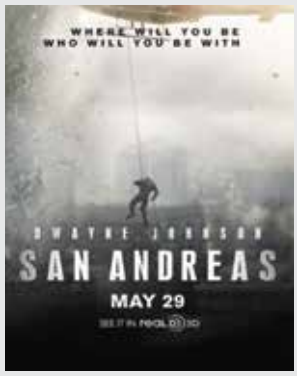
CODEX

2015 - ISSUE 7

THE MAN FROM U.N.C.L.E.
HALO 5 | ANT-MAN



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LINE UP ISSUE 7

WHO TO BLAME

Editorial Team and Contributors: Marc Dando, Sarah Priestnall, Brian Gaffney, Matt Walters, David Heuring, Ron Prince

Design and Production: Craig Hildrew, Gareth Ewers

A big thank you goes out to everyone who contributed to this edition of Codex.

U P F R O N T

No matter where you turn at present, someone is using a new camera in production; from the use of Apple iPhones to the stunning ARRI ALEXA 65, we now see many camera formats on every project. Perhaps to some this is defying traditional convention but we are witnessing some fabulous results.

Even though I'm investing in making digital workflows better and better, this never changes my love of film and I've recently had the chance to see some of the amazing footage from Quentin Tarantino's *Hateful Eight,* shot by Academy Award winning cinematographer Robert Richardson on 65mm film. These images, along with the images I've seen from the ALEXA 65, continue to set new standards and inspire us all to help these talented people create beautiful imagery.

It has been an exciting year for us at Codex, with our equipment and workflows being used on hundreds of productions – from tentpole movies like *Avengers: Age of Ultron* and *Mad Max: Fury Road,* to independent movies, television shows, and commercials. We continue to raise the bar for handling the amount of data acquired by today's cameras whilst providing cost-effective workflows that save money by efficiently moving images and metadata from the set, to post production, and beyond.

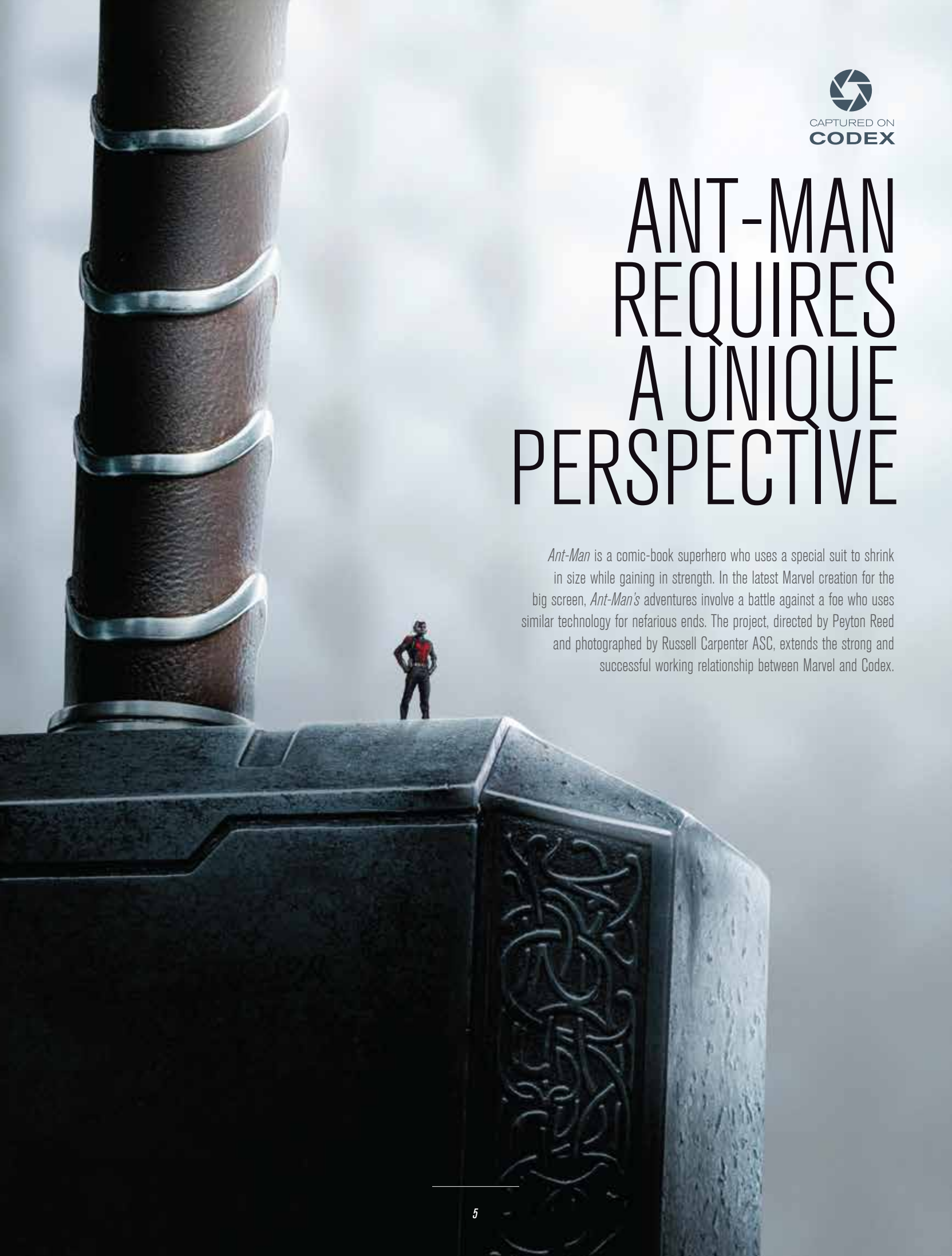
Codex Action Cam has become a key tool in the new, exciting area of Virtual Reality. I hope you enjoy reading how cinematographer Andrew Shulkind is working with Headcase VR, Codex, and Radiant Images on the Headcase Cinema Camera, using 17 Action Cams to capture 360° images along with the metadata needed to efficiently stitch all the pieces together. He gives you a glimpse into this new world on page 20.

At Codex, engaging with cinematographers, on the front lines of production, has always been critical to our product development. In this issue, you'll see the first in our series of interviews with another crucial part of production, the DIT – a vital constituency of Codex users whose feedback continues to make our products better.

This year, we've taken it one step further, setting up Codex Connect to build a community of Codex users all over the world. Wherever you are in the world, Codex Connect means you can be rest assured that Codex has your back. Codex's world-class team of support and workflow experts are available to assist you, whether you just need a new licence, or you need help in setting up a complicated, multi-camera workflow. And it's much more than that. Codex Connect makes collaboration easy by allowing you to securely share project information between team members, and as we all know, film making is an entirely collaborative process.

And of course, we continue to partner with the leading camera manufacturers as they keep raising the bar for image acquisition. Higher resolution, higher frame rates, high dynamic range – no problem, we can handle it. In the end, it's all about the story though – that's what we're passionate about – making it easy for creative people to tell amazing stories.

Marc Dando, managing director, Codex



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ANT-MAN REQUIRES A UNIQUE PERSPECTIVE

Ant-Man is a comic-book superhero who uses a special suit to shrink in size while gaining in strength. In the latest Marvel creation for the big screen, *Ant-Man's* adventures involve a battle against a foe who uses similar technology for nefarious ends. The project, directed by Peyton Reed and photographed by Russell Carpenter ASC, extends the strong and successful working relationship between Marvel and Codex.

SUCCESS STORY: ANT-MAN
CINEMATOGRAPHER: RUSSELL CARPENTER ASC
RELEASE: JULY 2015

Prior to *Ant-Man,* Carpenter, an Oscar winner for James Cameron's *Titanic* in 1997, had taken a long break from the visual effects-heavy blockbusters he had done in the 1990s, like *True Lies, Charlie's Angels* and *Hard Target. Ant-Man* provided the cinematographer with an opportunity to revisit the action genre while simultaneously tackling a range of unique photographic challenges.

Issues of scale and how to convincingly present it to the audience dominated most of the decisions about cinematography and visual effects. For guidance, the filmmakers looked at films with similar characters going all the way back to *Darby O'Gill and the Little People,* photographed with extensive forced perspective and giant props in 1959 by Winton Hoch ASC.

Carpenter had explored miniature humans in Frank Oz's 1995 feature *The Indian in the Cupboard,* and the opposite in Christopher Guest's *Attack of the 50 Ft. Woman* (1993), but in the interim, a technological revolution allowed for a completely different approach on *Ant-Man.*

"Even in the past four or five years, the technology has advanced light-years," says Carpenter. "It's so much more stable and heavy-duty. On a lengthy shoot with several units going, I don't think we ever had a failure. With the ALEXA, ARRI has totally upped their game, and the same major leap was taken by Codex. It was a completely different ballgame."

Carpenter and director Peyton Reed were brought onto the project late after the original director-DP team dropped out, making every second precious. They thought carefully about aspect ratio during a compressed prep period. A widescreen 2.35:1 frame seemed right for a Marvel spectacle, but in the end they chose a 1.85:1 image to give a little more top and bottom space to help communicate size relationships.

"We found that in the films in the past that didn't cut the mustard, part of the reason was the inability to move the camera in a way that was convincing or involving," says Carpenter. "So we looked to the commercial world, and found Rebecca Baehler, who works in tabletop and macro photography. She knows how to make things look like landscapes and she knows how to work quickly with small motion control rigs and other tools. I looked at her reel, and I thought it was fantastic."

Carpenter points out that many Marvel films take place in fantastical environments. *Ant-Man* unfolds in more mundane locales – a living room or an office building, for example. Convincing CG and a seamless blend with the live-action elements would be crucial to success. Sometimes a bit of imperfection was introduced into the CG camera movement and framing to help sell the illusion.

Colours needed to have a lived-in quality. *Ant-Man's* suit, for example, shows some wear and age. Locations in San Francisco and sets at Pinewood Studios in Atlanta, Georgia were similarly realistic.

"WITH THE ALEXA, ARRI HAS TOTALLY UPPED THEIR GAME, AND THE SAME MAJOR LEAP WAS TAKEN BY CODEX, WHICH WAS RELIABLE AND INVISIBLE" Russell Carpenter ASC

"I did some tests and found that the LUT that Trent Opaloch used on *Captain America: Winter Soldier* gave the reds in the suit a muted, slightly old feel," says Carpenter. "I made a couple of tweaks to that LUT to make sure the flesh tones were pleasing and the blacks were right, and it felt good to me. I knew I wanted to set exposure with room to move around if that was needed. The LUT gave me a safety net – I knew that if I needed to get something out, there'd still be information there."

The cameras were ARRI ALEXA XTs along with an ALEXA M, with Codex recording and media capturing Open Gate ARRIRAW. The glass included a set of Panavision Primo V lenses, which are optimised for digital sensors, and Primo and Optimo zooms. Frazier lenses and Technik Skater Scopes were also essential to get the perspective of a half-inch-tall protagonist.

It was important to Carpenter that the image his collaborators were seeing had the full richness, rather than a Rec709 representation. Digilab – now part of SHED in Santa Monica – handled the data wrangling and dailies. Stephen Ceci of Digilab/SHED worked closely with digital imaging technician Rafel Montoya and data management supervisor Kyle Spicer.

Codex Vaults were a key piece of the workflow, for data management and archiving. Marvel owns three Codex Vaults. Two Vaults were set up near the sets at Pinewood, along with 170 terabytes of storage. Initial colour timing was done with a Dolby PRM-4200, a high-end, super accurate monitor. Everything was accessible online so that VFX, for example, could get quick turnarounds without waiting for LTOs to be delivered to Technicolor. That additional efficiency was especially important given the truncated schedule.

Spicer would clean the metadata using an on-set Vault, making sure the scene and take info was correct and adding lens and other specs. Data from eight-terabyte Codex Transfer Drives was ingested to the SAN, and copied to LTO tape. Then production would get the green light to wipe and re-use the original Capture Drives.

High frame rates were an important part of the shoot, especially the macro photography. "We had an 8-terabyte day, my largest day ever, and we didn't miss a beat," says Ceci. "Data management is the concern – filmmakers want to know that their data is secure. If you can alleviate those concerns, with all the checks and balances in place, a DP and an editorial team can go back to shooting and creating the image. That's the way it should be, and it seems like we've gotten away from that over the past 15 years."

Ceci says that the macro footage on *Ant-Man* was amazing. "It was a lot of fun," he says. "We processed the material much like any other, but you don't work on a lot of shows with this amount of macro footage, with controlled rigs shooting high speed. Matching that to the main unit footage was a fun challenge."

Looking back on the experience, Carpenter says, "Codex was reliable and invisible throughout. Between what our DIT and our loader were doing, I really didn't have to pay much attention to the technical aspects!"

Ant-Man was released on July 17, 2015. According to Box Office Mojo, the film made enough money to cover its $130 million budget in the first six days of release.

CODEX+ALEXA MINI

First appearing earlier this year, ALEXA Mini has already proven to be a big hit, no doubt by combining a compact, lightweight form factor with the ALEXA's renowned image quality.

To achieve the small size whilst maintaining the quality that the ALEXA is known for, ARRI has come up with some unique solutions including a lightweight carbon housing and a solid titanium PL mount. The ALEXA Mini has a 4:3 sensor and an automatic de-squeeze mode for anamorphic productions. It can shoot at frame rates from 0.75 - 200 FPS.

Combine the Mini with any other ALEXA camera and you have perfectly matched images, even on anamorphic productions – thanks to the 4:3 sensor and automatic de-squeeze function. And once again Codex provides the glue with a common recording platform and workflow that has become the industry-standard.

Codex Multi-Camera Recorder

This new Codex Recorder is a rugged, reliable multi-camera recorder. It features 8 channels of HD-SDI input plus metadata and embedded audio, which means it can record ARRIRAW from 4 ARRI ALEXA Minis simultaneously. This makes it ideal for 360° plate shots, commercials, music videos and stunts. Its unique design incorporates a versatile cheeseplate system for the mounting of accessories.

CODEX+ALEXA SXT

Codex's relationship with ARRI dates back to the early development of the ALEXA, a camera that revolutionised filmmaking, dominating the feature film, television and commercials market.

With the ALEXA XT and the ALEXA 65, Codex became an integral part of the camera, as well as providing rock-solid workflows.

The relationship continues to thrive and Codex is excited to be working with ARRI on the latest member of the ALEXA family, the ALEXA SXT.

The ARRI ALEXA SXT (Super Extended Technology) range of cameras feature ProRes 4K output, improved image quality, frame rates up to 120FPS for most formats and enriched colour management capabilities. Once again, ARRI has relied upon Codex to provide the robust recording platform, media and workflow that their customers have come to expect. This includes the ability to use a new high capacity, high performance Capture Drive from Codex – the Capture Drive® SXR.

CODEX CAPTURE DRIVE® SXR

The Codex Capture Drive® SXR meets the requirements of the new generation of digital cinematography cameras, combining ultra-high performance solid-state storage with production-reliability in a compact package. Designed around the latest PCIe-based flash storage to deliver the fastest solid-state media available for professional media applications, it feeds seamlessly into Codex's industry standard workflows via Codex Vault and Codex Capture Drive® SXR Dock.

> UP TO 2TB OF MEMORY DELIVERING UP TO 20Gb/s BANDWIDTH > OPTIMISED FOR PERFORMANCE
> ADVANCED THERMAL DESIGN > ENGINEERED TO THE HIGHEST PERFORMANCE STANDARDS

And like all Codex media, the Capture Drives are the gateway to a straightforward, efficient pipeline from production through to post production with Codex Production Suite.

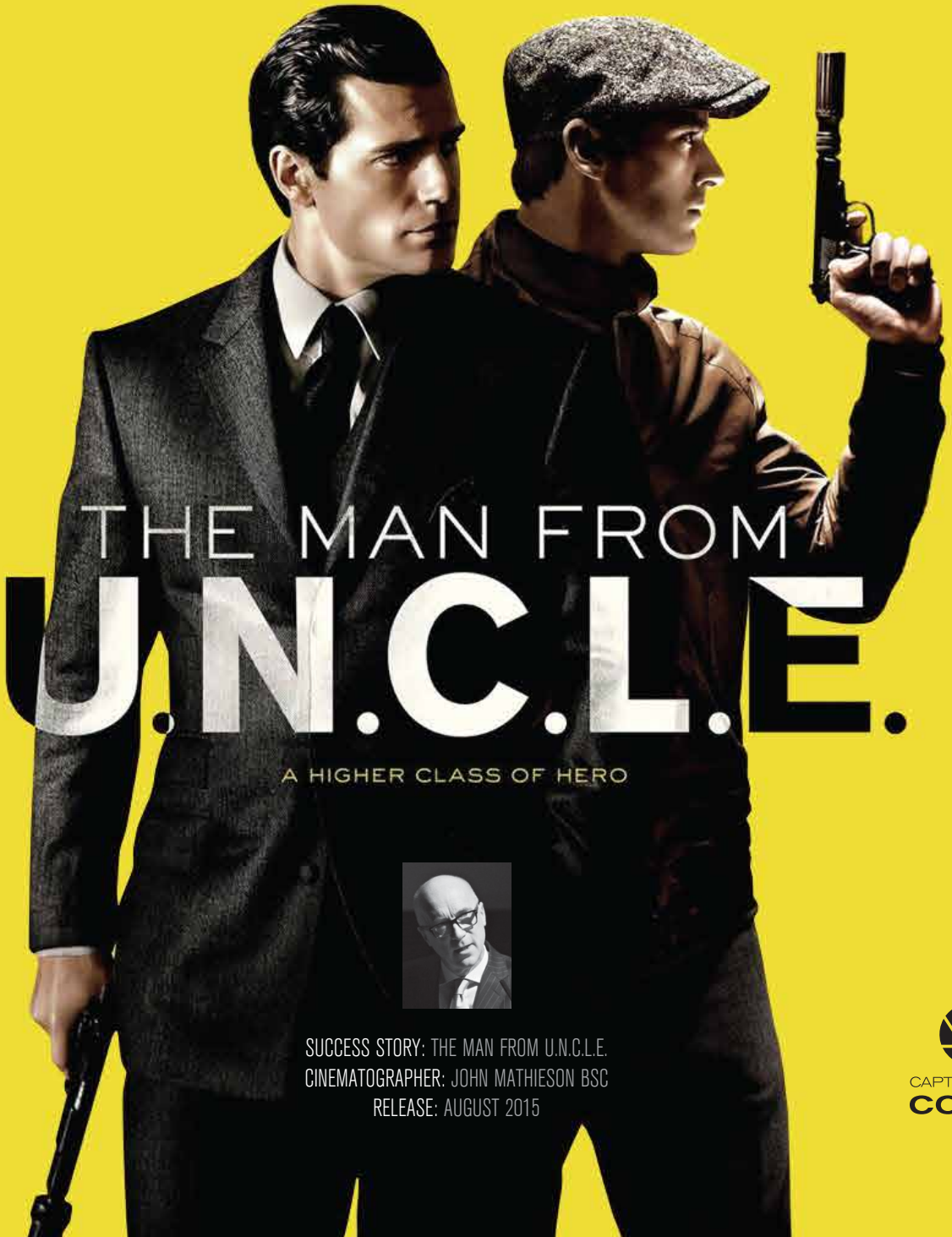
Based on new, high-performance electronics, ALEXA SXT cameras include a completely image processing chain with advanced defect pixel correction and optional noise reduction. This improves ALEXA's already renowned low-light performance, with the ability to shoot at higher EI settings. The maximum frame rate of all ProRes and ARRIRAW formats is now 100FPS, with most 16:9 formats having a maximum frame rate of 120FPS. The new range of cameras will comprise ALEXA SXT EV, SXT Plus, SXT M and SXT Studio models, replacing the current ALEXA XT cameras.

Because it's important for our customers to have longevity in our products, Codex has worked together with ARRI to provide maximum flexibility and extend the life of existing media with the ALEXA SXT. The camera can be used with four different adaptors – the SXR Adaptor, the XR Adaptor, the SxS Adaptor and the CFast 2.0 Adaptor. This means the SXT can be used with all these media types – Codex SXR and XR Capture Drives, SxS cards and CFast 2.0 cards.

Two-time Oscar nominee John Mathieson BSC (*Gladiator, The Phantom of the Opera, Robin Hood, 47 Ronin*) recently completed work on *The Man from U.N.C.L.E.,* an update of the stylish 1960s television series of the same name. The new film is an action-comedy in which Napoleon Solo (Henry Cavill) and Illya Kurykin (Armie Hammer) work to foil an atomic plot.

Regarding the film's aesthetic, Mathieson says, "It's definitely got that British invasion, early Bond sensibility – 60s pop art, a lot of plastic and polyester. Low-end technology, but good, futuristic ideals, and a good sense of design. The colours are very bold and synthetic, with E-type Jaguars and A-frame dresses. This film is kind of comic strip. At times we even split the frame. It's slightly quirky."

JOHN MATHIESON BSC BRINGS TO LIFE...



SUCCESS STORY: THE MAN FROM U.N.C.L.E.
CINEMATOGRAPHER: JOHN MATHIESON BSC
RELEASE: AUGUST 2015

CAPTURED ON
CODEX

"CODEX HAS COME FORWARD AS A STANDARD, WHICHEVER CAMERA YOU'RE ON"

John Mathieson BSC

Directed by Guy Ritchie, *The Man from U.N.C.L.E.* was Mathieson's second feature film foray into full digital cinematography. He enlisted top digital imaging technician Francesco Giardiello to help devise the workflow.

"Now that the Codex is internal, in the camera where it should be, you don't have the extra lump to carry around with you," Mathieson says. "I know my crew – the ACs and the DIT – liked it. I'm more interested, of course, in the sensor. Frankly, I don't care how it gets down the line, as long as it works."

Mathieson says that he would have preferred to shoot film, but that the demise of some of the major film laboratories in the U.K. made it impossible. He did shoot a little bit of 16mm film on a wind-up Bolex (processed at Bucks Laboratories) for the opening of the film, to bridge some archival footage from the period with the main storyline. In some ways, the colours and textures of the period production design lent themselves to digital, he says.

"Things were so boldly graphic, and slightly hyper-real at that time, so I rolled with it," Mathieson says of the decision to shoot digital. "It's quite 'up' and colourful. I applied myself to the job. It's an echo of those times. I certainly tipped my hat to the painters – Warhol and Lichtenstein – and filmmakers of that time."

He mentions classics of 1960s cinema such as *Grand Prix* (1966; cinematography by Lionel Lindon ASC), *The Ipcress File* (1965; Otto Heller BSC), and *Billion Dollar Brain* (1967; Billy Williams, BSC). In *Grand Prix*, John Frankenheimer made memorable use of the split frame technique.

Fittingly for this Cold War-era tale, the optimistic and opulent tones of the West are contrasted by drab dinginess in the Soviet-dominated East. Meanwhile, Solo and Kurykin bicker about the relative merits of decadent capitalism and communism. Later, the scene changes to 1960s Rome, another playground for Oliver Scholl's production design and Mathieson's frame.

The aspect ratio was 2.40:1. The digital sensor made it easy for Mathieson to work with a wide range of lenses, including E-series Panavision anamorphics, anamorphic zooms, longer spherical zooms, and a Technovision conversion of an older Cooke lens that delivered lots of flares and blooming. Zooming within shots was considered part of the 60s flavour, as was a bit of vignetting at the edges, which was reasonably consistent in the longer focal lengths. Whatever the lens, the final image maintained the 2.40 frame.

The Man from U.N.C.L.E. would require a workflow that would accommodate multiple sources, formats, and resolutions. Giardiello's charge was to provide maximum image quality without unduly burdening the filmmakers, and to move toward a common colour space for the accurate development of the look of the movie. The colour pipeline and workflow was based on a "classic" 10-bit RGB Log-C to P3/709 conversion, plus custom integration. "I needed to create a workflow able to accommodate both flat and scope image formats, and a range of cameras," says Giardiello. "We had to be able to put cameras everywhere, and overcrank if needed. This included aerial shots, underwater shots, body/car/bike rigs, et cetera, all running together. That meant a multitude of different colour/data pipelines that, without this workflow, we would have had to match and change on a shot-by-shot basis, every day.

"Since John decided to go with the ALEXA/ARRIRAW as the main camera/recording format, we chose the ALEXA M as the option for the aerial units, and the GoPro Hero 3 for some very specific 'hidden camera' action shots," he says. "Then, for a couple of situations, we added a Canon 5D because we needed a small underwater camera setup with which we could still mount 'proper' lenses. In other situations, a Canon C500 with a Codex S recorder was used."

Working with the Technicolor colour science department and Paul Ensby, Mathieson's longtime colourist, the team generated a colour pipeline which was mainly based on the following three elements: an input LUT, when needed, for non-LOG-C sources; an ASC CDL (colour decision list), to define the look; and an output LUT, to better define look and the overall density and to establish the gamma/colour space. Standard ASC CDL values that Giardiello generated on set shot-by-shot were introduced into the pipeline and baked into the dailies and later, used in VFX and for the DI as a starting reference.

"We used a live, one-light grading system based on ASC-CDL values that allowed John to define his look from the set in a very accurate, but simple way," Giardiello says. "It allowed John to fully convey his artistic intentions to the director and producers immediately, on-set. He could trust that the dailies would be as he intended without having to spend additional time after a long day of work, and he could build his cinematography using the on-set grading as an additional tool, as he would a light, a gel filter, a flag or camera movement. It's a harmony that has been created not just to make things quicker, but to make them better."

Giardiello has used Codex on every job for the past five years. "Codex has always guaranteed me a solid, fundamental and unrivalled instrument for my job," says Giardiello. "Capturing ARRIRAW on Codex allowed us even more flexibility on *The Man from U.N.C.L.E.* Through Codex we customised and integrated different pipelines. We created an extremely solid and reliable colour pipeline, and also it allowed us to add our custom CAMERA FORMAT metadata field that defined how the many input sources would to be handled in post, smoothing out the various procedures needed to conform the movie."

The DI was done at Technicolor in London with Ensby. "Paul has a light touch," says Mathieson. "He's got a very sensitive eye, and he doesn't go to extremes, pulling things apart. I feel that when you do a DI, it should be like a piece of music, with rhythm. If you noodle with every shot, you'll destroy all the caricature and imperfection in it, and it becomes normal. Imperfections give you your look as a DP. The danger of the moment is that there's so much photography that looks the same. So much CGI work goes in, which has a certain look.

"There's an expression: imperfection is the essence of music," he says. "You did what you thought was right on the set, at 3 o'clock in the morning. It might not be great but it was bold and it was instinctive and you were there at the time. It had a feel. Stay with that. I feel that's a better way to go, and I enjoy that more."

Mathieson is currently shooting *Knights of the Roundtable: King Arthur* with Guy Ritchie using Codex recording and media. Giardiello is the DIT. Mathieson credits Codex with bringing some order to the chaos in digital filmmaking workflows.

"With film, we had a universal standard that worked," Mathieson says. "With digital, there have been a lot of people driving wedges between us. It's really alarming when things bounce all over the place. Codex said, 'Enough of this nonsense.' What we need is a common language. Codex has come forward as a standard, whichever camera you're on."

CODEX+CANON C300 Mark II

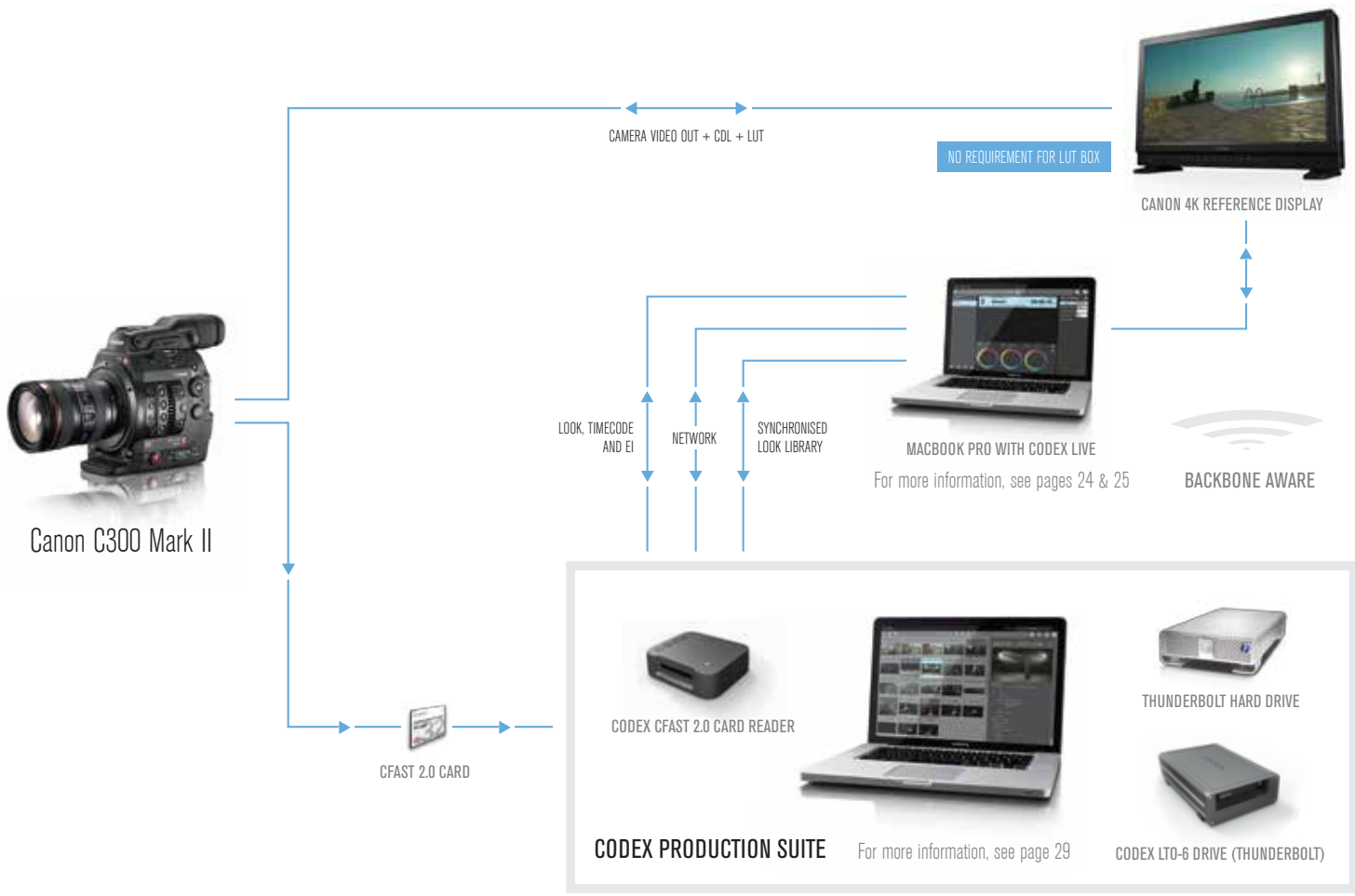
Having entered the professional cinematography market with a bang a few years ago with the Canon EOS C300 and C500, Canon is now building on their success and launching the eagerly awaited, second generation EOS C300 Mark II.

Codex is proud to continue to support Canon with Codex recording systems already used by leading cinematographers like Steven Poster ASC (*Amityville*), Rodrigo Prieto ASC (*The Human Voice*) and Shane Hurlbut ASC (*Need for Speed, Fathers and Daughters*) as well as going into space on the International Space Station for the Disney/IMAX production tentatively titled *A Perfect Planet* with DP James Neihouse. Now we are announcing an entire dailies and archiving system for the C300 Mark II.

The redesigned imaging system in the Mark II includes a newly developed 8.85 Megapixel Canon Super 35mm 16:9 CMOS image sensor that supports up to 4K (DCI) recording with a maximum resolution of 4096 x 2160 pixels. It has a wider colour gamut, supporting Rec. 2020 for UHD TV and P3 for digital cinema. Other new features include 4K/2K/Full HD internal and external recording (including 4K RAW output), sophisticated auto-focus and a new 10-bit Canon Log 2 Gamma.

Director Brett Danton is one of the first people to shoot with the Mark II, going to Mykonos with DP Ashleigh Carter to shoot a short promotional piece for Canon. Check out the stills below. "The C300 Mark II is a huge step forward – everything from the camera to the workflow worked out of the box. The auto-focus is astounding. This camera truly brought the fun back to filmmaking!"

CANON C300 Mark II + CODEX WORKFLOW WITH MACBOOK PRO



Codex fully supports Canon's new XF-AVC format, a MPEG-4 AVC/H.264 video compression format which provides a high data compression rate without sacrificing image quality. Combine this with an efficient, reliable workflow, and you have an ideal scenario for productions of every size and budget. Codex Production Suite on a MacBook Pro is a fully-featured dailies and archiving system in a small footprint that can travel wherever you need to be.

CFast 2.0 Workflow

With CDL-based colour grading, metadata tools, QC and audio sync, Codex Production Suite has everything you need to produce a full range of deliverables on-set or near-set. Codex Live adds on-set CDL-based look management and syncs seamlessly with Codex Production Suite. For archiving, add a Codex Thunderbolt LTO-6 drive. And it all connects seamlessly to Codex Backbone so that production elements and metadata can be securely accessed, viewed and edited by authorised users.

"CODEX IS A ROCK-SOLID PLATFORM AND WORKFLOW, BACKED BY WORLD-CLASS SUPPORT"

James Neihouse

HALO 5

CAPTURED ON CODEX

GOES 65

When it comes to feature film cinematography, Jess Hall BSC is a fan of 35mm film emulsion, having done a range of projects including *The Spectacular Now*, *Creation* and *Transcendence* on film – the latter with a full photo-chemical finish. But Hall often shoots digital cameras on a range of commercials, where he has worked with high-calibre directors including Spike Lee, Guy Ritchie and Rupert Sanders on spots for clients like Nike, BMW and Gatorade.

Hall's most recent commercial assignment was for Microsoft's *Halo 5: Guardians*, a sci-fi shooter video game for Xbox One.

Hall, reteaming with Sanders, was intrigued by the possibilities of the ARRI ALEXA 65. Launched in late 2014, the camera features an image sensor that is slightly larger than a 5-perf 65mm film frame. Cinematographers say that the format captures a perspective that is closer to that of the human eye. Combined with 6K uncompressed ARRIRAW image files facilitated by onboard Codex recording, the result is intense and enveloping imagery.

"To me, the ALEXA 65 seemed like a very natural place to go for the commercial," says Hall. "The Halo 5 game is an experiential video game with graphics that are hyper-real and so sophisticated. To show those images to an audience, you want picture quality that is that good or better. The larger format lends itself to that level of clarity. At the same time, as someone who has shot a lot of anamorphic, working with shallow depth of field was very appealing to me. Also, I'm a big fan of ALEXA because I like the way it renders colour. The colour space has a naturalism and subtlety that is very pleasing, if lit correctly, for a digital camera. Because it's an ALEXA, the camera felt very comfortable and familiar."

The Halo 5 spot was shot in extremely bright, hot and dusty conditions near a disused mine in the Santa Clarita Valley, north of Los Angeles. The challenging environment made it a good road test for the camera. Because it was a brand new camera at the time, Hall shot simultaneously with a standard ALEXA XT. But the ALEXA 65 performed flawlessly. "Right off the bat, from the first frame, we just fell in love with the images that were coming out of the camera," says Hall.

Hall chose older lenses with Hasselblad glass and an impressive pedigree – they were used by Vittorio Storaro ASC AIC for the 65mm sequences in *Little Buddha* (1993).
"Storaro used them for the meditational scenes in that film because he had the idea that they should be clearer than reality, in a way," says Hall. "I thought that quality would be right for drawing people into this hyper-real video game experience. I also found that the older lenses smoothed things out in the production design and produced interesting orange and blue flares."

Hall operated the ALEXA 65, often using an EasyRig to support the somewhat heavier camera while he clambered over the difficult, uneven terrain. He emphasised lower angles to lend gravitas and an imposing feel to the characters.

Iris control and focus were remotely controlled via wireless, giving Hall complete freedom of movement. Onboard recording was an advantage, in part because the movements of the character and the camera were designed to feel spontaneous and not overly precise.

"A video game is of course a very engineered journey, but it shouldn't feel that way," says Hall. "Halo is introducing a new dynamic to the characters. So the spot needed to be about reacting to a performance, and letting that performance have life. The camera needed to feel like it was capturing the action as it was happening, without being rigid or planned."

Illumination was almost completely existing, natural sunlight. Front light was avoided. The shot list was carefully tailored around the position of the sun, with wide shots scheduled for low sun, and close shots that could benefit from overhead flagging and diffusion planned for the middle of the day.

The main character was generally centre-framed and often kept in dark shadows by overhead negative fill, while the environment he's navigating is lit with strong sunlight, contrasted by hard-edged shadows that are softened by smoke and dust.

Surprisingly, the spot includes no green screen work. Skies and some deep background elements were added with rotoscoping techniques, but the foreground, mid-ground and fire and smoke elements were real and captured in the camera, for the most part. Initially, Hall checked a 4K monitor as he worked, but a couple hours into the shoot, he was working by eye.

"Even though we were not finishing in 6K or even 4K, the additional resolution was very useful for visual effects," says Hall. "My idea was to utilise it in a similar way to how VistaVision is used in the effects world for plate work. I was intrigued by the idea and keen to test the process of scaling down in resolution. I love the quality of small old photographic prints that have been made from larger negatives, there is a level of detail there that is intriguing, that draws the eye in without feeling too sharp. I saw a lot of possibilities there and wanted to experiment."

With two days to shoot two entire spots, Hall had his hands full. He was ably assisted by digital imaging technician Alex Carr, who worked with Claudio Miranda ASC on *Oblivion* and *Tomorrowland*. Carr owns a Mercedes Sprinter van, which he prefers to use in place of a DIT tent when locations are brutal and unforgiving.

"The Halo set was perfect for the Sprinter setup," says Carr. "There was constant wind and dust, which can make it hard for specialised equipment to work efficiently."

Hall agrees. "With all the dust and smoke and everything that we had at that location, it was a brilliant idea," the cinematographer says of the Sprinter van/DIT enclosure. "That gave Alex a little incubated environment to work in."

Carr was intrigued by the prospect of working with the ALEXA 65. The experience, he says, was in some ways quite similar to working with a standard ALEXA XT – live grading, camera settings, reloading – but in other ways, quite different. Downloading, archiving and dailies prep of the high resolution files required some adaptation. All equipment was rented from ARRI Rental.

Carr used Codex Vault, a compact, secure, all-in-one workflow solution for download, backup, dailies, archiving and other near-set lab applications.

"I tested Codex Vault with the ALEXA 65 on an extra prep day and figured out how to maximise the download," says Carr. "Once I was able to import media into ColorFront OSD, I knew any deliverables would be just like any other camera and its workflow."

After receiving the Codex Capture Drive, Carr would ingest into Codex Vault and would process the material into 6K ARRIRAW files. After processing, he would download over 10GigE to his workstation, and copy to the production's backup drives. Meanwhile, he worked on colouring and transcoding. Media was viewed in 4K resolution. Carr's workstation has a 12TB SSD Raid, and distributes bandwidth to multiple processes simultaneously, giving him the ability to work on several pieces of media without waiting to access any media.
"I used ColorFront OSD to import, grade, then export editorial files," says Carr. "It was interesting playing back 6K down-sampled to 4K. That took every bit of horsepower available in my custom PC system. Even transcoding to editorial files and VFX files used every bit of horsepower available.

"On set, the ALEXA 65 is very easy to use. With Jess, I try to stay very technical and provide a solid workflow to give him as much creativity as possible. I would watch exposure, then grade the ARRIRAW for Jess to come in to look. Overall, working on set with the ALEXA 65 was almost the same as working with an ALEXA XT."

Carr adds that the 65mm format requires careful consideration in terms of lighting. "And I would highly suggest giving your focus puller plenty of time for marks!" he says. *The Halo 5: Guardians* spots started airing in late March, and have garnered millions of online views.

Looking back on the shoot, Hall says, "Working with a camera with such high resolution made sense given the video game graphics kids are exposed to. It was great using a system that could stay in step with that imagery while allowing us to work with creative flexibility. I'm looking forward to the right opportunity to use it on a feature."

"IT WAS GREAT USING A SYSTEM THAT COULD STAY IN STEP WITH THAT IMAGERY WHILE ALLOWING US TO WORK WITH CREATIVE FLEXIBILITY. I'M LOOKING FORWARD TO THE RIGHT OPPORTUNITY TO USE IT ON A FEATURE." JESS HALL BSC

SUCCESS STORY: HALO 5: GUARDIANS
CINEMATOGRAPHER: JESS HALL BSC
RELEASE: MARCH 2015

CODEX ACTION! CAM

Whether you're making commercials, TV or movies, sometimes your camera package is just too big for the situation or location you're trying to shoot in.

Codex Action Cam was recently used on the worldwide blockbuster *Mission: Impossible – Rogue Nation.* Although mostly shot on film (with ALEXA 65 and Codex being used for the underwater scene), the compact size of Action Cam made it indispensable on a couple of key sequences. The first is when CIA operatives raid Ethan Hunt's apartment in Cuba, which used Action Cams as helmet cams. The second is the key motorbike chase sequence, racing through the mountains of Morocco.

Hand-held, attached to a bike helmet, or one of seventeen Codex Action Cams in a 360-degree rig, Codex Action Cam has been a go-to solution over the last year.

Codex Action Cam itself is a tiny remote head camera for shooting at up to 60fps but it's not just a camera – it's a complete shooting, capture, transcoding and data management solution for situations that require a compact form factor and low weight, without compromising on image quality. It comes packaged with the Codex Camera Control Recorder, providing full remote control of the camera plus the proven, industry-standard Codex workflow.

Phedon Papamichael ASC GSC, Claudio Miranda ASC, Linus Sandgren, Stijn Van Der Veken ASC SBC – these world-class cinematographers and more have already used Action Cam all over the world for feature films, commercials and promos, confident that the images will cut in seamlessly with other cameras without compromise.

Antonio Riestra AMC

Antonio Riestra AMC recently used Action Cam in combination with ARRI ALEXA XT on the suspense movie *Stephanie,* directed by Akiva Goldsman. He needed a camera that would fit where a regular camera body wouldn't and that would integrate well with ALEXA. Its size and weight mean that it's easy to operate handheld (literally!) The camera head itself is so small that, in essence, he had a lens that could go wherever he needed it to.

KEY FEATURES

> Lightweight and compact
> 2/3" Single Chip Sensor with global shutter
> Synchronises with ARRI ALEXA, Sony F65, F55, and F5
> Excellent high-definition image quality at up to 60fps
> Wide dynamic range
> C-mount with EF, PL and B4-mount options
> Reliable and robust Codex recording and workflow

"WE USED A PL MOUNT ON IT SO WE KEPT CONSISTENCY WITH OUR LENS PACKAGE AND WERE ABLE TO MATCH COLOURS. IT WORKED GREAT FOR US."

Antonio Riestra AMC

TECHNICAL SPECIFICATIONS

Compact Package The Action Cam camera head measures just 45 x 42 x 53mm. The Codex Camera Control Recorder is only 83 x 139 x 188mm.

Extended Dynamic Range With a 12-bit RAW output and Codex's industry-leading debayering, Action Cam has 10.5 stops of dynamic range and performs well in most lighting conditions.

Lightweight and Flexible A single co-ax cable (up to 180m), connects the Camera Control Recorder and Action Cam head, carrying video, control signals and power.

CCD Sensor Technology Action Cam uses a 2/3" CCD sensor, providing great light sensitivity, signal-to-noise and temperature stability.

Global Shutter No distortion of fast moving objects or other temporal artifacts.

Native S3D For easy 3D production, connect two camera heads to the Codex Camera Control Recorder, and the signals undergo exactly the same image-processing.

Upgraded C-Mount Easy and accurate back focus, making it possible to use C-Mount lenses for professional production.

CAPTURED ON CODEX

ACTION CAM CAPTURES A JOURNEY OF LOVE FOR 'DREAM ESCAPE'

Oscar-nominated cinematographer Phedon Papamichael ASC GSC deployed dual Codex Action Cam packages on a branding project for the Infiniti QX50 luxury compact SUV.

Using the tiny Codex Action Cams to shoot handheld location and road footage himself, Papamichael discovered new-found freedoms and creative cinematographic possibilities, and that the high-quality Action Cam imagery inter-cut perfectly with the 4K footage from the principal cameras on the production.

Papamichael, who is best known for big-screen cinematography on movies including *The Descendants, The Ides Of March, The Monuments Men* and *Nebraska,* which brought him an Oscar nomination in 2014, often shoots and directs commercials, where he can lavish attention on each moment and try out the very latest gear. It was in that vein that he shot and co-directed the branding film for the Infiniti QX50 incorporating Codex Action Cams.

In the film, Chinese superstars Archie Kao and Zhou Xun portray a couple who decide to break the rules during a typical car shoot, and get a taste of freedom in the new SUV. Chased by paparazzi on motorcycles, they abscond to the Griffith Observatory, where they evade the pursuit by going off-road in Griffith Park. Other scenes were shot in the high desert near Mojave, and at Zuma Beach north of Malibu, where they frolic on the sand, shooting movies on their cellphones. They eventually return the car to the soundstage, where the frustrated director looks at the cellphone footage of their escapades.

The film was directed by Jaume Collet-Sera, through production company Bullitt. Papamichael took over directing duties on the final day of the five-day shoot, which involved beauty stage-work of the vehicle. The toolkit, mainly provided by CamTec in Burbank, included two RED Dragon cameras, a drone mounted with a Panasonic Lumix GH4, an Edge vehicle and crane, three Canon 6Ds shooting time-lapse footage, plus two Codex Action Cams.

"We initially added the Codex Action Cams to our camera package for travelling car logo/badge shots and other moving details," said first AC Jeff Porter. "But when Phedon and Jaume saw that you can literally hold the Action Cam head in the palm of your hand, they wanted to play. They saw an opportunity to shoot unscripted, spontaneous moments with the actors driving in the Infiniti SUV."

seat, I could hold Action Cam out the window and point it through the side window of the front seat, getting a hostess-tray-type shot. I could rake the car and get the actress's reflection in the rear-view mirror. We were working quickly and winging it. There's a lot of shaking and bumps in there, but it definitely made for some usable shots that we could never have gotten otherwise."

Codex Action Cam is a tiny remote camera head that shoots up to 60fps. With a single co-ax cable to the Codex Camera Control Recorder, it delivers a proven workflow. It uses a 2/3" single-chip sensor with a global shutter to capture 1920 x 1080 RAW images with wide dynamic range. Papamichael appreciated the Action Cam's compatibility with professional grade cine lenses – in this case he opted for Super 16-format Zeiss Superspeeds, with a C-mount-to-PL-mount adaptor.

"I could roll the iris with one finger," added Papamichael. "The little monitor was laying on my lap and I could pull my own focus to a degree. I would open it up and get the image flared out, or we'd come out of a tunnel and I'd roll the iris closed. People are excited about the footage we got. I'm thinking that with short edits, it will integrate pretty well with the RED footage we shot. Action Cam gives you a lot of possibilities – and it's certainly a fun option to play with."

The Action Cams recorded RAW CDX 1920 x 1080 files that Codex Tech Nick Lantz converted to 10-bit DPX files. For the most part, a rate of 25fps was called for, as the commercial is meant for broadcast in China, although Papamichael sometimes shot up to 50fps. The RED cameras were set up to capture images at 4K resolution with 5:1 compression. Papamichael used Optimo zooms on these cameras in part because he likes the way they flare.

"WE LITERALLY HELD THE CAMERAS WITH ONE HAND AND WENT FREE-DRIVING WITH THE ACTORS"

Phedon Papamichael ASC GSC

However, limited space inside the car meant there was no room for camera operators or focus pullers. Consequently, Papamichael and Collet-Sera were given small, handheld monitors, and quickly instructed in how to operate the Codex Camera Control Recorder.

"We literally held the cameras with one hand and went free-driving with the actors," said Papamichael. "Because we used these small cameras, we were able to get probably 100 set-ups on a 30-minute drive. It was great. From the back

"The beautiful moments that Phedon and Jaume captured of Archie and Xun with the Codex Action Cams could not have been achieved with a process trailer, or with a camera operator and focus puller jammed into the front seat," said Porter.

"The images are simply amazing. For previous car and motorcycle commercials, Phedon and I have used a variety of other small cameras, such as the Novo 2K, BlackMagic Pocket Camera and GoPros. But the Codex Action Cam is by far the best. Besides its amazing image quality and low light capability, it is the only one of these cameras that has a global shutter, which virtually eliminates the wobble or jello-effect we've experienced when we have mounted cameras with rolling shutters onto vibrating cars or motorcycles."

Papamichael most recently shot *The Huntsman,* a Brothers Grimm-based feature film starring Emily Blunt, Jessica Chastain, Chris Hemsworth and Charlize Theron.

SUCCESS STORY: DREAM ESCAPE
CINEMATOGRAPHER: PHEDON PAPAMICHAEL ASC GSC
RELEASE: 2015

CAPTURED ON
CODEX

CODEX TAKES THE VR STRAIN

Virtual Reality (VR) has opened up a wide range of opportunities for innovation and storytelling, both for manufacturers and for those brave early adopters that are rewriting the book on how to use this new toolset. Codex is excited to be working with one of these innovators, cinematographer Andrew Shulkind.

As well as being a successful DP, Andrew has always enjoyed experimenting with new and unique movie-making technologies, whether it's lighting, cameras, lenses or workflows.

HEADCASE

LIVE-ACTION VR AT COMIC-CON, FOR FX NETWORKS

Can you give us an overview of Headcase and what you do?
Headcase is a collaboration of filmmakers and storytellers. We have varied backgrounds – writing, producing, directing, shooting for movies, commercials and sports – but we share the common goal of bringing a cinematic approach to the burgeoning world of 360° content. One of the partners is Lucas Foster, a producer known for action movies like *Mr. and Mrs. Smith* and *Crimson Tide*, another is Jim Langois, who came up as an editor with Michael Kahn. Other partners have backgrounds in visual effects, the world of sports, and sports marketing and we are working in close partnership with John Fragomeni and Andy Cochrane at Mirada. So Headcase brings a wide range of experience to this new frontier.

ON DESERT LOCATION FOR CAR SHOOT

THE HEADCASE CINEMA CAMERA

Tell us a bit about your background.
I'm a commercials and features cinematographer for a range of big brands and established and up-and-coming directors. These days visual effects play a substantial role in most projects and I get most excited about ambitious projects that push some boundary. I got started in this business as a camera assistant, working for great cinematographers like Darius Khondji ASC AFC, Janusz Kaminski, and Don Burgess ASC. I was always inspired by the way that these cameramen would use technical tools to create high art. That template continues to inform how I approach every job.

Why are you so interested in new technologies and what sparked your interest in VR?
I'm not necessarily a techhead, but I'm always looking for technical and creative solutions to the range of challenges that present themselves on-set when stakes are high, but not just for the sake of using something flashy. You might say that I am a circumspect early adopter; there are always fun and fresh ways to approach the work and the intersection of technology and creativity is what has always drawn me to cinematography. I was fortunate to learn from the best, working my way up right out of art school for the top cinematographers in the business. These days we are faced with new technologies that are constantly eating themselves and we get to employ a lot of these in commercials. So prior experiences with tiny cameras, 3D, shooting some of Apple's earliest material for the iPad and similar experiences primed me perfectly for thinking in this immersive way. When we joined forces to create Headcase, it was a natural fit and a welcome challenge. Virtual Reality is a unique parallel medium that forces us to think anew about the way that people are engaging with content and with each other. The future is now.

What are some of the challenges in shooting for VR?
Because this is such a new arena, and because many in the space are coming from an engineering background (as opposed to filmmaking), we are constantly modifying and overcoming challenges – some can be solved by technology, some are more to do with shooting in a 360° environment. For example, on a recent job, we had to dress my camera operator in wardrobe because it was impossible to avoid them being featured in the shot. From a technological standpoint, it was important to find small cameras that produce high quality images – that was a challenge we've overcome. Monitoring is definitely still a challenge. You can look at all the multiple video streams individually or on quad-split monitors but that obviously is missing the immersive piece. So we are finalising a live stitch for on-set viewing which we call our semi-stitch and working with two different partners to customise a solution here. That's a big step forward.

Why did you decide to work with Codex on a camera solution?
I was already very familiar with Codex and their range of recording, media and workflow products and I knew that their gear was not only always cutting edge but also very reliable and my favourite tool for recording RAW out of the ALEXA. When I first heard about Codex Action Cam, I was very excited. I immediately saw that it could be a great fit for VR projects because it combines three factors that are critical for this kind of work – small size, high quality images, and a robust workflow. We were able to build a 17-camera rig and have all the cameras sync together with matching timecode while encoding metadata. This is very useful for us in the post production flow. And the quality of the image certainly makes the stitching process a lot easier. We call the rig the Headcase Cinema Camera.

Can you talk about some of the projects you've been involved in?
There has already been a wide variety, some of which I can't discuss yet. One that I can talk about is a live-action VR project for FX Networks that was revealed at Comic-Con in July. It's a two and a half minute piece for Guillermo Del Toro's *The Strain,* which makes the participants feel like they are trapped in a warehouse within the story. Interestingly, the experience included a group of six people with synchronised goggles. For shooting, we used the 17-camera rig with Codex Action Cams.

"CODEX ACTION CAM IS AN ESSENTIAL BUILDING BLOCK IN OUR SYSTEM."
Andrew Shulkind DP and VR pioneer

'THE STRAIN' WAREHOUSE, COMIC-CON 2015

Is the Headcase Cinema Camera available for rental?
Yes, it's available for rental through Radiant Images in Los Angeles. Along with Codex, they've been a critical partner in this venture. We do a lot of consulting on these early projects, whether or not I'm the DP.

And finally, what do you think the future holds?
The cinema experience of the future will certainly change – more people today are consuming content on smaller screens and the worlds of cinema and gaming are continuing to merge. No one who puts on the headset thinks that VR is a fad – it's undoubtedly a part of the future entertainment experience. I think many years down the line we'll think that the idea of ever having composed for a rectangular screen was cute.

PANASONIC VARICAM 35 | CODEX V-RAW

"When Panasonic announced that Codex would be their RAW recording solution for the VariCam 35, we were very excited - we've worked with Codex recording and workflow technology for several years now and they have great, reliable products backed by excellent support."

Michael Condon SOC, VP Digital Division, Clairmont Camera

4K is now a viable consumer entertainment platform, whether in the cinema or in the home with 4K televisions and content providers like Netflix and Amazon distributing 4K content. Panasonic has stepped up to the plate with their 4K digital cinematography camera, the VariCam 35. And even if HD or 2K are your delivery format, acquiring in 4K RAW or higher produces stunning imagery, plus your content is future-proof.

The Panasonic VariCam 35 camera is a 4K camera with a newly developed Super 35 image sensor and a modular design. The sensor size is 4096 x 2160 (17:9) for 4K image capture. With 14+ stops of latitude, this new imager captures high-contrast, wide dynamic range imagery without compromise with the V-RAW format. To maximise the dynamic range of the recorded images, Panasonic has developed a new log curve (V-Log), which maps the 14+ stops of image data to the recorded file.

Colour management capabilities include an extended colour gamut, with support for an Academy Color Encoding System (ACES) workflow. ACES is also fully supported by Codex workflow products. For recording the uncompressed 4K V-RAW output at up to 120fps, as well as an efficient, industry-standard workflow for dailies and archiving, Panasonic naturally turned to Codex. Taking advantage of the VariCam 35's modular design, Codex has designed the V-RAW Recorder to bolt on the back of the camera, eliminating the need for any cables. Power is supplied to the camera via the recorder and the recorder also has three 12V accessory power outlets, adding flexibility and usability to the camera/recorder combination.

Codex V-RAW Recorder Specification

Interface	Direct Attach Module	Control	Camera
Recording Media	Codex Capture Drive® 2.0	Maximum Frame Rate	120fps uncompressed RAW
Recording Formats	4K RAW, 4K UHDTV RAW, uncompressed 12-bit up to 30fps, 10-bit beyond 30fps up to 120fps	Metadata	Camera metadata only
		Weight	3.3lbs (1.5Kg)

Codex Complete Workflow

Codex also provides a rock-solid workflow for Panasonic's AVC-Intra format as well as RAW so when you shoot with the VariCam 35, you don't need anything else. QC your images, clean your metadata and archive your RAW or AVC-Intra files, and then quickly transcode to whatever deliverables you need. Each format can be generated with and without LUTs and burn-ins as required, and with all the associated sidecar formats and metadata. Codex Production Suite includes look management with primary CDL-based colour grading plus a simple but sophisticated audio sync tool.

Add full integration with Codex Media Vault via Codex Backbone and you don't need anything else to smoothly manage your production from the set into post and VFX.

CODEX CAPTURE DRIVE® 2.0

Capture Drive® 2.0 (available in 1 TB and 2 TB capacities) is designed around PCIe-based flash to deliver the fastest solid-state media available for professional media applications. It combines ultra-high performance solid-state storage with production reliability in a compact package.

> UP TO 2TB OF MEMORY DELIVERING UP TO 20 GB/S BANDWIDTH
> ENGINEERED BY CODEX TO THE HIGHEST PERFORMANCE STANDARDS
> ADVANCED THERMAL DESIGN > RECORDS UNCOMPRESSED 4K RAW AT UP TO 120 FPS FROM THE PANASONIC VARICAM 35

The Codex Capture Drive® 2.0 is the gateway to the production-proven Codex workflow through Codex's Production Suite, which is available on Mac Pro and MacBook Pro as well as Codex Vault S-Series and XL-Series hardware platforms. Vault is used around the world by all kinds of productions, on-set, near-set or in post production facilities and backed up by our world-class 24-hour support team.

"Panasonic couldn't have chosen a better partner for RAW recording and workflow for the VariCam 35. Codex's products are cutting-edge and backed-up by world-class customer support."

John Sharaf, Atlanta-based Cinematographer and Rental House Owner

Codex V-RAW Recorder

The V-RAW Recorder for the VariCam 35 continues Codex's tradition of providing not just the most reliable recording and media, but also a streamlined workflow from production to post and archive for features, commercials and television. Specifically designed for the VariCam 35, with more than enough bandwidth to handle 4K at up to 120fps, the V-RAW recorder records onto Codex Capture® Drive 2.0, the highest-performance, commercially available media.

CODEXLIVE

COMMAND&CONTROL

Featuring an easy-to-use UI, Codex Live is available in two versions, Pro and Premium.

Codex Live Pro allows you to work directly with the live camera feed over HD-SDI to create and preview looks and grades that can be used to communicate the creative intent on-set and as a starting point for dailies and post production. Looks can applied automatically when generating deliverables via Codex Production Suite, or can be exported in various formats (ASC-CDL, 3D LUTs) so that they can be applied in other software. Codex Live works seamlessly with Tangent panels interactive colour grading, the Fujifilm IS-mini, a 3D LUT box for on-set camera preview, and the Canon DP-V3010 4K Reference Display.

For single or multi-camera and recording control, as well as the LUT and grading tools in Pro, upgrade to Codex Live Premium. Codex Live Premium is at the centre of your on-set workflow.

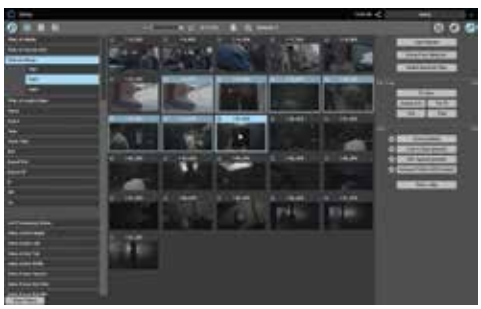
"Look design is a critical creative component of any film production. I want to get involved before a production even starts shooting. Talking with the DP and story tellers in advance really helps to best understand what the creative vision of the film will be. At SHED in Santa Monica, we use Codex equipment throughout. Codex Live is a great tool for initial look design and managing the looks that we start with all the way from pre-production camera tests to the final colour we achieve in the finish." Yvan Lucas, Founder SHED

Codex Live is fully synchronised with Codex Backbone where the look-related metadata is securely managed in the "Look Library" for collaborative use in the creation of dailies and then onwards into post production and VFX. It's also fully compatible with Codex S-Series, XL-Series, and Vault for OS X.

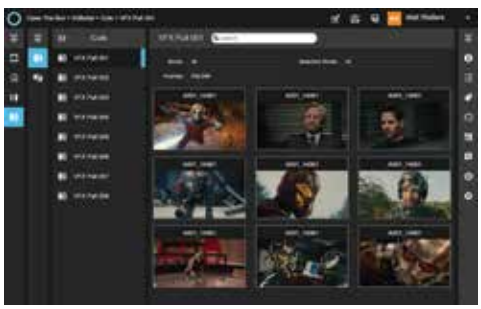
EXCHANGING LOOKS

The look will be applied to the recorded material automatically during playback so that it can be seen on-set.
When a look is sent to the LUT box the settings are saved and marked with the current timecode and the exposure index (EI).

Codex Live



Codex Vault



Codex Backbone

Codex Live synchronises saved looks with Codex Vault

> When the media is offloaded, Vault checks the timecode and EI of each clip. It then finds the look that was applied to the corresponding LUT box at that time and puts the look info in the clip's metadata.
> The look can then be applied automatically when playing back in Codex Review or when generating deliverables.
> Codex Review will also pick up the settings and allow further tweaking of the colour parameters during dailies review.
> The look can also be exported in various formats so that it can be loaded into other software for dailies and colour grading.


ARRI ALEXA XT/SXT/65


ARRI AMIRA


ARRI ALEXA Mini


Codex Action Cam

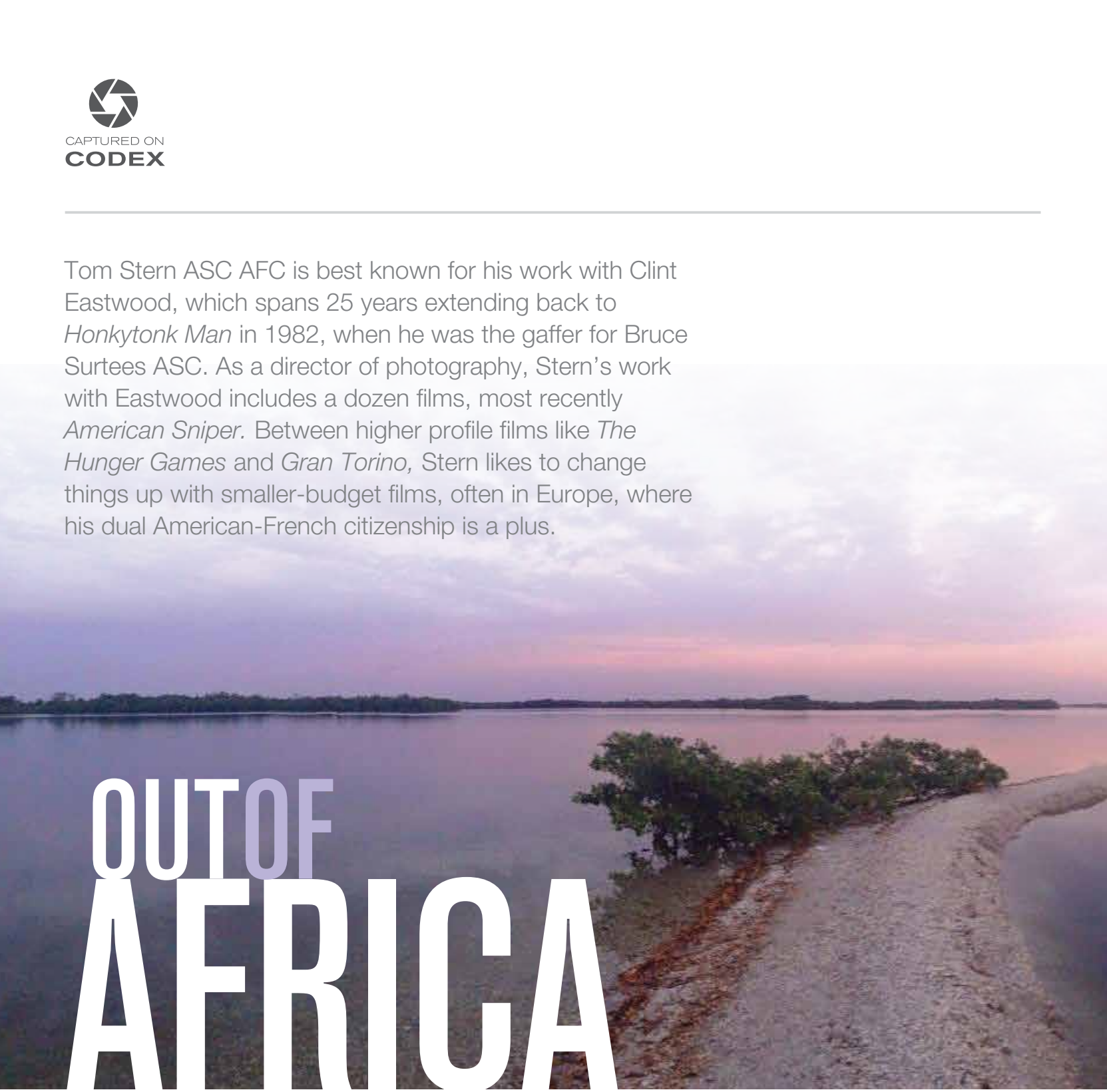

Canon C300 Mark II/C500


Panasonic VariCam 35


Sony F5, F55, F65

CODEXLIVE LOOK MANAGEMENT

Tom Stern ASC AFC is best known for his work with Clint Eastwood, which spans 25 years extending back to *Honkytonk Man* in 1982, when he was the gaffer for Bruce Surtees ASC. As a director of photography, Stern's work with Eastwood includes a dozen films, most recently *American Sniper.* Between higher profile films like *The Hunger Games* and *Gran Torino,* Stern likes to change things up with smaller-budget films, often in Europe, where his dual American-French citizenship is a plus.



OUT OF AFRICA

Most recently, Stern lent his talent and experience to a film titled *Cessez-le-feu* (Cease-fire).

SUCCESS STORY: CESSEZ-LE-FEU
CINEMATOGRAPHER: TOM STERN ASC AFC
RELEASE: 2016

"I enjoy working on that kind of project, in addition to what I do with Clint," he says. "It's very refreshing. I love doing a Hollywood film, and then going to Russia or France to make a film. There are different ways to make films. We in America are not the only people who make movies. In other countries, given the size of the market, films are made for a different price. As a result, filmmaking is done differently. It's interesting to see what you can do without."

Most recently, Stern lent his talent and experience to a film titled *Cessez-le-feu* (Cease-fire). One of the producers, Gilles Waterkeyn, had worked with Stern a few years back on *Nuits Blanches* (a.k.a. Sleepless Nights) and the connection helped bring Stern to the new project. Some additional scenes were also photographed by Yann Maritaud.

The director, Emmanuel Courcol, was a successful screenwriter making his feature film debut. The cast was led by Romain Duris, who was nominated for a 2011 César for his role in the visually innovative *The Beat My Heart Skipped.* (Stephane Fontaine took home a César for cinematography on that film.) Ambitious in scope, *Cessez-le-feu* is set mostly in 1923, when Georges Laffont, a World War I hero who lost his brother in the conflict, attempts to escape his traumatic past and heal, by travelling across France to Africa, where he bonds with an African warrior and his family. He eventually forms a difficult relationship with a sign-language teacher. Locations included the French city of Nantes as well as desolate yet picturesque locations in Senegal and Burkina Faso in northwestern Africa, south of the Sahara.

Stern says that conditions were challenging. The camera was an ARRI ALEXA XT with Codex recording, media and workflow, and the format was spherical.

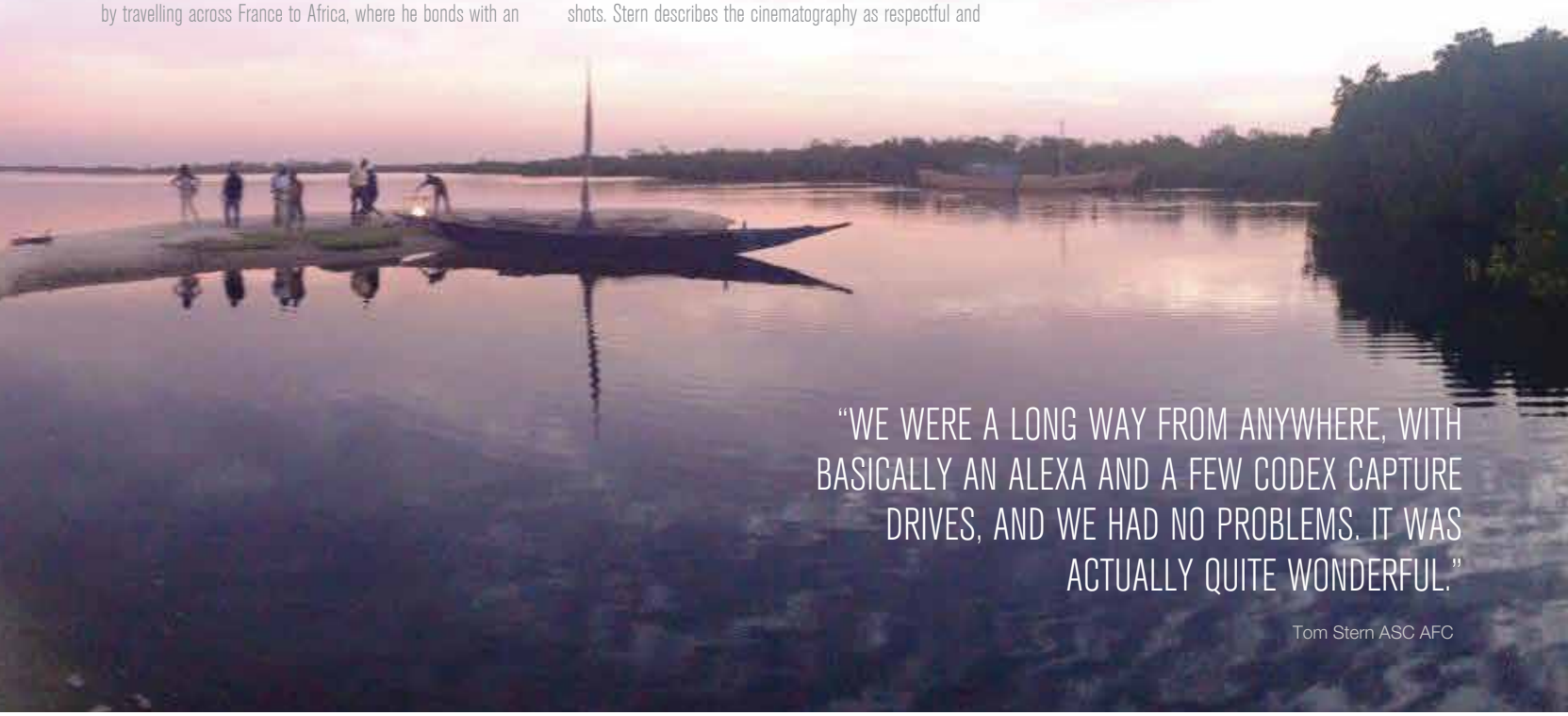
"We started out in the Sahel Desert," he says. "The roads were bad – it's a developing part of the world. We did it in a very guerrilla way, and I was a bit nervous, but it worked. We had no DIT and no data management. We had drives bouncing around in the back of these trucks, and every night one of the PAs would back them up into standard towers. We would wipe the drives the next morning, which meant we didn't need as many drives as we use when we're working in Los Angeles. We never had any problems."

Stern led a crew that included a camera operator, first and second assistants, and a French gaffer. The grip crew was mostly local. The lenses included a set of ARRI Ultra Primes and a long Optimo zoom for B camera and scenic landscape shots. Stern describes the cinematography as respectful and objective, in keeping with the period story.

"What intrigued me was making a film without Technocranes and all that heavy lifting," he says. "One, the budget would not have supported it, and two, it was interesting to be as essential as possible in our work. I had everything I needed." The images were captured in the ARRIRAW format on Codex Capture Drives, which was important to Stern. "I like to have the depth when I get into post production," he says. "I'm always shooting for theatres, and I think you get better quality. We were a long way from anywhere, with basically an ALEXA and a few Codex Capture Drives, and we had no problems. It was actually quite wonderful."

Cessez-le-feu is currently in post production. Stern is busy prepping his next film with Eastwood. Titled *Sully,* the movie tells the story of Chesley "Sully" Sullenberg, who successfully piloted an Airbus 320 to a safe emergency landing on the Hudson River in 2009. Sullenberg, who is credited with saving 155 lives, is rumoured to be played by Tom Hanks.

Stern plans to shoot the film with ARRI ALEXA XT and ARRI ALEXA 65 cameras. Both utilise Codex recording, media and workflow.



"WE WERE A LONG WAY FROM ANYWHERE, WITH BASICALLY AN ALEXA AND A FEW CODEX CAPTURE DRIVES, AND WE HAD NO PROBLEMS. IT WAS ACTUALLY QUITE WONDERFUL."

Tom Stern ASC AFC

CODEXPRODUCTIONSUITE

Codex Vault

The challenges facing any production can be daunting. The costs involved in planning and developing a project are a challenge on their own, let alone the timeline required to assemble a team of creative professionals to capture and produce the images and sounds required to fully realise the vision of the director and storyteller. Codex Vault will streamline and simplify your workflow and save you time and money. Most importantly, Codex safeguards your most valuable asset, your digital negative, so that it lives on into the future.

However big or small, productions today demand a pipeline that delivers camera original data, metadata, editorial media, VFX deliverables and production reports securely and efficiently to whoever needs access to them. Codex makes it simple for any production to manage their assets, with Codex Vault, Production Suite, and Media Vault, all accessed easily and securely through Codex Backbone.

With world-class image science, high quality image processing, the flexibility of the Codex File System (CFS) and a completely redesigned user interface, Codex Production Suite is a fully-featured dailies and archiving system.

Codex's Production Suite features sophisticated tools for colour grading and LUT management, QC, metadata editing and audio sync so you can manage and create all your deliverables within one unified system. Transcode to all the formats you need to deliver, faster than real-time, even with an input LUT, CDL and a 3D LUT.

Vault has more than enough horsepower so you can meet the toughest deadline with time to spare. And a new Production Apertures tool automatically scales the deliverables based on the framing for a particular camera. More and more ways to make production simpler.

Vault Library - Shot Selection

Codex Review - Colour

Vault Library - Metadata Editor

"Vault is a wonderful tool; with which everything now is done on site. We literally have the lab with us, and the entire film production is controlled live." Dick Pope BSC

Flexibility and adaptability are more critical than ever so Codex Vault is now available on Mac Pro and MacBook Pro as well as Codex's own hardware – the S-Series and XL-Series. With Codex Production Suite plus these four hardware options, Codex has developed a streamlined, unified workflow, capable of managing the data requirements of any production independent of the camera. And there are two versions to suit any production and budget – Production Suite Pro for compressed workflows and Production Suite Premium for RAW workflows. Upgrading from Pro to Premium is simple – so if you're shooting a commercial and there's a need for RAW for some visual effects shots, you can quickly upgrade your licence and keep working.

Vault OS X

Codex Production Suite provides a full dailies and archiving system ready to integrate with your Mac Pro or MacBook Pro and a Codex Capture Drive® Dock or Capture Drive® 2.0 Dock (for the new Codex Capture Drive® 2.0). Not only can you quickly and efficiently copy your camera original negative to a hard drive, but it also includes the following features:

> Primary colour correction and digital printer lights with support for ACES and ASC-CDL, allowing looks to be created and communicated to editorial and post production.
> Import and processing of CDLs and LUTs so that externally created looks can be applied.
> Add Tangent panels for grading.
> Metadata checking, fixing and appending – metadata can then be attached to dailies for increased efficiency in post production.
> QC tools – flag any issues, make notes and generate a detailed QC report, with or without thumbnails.
> Audio Sync – import WAV files, playback shots in a proxy window, and synchronise the audio files to the shots, based on the timecode.
> Fast but high quality transcoding to common dailies formats, including Apple ProRes, Avid DNxHD and H.264.
> High quality debayering to DPX and Open EXR for VFX deliverables.
> Archiving using LTFS with full verification to LTO-6 tape with Codex Archive.
> Full ACES colour pipeline.

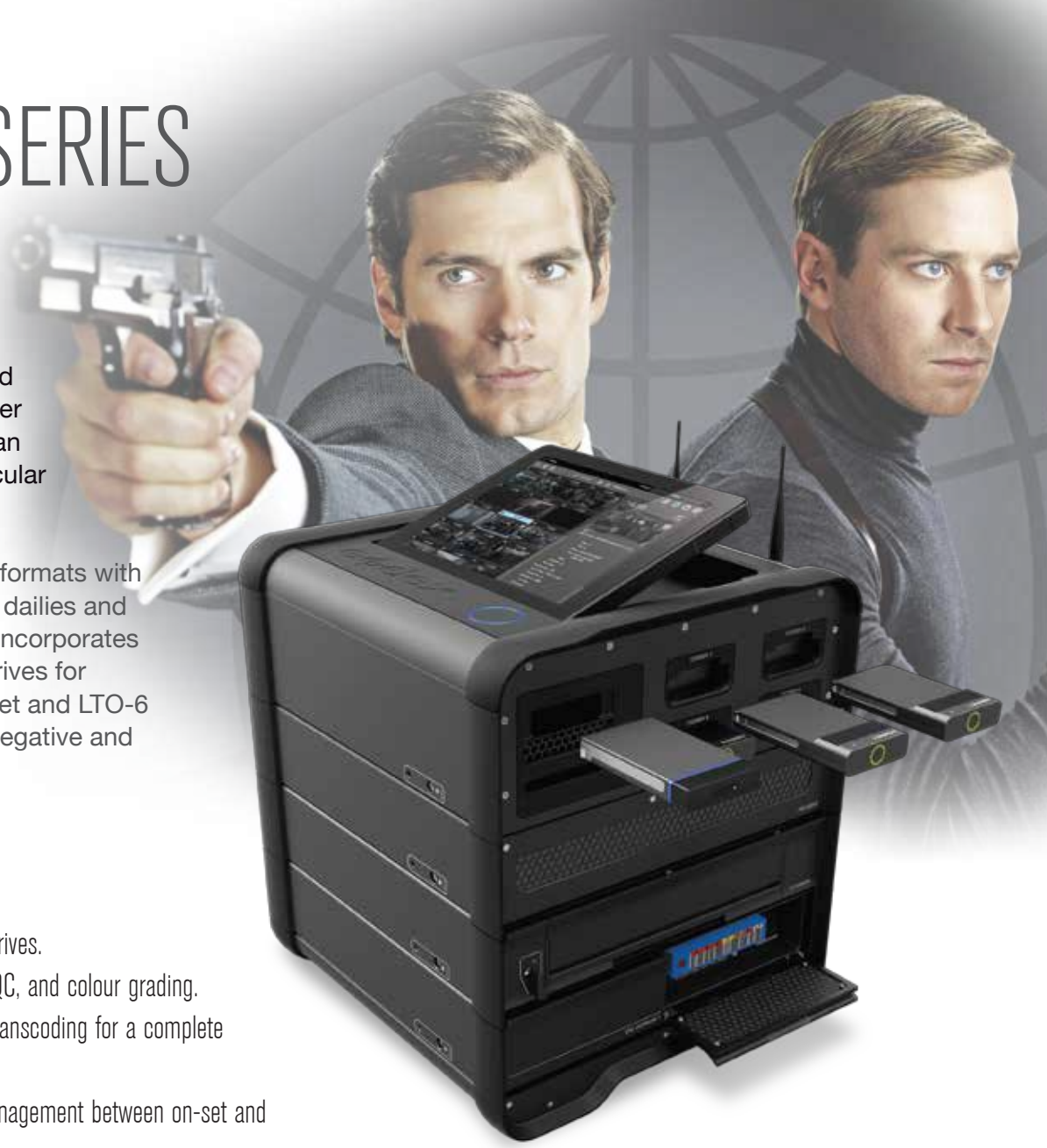
"Codex has come forward as a standard, whichever camera you're on."

John Mathieson BSC

For a smaller footprint, ready to travel wherever you need it to be, Codex Production Suite running on a MacBook Pro is an ideal solution. With Codex Production Suite Pro, just add a Codex CFast 2.0 reader to ingest files from ARRI Amira or Mini (ProRes) or Canon EOS C300 Mark II (XF-AVC) and you have a complete, battle-tested workflow for these compressed formats. For RAW files, simply upgrade to Codex Production Suite Premium. You won't need anything else.

All tools in the Codex Production Suite are also available on Codex Vault S-Series and XL-Series, providing continuity but also flexibility from project to project.

CODEX S-SERIES



Battle-tested all over the world and ready to go wherever you need it, the S-Series is a modular, rugged device with super-fast transfer and processing times that can be customised to your particular workflow.

Supporting multiple camera formats with a single, simple interface for dailies and archiving, the S-Series also incorporates 8 or 16TB Codex Transfer Drives for securely moving data from set and LTO-6 tape drives to archive your negative and satisfy your bond company.

- > Check, fix, and append metadata.
- > Archive to dual LTO-6 with LTFS.
- > Clone to secure Codex Transfer Drives.
- > Add Codex Review for playback, QC, and colour grading.
- > Colour grading, audio sync, and transcoding for a complete dailies pipeline.
- > Sync with Codex Live for look management between on-set and dailies and beyond.

"CODEX HAS ALWAYS GUARANTEED ME A SOLID, FUNDAMENTAL AND UNRIVALLED INSTRUMENT FOR MY JOB... THROUGH CODEX WE CUSTOMISED AND INTEGRATED DIFFERENT PIPELINES."

Francesco Giardello, DIT/Digital Workflow Supervisor *The Man From Uncle, Pan, Ben-Hur, Thor: The Dark World*

CODEX TRANSFER DRIVE

- > Safe and secure transport between on-set, near-set and post.
- > Eliminates redundant copies of the digital negative.
- > Saves money on hard drives.

CODEX XL-SERIES

Designed to handle the large amounts of data generated by today's cameras with ease, Vault XL-Series is a rack-mounted, networked attached device that's easy to integrate into an existing near-set or post production infrastructure. It's simple to operate and reliable in the toughest conditions. For most of 2015, Vault XLs have been doing the heavy lifting on every ALEXA 65 project out there, making the amount of data generated by this amazing camera easy to handle.

Combine the power of the Codex File System to deliver whatever files you need in whatever format you require with the benefits of network storage and the power of GPU-processing for a fully-featured toolkit for productions of all sizes.

> Powerful CPU and GPU processing (24 cores) for dailies and archiving
> Gateway to Codex M-Series Media Vault Library
> Easy integration with an existing SAN environment

"CODEX IS A ROCK-SOLID PLATFORM AND WORKFLOW, BACKED BY WORLD-CLASS SUPPORT. IT WAS THE OBVIOUS CHOICE FOR THIS PROJECT."

James Neihouse, cinematographer, talking about putting Codex equipment aboard the International Space Station.

codex connect

Join the Codex community through Codex Connect. Wherever you are in the world, Codex Connect means you can rest assured that Codex has your back. Codex's world-class team of support and workflow experts are available to assist you.

With Codex Connect you get access to the latest software upgrades for the Codex Production Suite.

Need a refresher on how to use a particular module like Sound Sync or Colour? Access online tutorials with Codex Connect.

Do you have a tried and tested workflow that you use on every job? Codex Backbone makes it easy to migrate the job templates to a new project.

Need to share some looks that you created in pre-production so that everyone's on the same page? Just create a project and upload them to Codex Backbone and securely share them with your team.

Want a lens grid for a particular lens? Connect to Codex Backbone and see if one's available.

Just had to characterise a bunch of lens for your favourite DP? Now you can save them in Codex Backbone so they can be shared with VFX or be re-used on your next project.

Tired after a 12 hour day of supporting a production? With Codex Backbone, you can simply and quickly generate reports for the script supervisor and editorial.

Filmmaking is a collaborative process - Codex Connect and Codex Backbone make collaboration easy.

Francesco's on-set rig in an ancient forest in Wales, filming *King Arthur*.

PILLAR TO POST

Francesco out from his tent on *The Man From U.N.C.L.E.*

Francesco Giardiello is one of the busiest DITs around, working on major motion pictures and high-end TV productions. Over the years, and more often than not, he's been among the first to deploy the latest Codex technology at key steps in his meteoric career. As he transitions into digital workflow supervision, Francesco remembers some landmark moments...

Selected filmography: *Knights Of The Roundtable: King Arthur, Christ The Lord, Ben-Hur, Pan, The Man from U.N.C.L.E, Black Sea, Thor: The Dark World, Romeo & Juliet, The Vatican, Game Of Thrones...*

When did you first see Codex?

It was at the end of 2009, when prepping the first season of HBO's *Game Of Thrones* at ARRI Media in London. I had heard about Codex, their external recorder and their road map for ARRIRAW recording from the ARRI ALEXA cameras. So we got a prototype to test. Although ALEXA was yet to be released, and it was still early days of the science behind ARRIRAW debayering, the potential of Codex to streamline and accelerate the workflow was blindingly obvious.

We had to go with Sony HDCAM SR tape and tape decks for that first season, but kept an eye on the progress of the Codex technology. In 2010, after ALEXA was launched, we looked at Codex again, and saw the chance to get rid of tape for recording completely. It was the start of a great relationship with Codex, that continues to this day.

> "I HAVE USED CODEX EVERY SINGLE DAY OF MY WORKING LIFE SINCE 2010, AND CAN GENUINELY SAY THAT YOU CAN TRUST IT, IT WORKS."
>
> Francesco Giardiello

How did you implement Codex on Game Of Thrones?

On the second season we wanted a tapeless workflow, but it still needed to be 1080p to accommodate the delivery specs. So we used the Codex Onboard M recorder to facilitate a 10-bit 1080p 444 DPX workflow from camera into post.

One of the really exciting things with Codex is the ability to manage the static and dynamic metadata in digital image files. I realised that along with speeding up QC, back-up and dailies deliverables operations, we had the chance to implement a colour pipeline with Codex, using the CDL server to record colour information straight into the file headers. This was really important as during the first season of *Game of Thrones* – and on so many other jobs – we had no proper way to reference and apply looks from the set, and colour accuracy was sometimes a lottery.

Before Codex, we had to communicate to post which LUT/CDL had to be applied through USB sticks, using a naming convention, and writing it on the slate/camera sheet, with no scientific method to reference and apply looks. Changing the look more than few times a day had the potential to make life a nightmare for the post guys.

However, with the CDL server, and the powerful ability of Codex to input new metadata via filecards, we could eliminate colour issues, not to mention stress and wasted time, and created a colour-consistent pipeline, which was really important on a big, fast turnaround show like *Game of Thrones.*

What did you learn from deploying Codex on *Thor: The Dark World?*

Thor: The Dark World was a big step. It was a VFX-heavy movie, and my first experience of a workflow with mixed anamorphic and spherical lens metadata. With the various lenses, and aspect ratios – such as 16:9, 4:3 scope and flat – we had around ten different camera formats to deal with. It was complex, but I quickly learnt how to use the metadata coming off the Codex to streamline the whole post process. This was especially helpful for the VFX vendors. We were able to tell them how to extract target frames from recorded footage – with different extractions of anamorphic and spherical frames – which they could then use to create floating windows and to stabilise or reframe the picture.

What's your take-away of using Codex on *The Man From U.N.C.L.E.?*

I think that my experience on *The Man From U.N.C.L.E.* destroyed any doubt that anyone had about digital cinematography with ALEXA XT. The technical development work that Codex did with ARRI to allow direct RAW recording in-camera on the ALEXA XT was a massive benefit to the camera department and proved just how good the Codex workflow really is. Nothing had changed in terms of quality, which was already there, and nothing had really changed for the DIT, apart from making life much easier on the floor. But what had changed was the perception of the camera. Suddenly, here was a digital cinematography camera with the option of an optical viewfinder, but without an external recorder and far fewer cables. It felt more like working with an Arriflex 435, and it made for an easier move for people from film to digital cameras.

Tell us about your experience of using Codex Vault with the ACES workflow on *Pan?*

Pan was my first job with the Codex Vault, and its speed and capacity certainly helped to accelerate the QC, back-up, dailies and post workflows. But crucially, I was able to bring my previous Codex metadata and colour pipeline experiences together from previous shows to create the first camera-to-post ACES colour pipeline for ALEXA ARRIRAW and RED EPIC footage.

The result of working with Codex, in tandem with other technology vendors, was that the images we viewed on-set from the ARRI ALEXA and RED cameras, were visually identical to those seen in dailies, by the editorial and VFX teams, and in the final DI grade.

In Vault Review we could review the full ACES colour pipeline, make tweaks, check timecode and clone the material to a temporary storage archive – all on-set before we sent the footage for dailies processing. Furthermore, three-quarters of the movie has VFX content, and Codex Vault also proved invaluable in streamlining the metadata archive for efficient VFX delivery.

Vault formed a seamless bridge for the assets to move into post production, delivering peace-of-mind by ensuring complete colour precision throughout. The uncertainty between on-set look management and downstream colour correction just vanished. That's the level of consistency and reassurance that ACES aims to deliver and that's exactly what we achieved.

Francesco and John Mathieson BSC on *King Arthur* setting up the look on-set

Francesco (c-r) with Rodrigo Prieto ASC (c) and director Edoardo Ponti (l) while testing the Canon C500 for *The Human Voice*

Set-up... Francesco (r) talks to cinematographer, the late Martin Kenzie BSC during *Game Of Thrones*

"IF YOU WANT TOTAL FIDELITY, AND A WORKFLOW YOU CAN RELY ON, CHOOSE CODEX." Francesco Giardiello

How has Codex changed your work and camera-to-post workflow?

The truth is there are no words to describe how important Codex systems have been in advancing my career and in opening my mind to new possibilities. Workflows have become more dependable, more secure and much, much quicker. Because of this reliability, I see Codex as a pillar, a solid building block, upon which you can work to lay down the blueprint for the digital workflow from the camera, through to dailies, backup, and into post production. I am now able to imagine a career as a digital workflow supervisor who bridges the gap, and ensures collaboration, between the DIT, production, editorial and the various VFX vendors by establishing solid workflows at an early stage that meet everyone's needs.

What would you say to anyone considering their workflow options with and without Codex?

Workflow without Codex? I dread to think about that. I have used Codex every single day of my working life since 2010, and can genuinely say that you can trust it, it works. Plus, Codex really care. In the last five years I have been on a journey with Codex, and they have been on a journey with me. They have listened to my needs, from the coalface of digital moviemaking, and have quickly developed features and performance capabilities accordingly. If you want total fidelity, and a workflow you can rely on, choose Codex.

CODEXBACKBONE

Codex Backbone is about answering questions. What was shot yesterday? Did we backup this roll? What is on this LTO Tape? With Codex Backbone, information about your data is omnipresent and available immediately to those who have access. So you'll always have the answers.

Productions need to automate the control of all digital files and more importantly the metadata. With Backbone this important information about the production can be accessed and utilised quickly and efficiently. Codex Backbone integrates Codex's production-proven Vault technology with the Codex S-Series Server and adds a web-based login with an easy-to-use interface that a producer can use to browse and access this critical information.

Codex Backbone can be used for feature film and television production. It is an integrated end-to-end pipeline that can deliver the time and money savings that have been expected from digital productions but often not achieved. Codex Backbone and all parts of Backbone are scalable allowing studios and productions to expand and reduce the amount of usage to save money. Studios and individuals alike will be able to track and re-use their information across shows, streamlining the production process.

CODEX BACKBONE SYSTEM

Codex Vault Platform

Codex Vault Platform has proven itself as a reliable image management and storage system. When a show gets to the shooting stage, Codex Vault will do the heavy lifting in getting the shots cloned, archived, and transcoded. Codex Vault is scalable to accommodate single camera and multi-camera productions and supports many different camera and media types. Every Codex Vault can be networked to automatically update Backbone every time a Capture Drive is inserted and removed from the system. Original camera files that are archived to LTO tape and to the Codex Media Vault Library are routinely synced with Codex Backbone. This information, and the associated metadata files, are uploaded to the cloud for immediate browsing and information recall from the web-based Codex Backbone interface.

"It makes perfect sense - from capture to archive with Codex systems. Continuing the information flow in one unified system is the innovation I have been waiting for."

Ron Ames, Visual Effects Producer

Codex S-Series Server

Codex S-Series Server is your own private piece of the cloud that you can take with you and completely control. Codex S-Series Server runs the same system that is running in the cloud, but lives inside your internal network. This gives you the flexibility to run Backbone behind any company firewall, or in any location in the world. No internet? No problem. Codex Backbone has been designed to give you the information you need at all times. With the Codex S-Series Server you have the peace of mind of knowing that no matter what happens in the outside world, your show will not stop. Codex S-Series Server uses the same expansion modules as Codex Vault. This gives you the most flexibility and scalability for the least amount of cost. Information from multiple Vaults can be easily transferred to the S-Series Server for long-term image and data access. 8 or 16 terabytes of data can be transferred at a time by simply moving the Transfer Drive from Vault and inserting it into the S-Series Server.

Codex Backbone is the central repository for images and metadata from beginning to end.

As bandwidth gets better and expands into the most remote production locations, tracking your production in the cloud is becoming a reality, wherever you are. Wherever productions go to work, Codex Backbone is there. It works offline or online and in remote locations sharing metadata around the world and allowing crews in multiple locations to easily collaborate, saving time and money. Using Codex Backbone, users can access production information from anywhere.

Codex Backbone can be run on public cloud-based servers such as Amazon Web Services, private cloud services like Sohonet's Media Network, or locally during production using a Codex S-Series Server. This flexibility allows Codex Backbone to fit the varying needs of any production.

Codex Backbone allows production information and pipeline stages to be securely viewed and edited any place, any time, by approved crew members, using any desktop or mobile device with an internet connection and is also designed to communicate with any other 3rd party system. Because it's a layered system, productions take advantage of the scalability of the system. Codex Backbone Users, Codex Vaults, and S-Series Servers can be added and removed as necessary.

Managing VFX pulls is something that has traditionally been done by post facilities. A VFX editor submits a pull list, the facility loads the shots from LTO tape (sometimes taking days) and then sends the shots to the VFX vendors. With Backbone and the integration of Codex's VFX Pull solution and other specialised applications, including the Codex Production Suite, this can all be managed by a production's editorial department or a studio, returning control of this critical process to production.

"As production and post production become more and more entwined, it is important to have tools that not only securely manage the data but still make it accessible. Codex has become the gold standard for recording. I am confident that their media management tools with Codex Backbone and the new Codex Media Library will not only provide a secure method to move our valuable data around, but will also enable us to increase the efficiency with how we access this data and the ease with which we supply our vendors with the elements they need. This will streamline VFX turn around and the entire movie-making process."
Jesse Torres, VP Post Production at Marvel

CODEX BACKBONE AWARE

Codex has always worked in harmony with other systems and Codex Backbone is no different. Codex Backbone is built on open REST APIs that can be shared with partners including VFX tools such as, Shotgun, PIX for dailies, Sohonet services, or your own internal pipeline systems.

CODEXVAULTWORKFLOWS

No matter what camera you shoot with or what media you record onto, simplify and safeguard your workflow with the compact, production-proven Codex Vault. From production to post with no fuss.

FILM UNIT

ARRI ALEXA XT/SXT/65

ARRI AMIRA

ARRI ALEXA Mini

Codex Action Cam

Canon C300 Mark II/C500

Panasonic VariCam 35

Sony F5, F55, F65

HD-SDI LOG

CAMERA VIDEO OUT

LUT BOX

HD-SDI LOG

CAMERA VIDEO OUT

LUT BOX

BACKBONE
AWARE

MEDIA

CODEX CAPTURE DRIVE

SxS PRO CARD

PANASONIC P2 CARD

AXSM CARD

CFAST 2.0 CARD

CODEX ON-SET CART

HD-SDI LOG + LUT

ON-SET MONITOR
CALIBRATED

HD-SDI LOG + LUT

ON-SET MONITOR
CALIBRATED

BACKBONE
AWARE

LUT + TC WIFI

IPAD

SYNCHRONISED LUT LIBRARY

LOOK, TIMECODE & EI

CODEX COLOUR CART

CAMERA ORIGINALS
& METADATA

ON-SET CLONE & ARCHIVE

CODEX TRANSFER DRIVE

NEAR-SET/PRODUCTION

CODEXMEDIAVAULT

In the days of film origination, archiving was relatively easy with the proper storage environment. Film could last for more than 100 years and all you needed to retrieve it was a light source and a lens. Film archiving in the past was really more of a real estate problem – where to store all the cans of film. The advent of digital origination has changed everything. Although these digitally-originated movies could be archived on film, the process became cost-prohibitive. We are past the transitional period and now require a dynamic archive that can not only support long term preservation, but that also makes the content readily accessible. Although LTO tape archival has been adopted as a production archive solution since 2006, it has already evolved several generations from LTO-3 to LTO-6 with modest gains in capacity and archival speeds relative to film. A truly cost-effective replacement to long term film archiving hasn't emerged yet. That said, there is still an urgent need for an organic archive that can be accessed both during production and throughout a film's finish and marketing lifecycle.

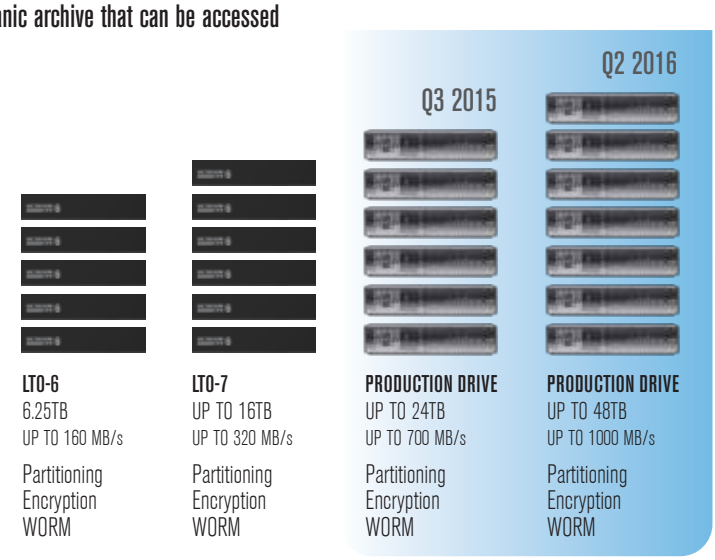
The new generation of digital cameras require significant bandwidth to support high dynamic range, higher frame rates and resolutions of up to 8K. This means that increased bandwidths are needed throughout the production pipeline. These data requirements will continue to grow as higher performance technologies emerge in modern production. Content producers today need a system that combines security and absolute reliability with accessibility. With these requirements in mind, Codex has designed the Codex Media Vault providing cost-effective storage for production assets in a high-availability, secure environment, with no compromise in scalability or performance.

Building upon Codex's solid track record for uncompressed RAW capture and streamlined, secure workflows, productions can now manage and track not only the original camera files, but all of the associated metadata, editorial media and VFX shots using Codex's Media Vault Library. Codex Backbone ties all this together, tracking all production data and metadata from capture through to post production and beyond.

CODEX PRODUCTION DRIVE

Codex Media Vault Library, featuring Codex Production Drives, provides portable near-line storage, offering secure, fast access for production, editorial and VFX vendors. Codex Production Drives are a unique new storage solution, engineered to provide a truly organic archive solution for production, marketing and content library management. Each Production Drive provides 24TB (soon to double to 48TB) of storage in an easily transportable form factor with a digital ink interface that allows for a QR reader to display what is stored on the drive without even having to power it up.

Codex Production Drives deliver best in class cost/performance and scalability backed by world-class service and support. The Codex Production Drive storage solution comes in a package that smartly scales into any near-set or facility location providing hundreds of terabytes to multiple petabytes. Compared to an LTO archive, Codex Media Vault is generations ahead in both cost efficiency and accessibility.



At Codex we strongly recommend the creation of an LTO archive on-set. However, if the production environment or schedule does not permit this back-up while still on location, Codex Production Drives provide a secure way to transport your data to a controlled environment.

Knowing that an LTO archive is a proven solution for most studios, Codex continues to support this workflow. Augmenting the standard LTO archive standard already created on-set using a Codex Vault, Codex Production Drives provide an additional back-up of the original data files, but can also be used to archive other production assets, such as lens grid maps, LTO Table of Content (TOC) files, and Avid editorial files.

Randomised, sequential I/O optimisation within the Codex Media Vault enables efficient access for all production service applications and workflow environments. This means that all users can expect reliable and predictable near-line access to the data. Unlike LTO tape, which has to load and shuttle to access a file, files can be accessed instantly - only 0.008 seconds to be exact. The system provides far faster access to content than LTO when it comes to VFX pulls, marketing requests and final conform and DI, even in facilities with access to high-speed robotic tape loader systems.

As the editorial department becomes the hub of today's productions, projects can quickly and affordably scale using Codex Media Vault and Codex Production Drives.

The editorial team can quickly, securely and efficiently request files and feed material to whomever needs it – VFX, marketing, production etc. – without having to request it from a post facility to recover it from LTO tape. This returns stewardship of the digital assets to the production, allowing for control of the budget and the schedule.

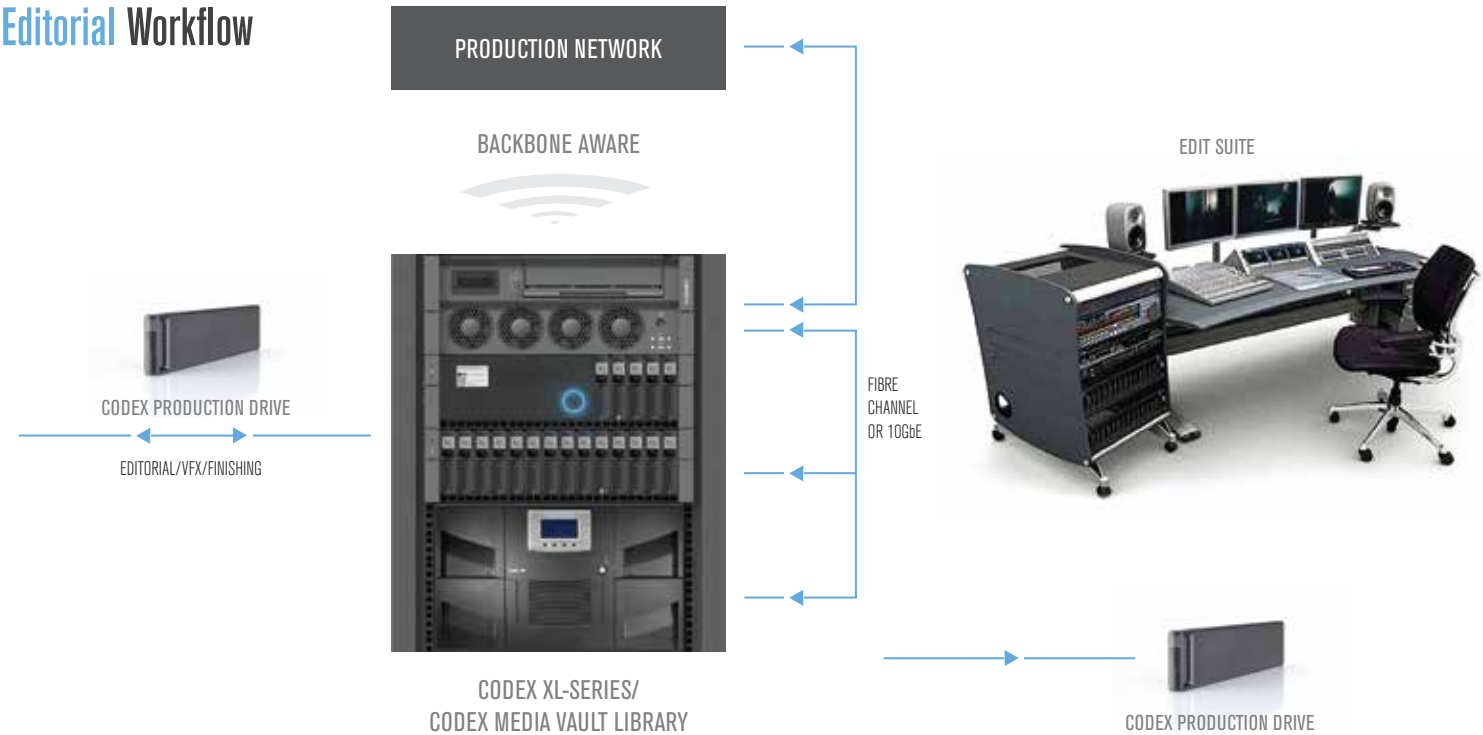
For VFX pulls and final conform, it's easy to pull and copy VFX shots and other files to Codex Production Drives. These Production Drives can then be sent back and forth to VFX facilities, for example, so VFX shots can be easily accessed from a local Codex Media Vault Library in the vendor's location. With Codex Backbone and Codex Media Vault Library, any production partner simply needs to install a Codex Media Vault controller to immediately connect via Codex Backbone to access the needed files.

To expand storage in editorial, on location or in a facility, simply load and slide in a Codex Production Drive and it mounts itself in seconds - nothing more. Additional expansion chassis can be provided to allow easy scalability throughout the production life cycle.

Media Vault Library Key Benefits

> CONTROLLED, SECURE ACCESS VIA CODEX BACKBONE > THE INSTANT ACCESS OF SPINNING DISK, COMBINED WITH THE LONG-TERM STORAGE PERFORMANCE OF LTO > HIGHLY ENERGY EFFICIENT > HUMAN READABLE DIGITAL INK LABELS, LINKED TO BACKBONE VIA A QR CODE > ENDLESS STORAGE EXPANSION > DATA PROTECTION EXCEEDING LTO TAPE VIA CONTINUOUS AUDITING > AES-256 ENCRYPTION OPTION FOR EXTRA SECURITY > NO REDUNDANT STORAGE COSTS

Editorial Workflow



Integrated with Codex Backbone, tracking the production assets of each Codex Capture Drive, from the very first day of production, all the way through to the director's cut and into the future, Codex Media Vault Library allows assets to be easily searched for and recalled using a digital ink and QR code system built into each Codex Production Drive stored within the Codex Media Vault Library.

CODEX ON-SET/NEAR-SET

FILM UNIT


ARRI ALEXA XT/SXT/65


ARRI AMIRA


ARRI ALEXA Mini


Codex Action Cam


Canon C300 Mark II/C500


Panasonic VariCam 35


Sony F5, F55, F65

HD-SDI LOG


LUT BOX

HD-SDI LOG + LUT


ON-SET MONITOR

BACKBONE AWARE

BACKBONE AWARE


CODEX CAPTURE DRIVE


SxS PRO CARD


PANASONIC P2 CARD


AXSM CARD


CFAST 2.0 CARD


CODEX S-SERIES

SYNCHRONISED LOOK LIBRARY

LOOK, TIMECODE & EI

DAILIES

EDITORIAL

AVID DNS, H264, BURN-INS

ON-SET
CODEX S-SERIES


CODEX TRANSFER DRIVE

NEAR-SET
CODEX XL-SERIES

CAMERA ORIGINALS & METADATA

CAMERA ORIGINALS & METADATA


LTO-6 ARCHIVE

REVIEW - QC - SOUNDSYNC AND LOOK MANAGEMENT


QC MONITOR


CODEX XL-SERIES


CODEX PRODUCTION DRIVE

PRORES, AVID DNX, H264, BURN-INS

EDITORIAL

DAILIES


CODEX PRODUCTION DRIVE

PRODUCTION

CAMERA ORIGINALS & METADATA (CAMERA, CDL, LENS)
BACK-UP TO CODEX PRODUCTION DRIVES FOR VFX, MARKETING, FINISH

CODEXMEDIAVAULT LIBRARY

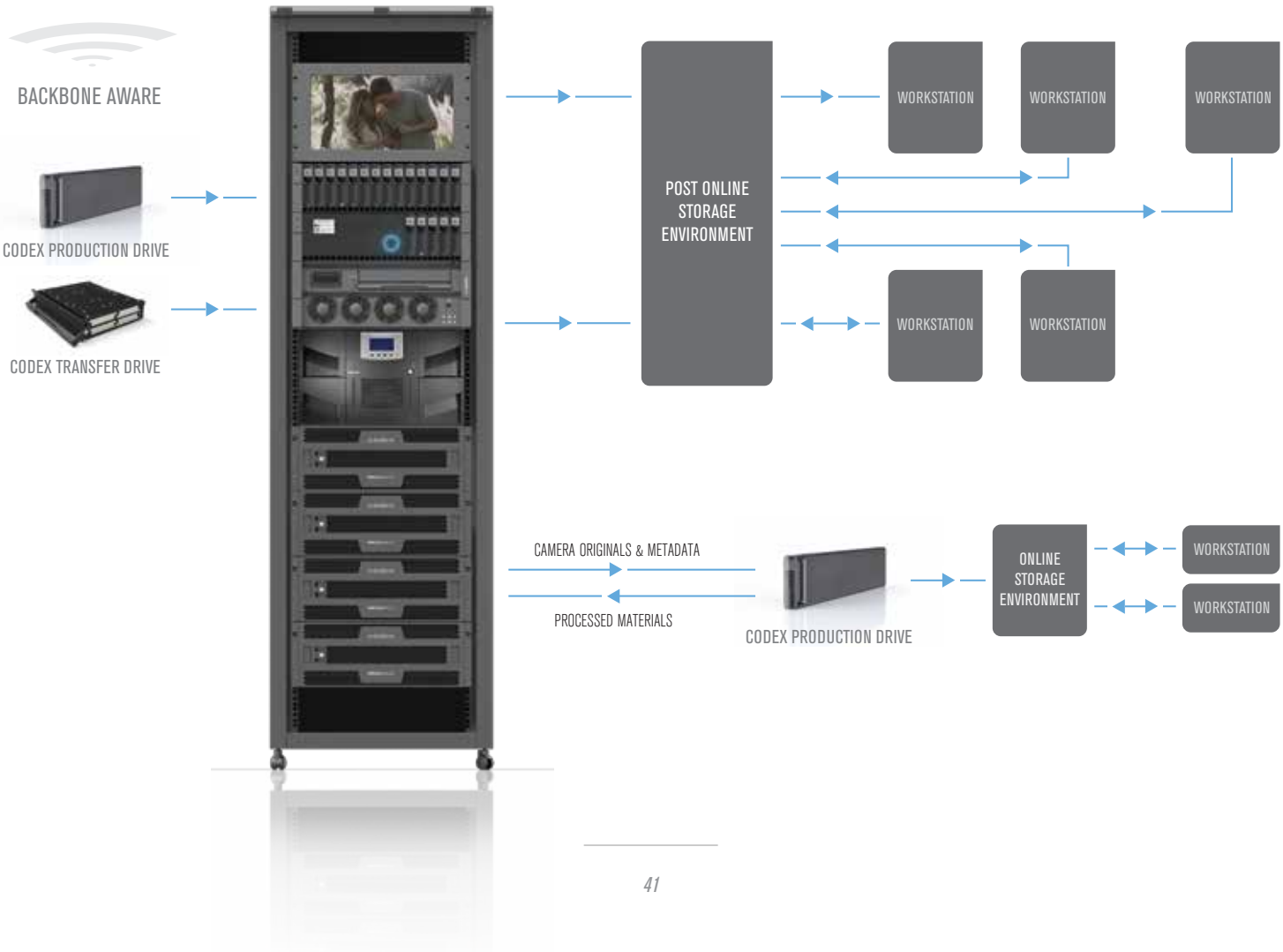
Codex Media Vault Library and Storage complete Codex's on-set and near-set solutions and offer extremely scalable storage, all managed by Codex Backbone. From purchase and set-up, all the way through production and beyond, Codex offers unmatched performance, reliability, security, and value.

Codex Media Vault Library can connect to a network via 10 GigE or Fibre Channel. Using Codex Backbone, production service partners can easily manage shot pulls or conform directly to their existing on-line storage, eliminating redundant copy times and facility charges for an additional copy. Storage can be managed intelligently between on-line (facility SAN) and near-line (Codex Media Vault Library), which, as well as reducing the copying of files, also reduces power consumption.

Codex Media Vault Library Secure your Data

With Codex Media Vault Library your data is completely secure – Codex Production Drives feature Redundancy Coding and all recovery data is stored on the individual drives, not hidden in a separate file system or backup database. So Codex Production Drives are fully recoverable wherever they are. A Continuous Audit is run in the background on partial data sets of a Codex Production Drive. This daily audit management run-time minimises energy consumption while constantly auditing the data across the Codex Production Drives. Any errors detected can be redrawn back onto the same Codex Production Drive, reconstructing the "data image" perfectly. This means that Codex Production Drives have an extremely high level of data integrity, exceeding that of LTO-6 by a factor of 10,000x.

And unlike many other storage and archiving solutions, Codex Media Vault is extremely energy-efficient with a power requirement of less than 10W in standby mode, meaning it's a secure, super-reliable, green solution in a small footprint.



HASTALA VISTABABY

"If you liked the first two *Terminator* movies, you're going to love *Terminator Genisys*," said director James Cameron about the re-invigorated sci-fi action franchise.

Whilst Paramount's *Terminator Genisys* is the fifth installment in the *Terminator* series, the new movie is more of a sequel to the initial pair of Cameron-helmed blockbusters – *The Terminator* (1984) and *Terminator 2: Judgment Day* (1991). In fact, *Terminator Genisys* is the first picture in a new stand-alone trilogy, with two sequels scheduled for 2017 and 2018.

Directed by Alan Taylor, with Kramer Morgenthau ASC the cinematographer, and little other involvement from Cameron apart from his enthusiastic endorsement, *Terminator Genisys* stars Arnold Schwarzenegger as the eponymous robotic lead, alongside Jason Clarke, Jai Courtney and Emilia Clarke. In the movie, John Connor, leader of the human resistance against Skynet, sends Kyle Reese from 2029 to 1984 to protect his mother, Sarah, from a Terminator assassin. However, an unexpected twist of events has altered the historical timeline. Instead of a scared waitress, Reese discovers that Sarah is a skilled fighter with a Terminator guardian. Contending with improbable allies and menacing new enemies, Reese sets out on an unexpected new mission – to reset the future.

Morgenthau had previously worked with director Alan Taylor on several productions – most notably *Thor: The Dark World* in London, and HBO's *Game Of Thrones* in Northern Ireland, as well as numerous commercials.

"I was attracted to the production partly because it gave me the chance to continue my creative moviemaking relationship with Alan, and partly because the opportunity to work on a *Terminator* film was a dream come true," enthuses Morgenthau. "As a kid you see an iconic piece of pop culture at the cinema, and never imagine you might be involved in it. But then 30 years later you get the opportunity to work on it in a major way. Science-fiction-fantasy, mixed with apocalyptic film noir, is very enticing to me."

The production made an effort to have the cinematography honour the visuals of the first two *Terminator* films – both photographed by Adam Greenberg ASC. Sequences set in the year 1984 favoured colours and tones of blues, greens and blacks in order to match the look of *The Terminator,* whilst scenes set during the future war against the machines were modelled after such scenes from *Terminator 2: Judgment Day.*

"Those movies were creative and technological trailblazers in their day, that stand the test of time," Morgenthau says. "We included some of the visual vocabulary from both of these movies, including an almost scene-by-scene flashback from *The Terminator*. But we did not want to be slaves to the original movies. As the story of *Terminator Genisys* takes a fresh twist, accordingly we introduced our own, more contemporary look."

Morgenthau says that whilst there were some early discussions about shooting on celluloid for the flashback to 1984 sequence, Terminator Genisys is a heavily VFX-driven picture, with several different units – so digital felt like the right medium to establish a simple, convenient workflow into post production. It was also the safest bet to ensure the look, created in-camera, transferred unadulterated from the set into post production.

SUCCESS STORY: TERMINATOR GENISYS
CINEMATOGRAPHER: KRAMER MORGENTHAU ASC
RELEASE: 2015

CAPTURED ON CODEX

As he explains, "You can get good images from most digital cameras today but, for me, the ARRI ALEXA is the best. The ALEXA XT was my first choice on *Terminator Genisys*. It's easy to work with, delivers incredibly good-looking images with great dynamic range, and comes with the widely-accepted Codex ARRIRAW workflow built-in.

"I have used Codex on many different productions – from *Game Of Thrones,* through *Thor: The Dark World* to *Terminator Genisys* – and have seen the technology evolve, become ever more efficient, and grow physically smaller by turns. I'm a big fan. Codex makes things super-easy and fast with ARRIRAW, particularly the integrated workflow technology in the ALEXA XT. From the cinematographer's point-of-view, you never have to worry about what's happening to your data, and there's no better system than Codex to help you stamp your identity on the picture from the start.

Ryan Kunkleman, Morgenthau's DIT, set up an on-set/dailies workflow with Codex and Technicolor. "We delivered data twice a day, along with a side-car CDL from the on-set Pomfort Live Grade, and got back JPEGs from the colourist, Brent Greer. This gave me the comfort that the ARRIRAW image was looking good and that my colour intentions would make it into editorial, VFX and the final DI."

In terms of lenses, Morgenthau opted for Panavision C-series Anamorphics, supplemented with some E-series lenses, "to bring some soul, imperfections and painterly qualities to the clinical harshness of the digital image," he says. "The C-series flare nicely, and have an attractive, rounded softness and painterliness with slightly lifted contrast. It's almost like having a diffusion filter built into the lens. I did not use diffusion at all on this movie, and rarely use it anyway these days. I prefer to use softer glass and add diffusion during the DI – where you have selective control over diffusing image areas such as highlights, blacks and skin tones."

Morgenthau is keen to praise the work of Panavision's lens guru, Dan Sasaki, in preparing the inventory of glass for the movie. "The C-series are all hand-made, and one lens can look quite different to the next. So, long before production began, I spent time with Dan to test, modify and finesse each lens, and to optimise them for shooting at the fastest-possible stop, to get decent resolution and close focus."

Regarding the choice of aspect ratio, Morgenthau says that he and the director felt that shooting 2.40:1 anamorphic would bring a certain cinematic majesty to the production, and help to move the franchise along visually – *The Terminator* shot 1.85:1 Super 35, while *Terminator 2* shot 2.40:1 Super 35.

Principal photography on *Terminator Genisys* began on April 21, 2014 in New Orleans. The production built multiple sets in a pair of cavernous air-conditioned buildings, formerly used by NASA to construct rocket boosters for the Space Shuttle, shot at a large, empty Lowes hardware store, and an abandoned power plant for the 1984 sequence. The Port Of New Orleans was used as the backdrop for the future prison/war camp scenes, whilst downtown New Orleans played for 1980s Los Angeles.

"We had a combination of large, traditional tungsten sources and modern LED lamps – and used a huge amount of both. Plus we used a wide variety of moving/interactive lights, with everything wired back to dimmer boards," he says. "I worked closely with production designer Neil Spisak and Jay Hart, the set decorator, to integrate the LEDs and their associated circuitry into various sets, like the Time Displacement Device chamber. Some scenes – such as the chase sequence in the giant server maze at the data centre – was lit by just by shimmering blue and daylight-balanced LEDs in the set. Echoing the original movie, the department store sequence was lit very sparsely with fluorescent practicals, out-of-focus LEDs, and 18K HMIs through the window. Visually, these are all pretty interesting sequences and I am very happy with the on-screen results."

The production transferred to San Francisco, shooting exteriors around the Golden Gate Bridge and the highlands overlooking the bridge, where the spectacular school bus chase and crash stunt takes place, with principal photography concluding in early August.

"As it's next to impossible to shoot on the Golden Gate Bridge, let alone do any stunts, we constructed a 500ft section of the bridge's tarmac and railings against green screen in a giant parking lot in New Orleans, and flipped over a couple of school buses for that sequence, which the VFX team composited together later."

Morgenthau says that a particularly intriguing aspect of working on *Terminator Genisys* was a long stint on "the vampire shift."

"*Terminator* is a night-time genre. We had six weeks of nights, starting on day one of the shoot. Typically, we were going to bed at 7am, would wake up at 5pm, get coffee, have breakfast and look at the dailies. As a cinematographer, night exteriors are the ultimate visual playground. You start pretty much from scratch, from black. You can be expressive with your lighting choices, compared to day exteriors where you have very little control. As I had to light around a quarter-square mile, I had several moon boxes, plus Vari-lights, suspended from a construction crane, along with BB lights. It was great fun."

As for getting the opportunity to work with one of the biggest names in the movies, Morgenthau declares, "Arnie is a great guy – fun and charismatic. You can easily see why he was the Governor of California, and why he has enjoyed such a long and successful career in the movies. *The Terminator* franchise is very dear to him. Thanks to him and Alan, working on *Terminator Genisys* proved a happy and rewarding experience."

"CODEX MAKE THINGS SUPER-EASY AND FAST WITH ARRIRAW"

Kramer Morgenthau ASC

"THE ACTION CAM IMAGE WAS AMAZINGLY CLOSE TO THE ALEXA'S"

Philip Lozano

ACTIONCAM INPARIS

Philip Lozano is a French director of photographer whose credits include 20 episodes of the television series *Lazy Company* as well as *Le Miroir,* a short film that took best cinematography honours at six different film festivals, including the Hollywood Reel Independent Film Fest in 2011. Lozano's background also includes 15 years as a camera assistant, operator or second unit cinematographer, often on projects with Luc Besson and Pierre Morel.

Recently, he had the opportunity to shoot his first feature film, titled *Braqueurs,* which translates as Robbers. The story takes place in the bleak suburbs of Paris, where a tight-knit group of professional criminals go quietly about their business until an error threatens their carefully protected anonymity. The director was Julien Leclercq *(The Assault, The Informant).*

Lozano says that the visuals for *Braqueurs* were inspired by *Heat,* the 1995 Michael Mann film shot by Dante Spinotti ASC AIC; and *The Town,* the 2010 Ben Affleck caper film shot by Robert Elswit ASC.

"Julien said he wanted a Scandinavian flavour," says Lozano. "Something a little more brutal and visceral, and less refined than the kind of stories that take place in Hollywood movies. The challenge on the film was to succeed in stylising the images just enough to make it look like fiction. We didn't want it to look like a documentary. We wanted to maintain the feeling of natural light and to stick to the artistic direction of the bleak Parisian suburbs."

Toward that end, Lozano made extensive camera tests. He considered anamorphic but chose spherical 2.40:1, in part because it felt more natural and less overtly cinematic. He chose to shoot the majority of the film on an ARRI ALEXA XT, with internal Codex recording capturing ARRIRAW in the open gate format. The 2.40:1 frame was extracted from the centre of the chip. Using open gate resulted in a significantly greater image area. The lenses for the ALEXA included ARRI/Zeiss Master Primes and Angenieux Optimo zooms.

"The entire process was designed to get the best possible quality," says Lozano. "We chose the ARRI ALEXA because the script called for low light scenes. We also had a lot of action, and we didn't have the budget for five or six cameras. We were also looking for a smaller camera, so we tested several systems including the Codex Action Cam. Honestly, it was way better than all the other cameras we tested, which all looked more like video. On the big screen, there was no comparison. When the producers saw the imagery from the Action Cam, they really wanted to use it and the rental facility (TSF in Paris) agreed to buy them."

Codex Action Cam allowed Lozano to shoot RAW 1920 x 1080 images at up to 60 frames per second. The 2/3" single chip sensor has a global shutter so there's no distortion of fast moving objects.

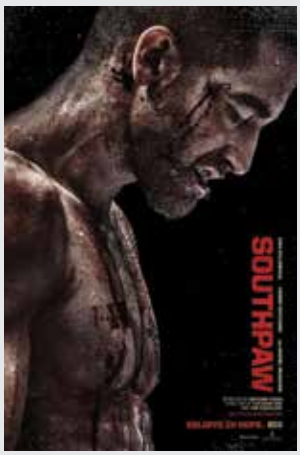
"The Action Cam image was amazingly close to the ALEXA's," says Lozano. "The latitude made it super easy to match in the grade. In a two- to five-second shot, you'll never see the difference."

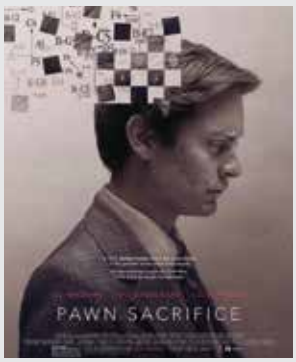
The Action Cams were used with older professional quality Super 16 format lenses, which were sharp, contrasty, and reasonably close to the look of the Master Primes used on the ALEXA, according to Lozano. The Action Cams came in handy for car rigs, wheel shots and even a shot of a character driving a scooter where the tiny camera was mounted on a helmet.

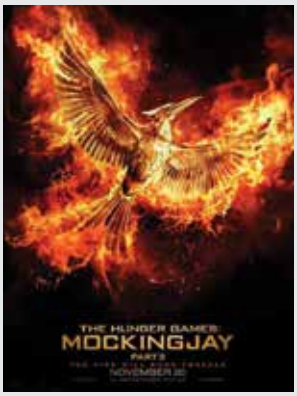
"It was one of the first uses of this camera in Europe, so we were careful about planning our shots," says Lozano. "The images fit with our brutal aesthetic. I'd say 80% of the film is handheld, and even when we had a static shot, we used something under the camera so it wasn't exactly stable. The Action Cam footage worked well with that look."

Produced by Labyrinth Films, *Braqueurs* was recently accepted at the 2015 Busan International Film Festival, one of the largest and most prestigious festivals in Asia.

SUCCESS STORY: BRAQUEURS
CINEMATOGRAPHER: PHILIP LOZANO
RELEASE: 2015







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