changing the intraocular distance to accentuate or diminish the 3D effect) when zooming, but you can manually override it. The camera does not converge (toe in) the lenses. The LCD panel provides 3D, L+R mix, L eye and R eye. The HDMI output provides 3D as frame packing (double the frame rate), side by side (half the horizontal resolution, L+R mix, L-eye and R-eye. L+R mix makes adjusting parallax easy as you can clearly see the effect on the screen.

XDCAM-EX 3D



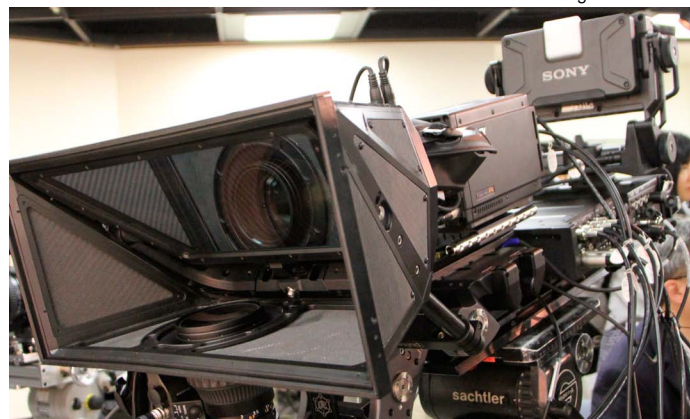
In addition to the Handycam NXCAM for 3D, Sony has a 3D XDCAM EX shoulder-resting camera for NAB. It should be popular for news, sports, documentaries and maybe 3D weddings. The camcorder has two sets of three HD 1920x1080 CMOS 1/2" sensors, recording MPEG2 HD 4:2:0 (MP4) format up to 35 Mbps simultaneously onto two SxS Cards. (You can also shoot 2D with a single card.) The lens has an ergonomically nesting zoom, focus and convergence control. It's like having a built in follow focus wheel permanently attached, with the added convenience of convergence being adjusted (as close as 1.2 meters) with the smaller circumference dial. This idea of a permanent follow focus wheel could catch on elsewhere.

Sony 3D



Above: Two F3 cameras set up on a 3D side-by-side rig.

Below: Two P1 box cameras on an Element Technica Pulsar mirror rig.



For live events, the XDCAM EX 3D shoulder camera could be used for sideline coverage and interviews. The little brother NXCAM HXR-NX3D1 3D Handycam could be mounted on goals, remote cranes, and cable cams. Box cameras can be used side by side for faraway wide shots and on mirror rigs for mid distance shots.

Sony's HDC-P1 2/3" 3-chip CCD box camera has been widely adapted for 3D production. MPES-3D01 software enables the MPE-200 3D box to act as an external rack mount controller that remotely manages 3D rig alignment, image shift, flip/flop, tilt, rotation, toe in/out, color correction and more.

Sony has set up 3D training centers in Los Angeles, Basingstoke, UK, and at Whistling Woods in Mumbai, India.

That wraps up our tour of Sony. There are many more new products to discover, not only at Sony, but in the many vast halls of NAB 2011. Have a great show.



Tsuboi River, Kumamoto



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www.sony.com/35mm

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