MONITOR RECORDERS

STRAIGHT FROM THE SENSOR

ATOMOS

IN ASSOCIATION WITH

PROFESSIONAL PHOTO

How you can improve your filmmaking by adding a monitor recorder to the mix

HISTORY | ADVANTAGES | NINJA POWER! | USER REPORT | MONITOR RANGE

ATOMOS

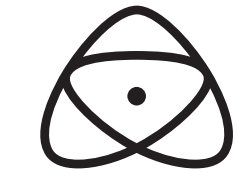
WELCOME TO THE WORLD OF MONITOR RECORDERS!

We've all become used to cameras becoming ever-more compact, which is great news for those who don't enjoy carrying around bags full of heavy equipment, but there is a price to pay for the shrinking size of your kit. One of the downsides is the fact that the size of your on-camera monitor is not likely to be much bigger than three inches, which makes it difficult at times to properly assess what you're doing, while it's nigh-on impossible to share your live view with anyone else, such as a client or an assistant.

Enter the external monitor, which can be attached or detached from your camera or rig in a matter of moments, or even be positioned remotely, and suddenly the problem is solved. But add a recording facility to this and you've achieved so much more.

Now you've effectively added another dimension to your set-up, with the facility on board to capture video with fewer compression artefacts and usually in formats that have the ability to work smoothly with major editing software. You've also effectively created a back-up for your footage, adding another crucial layer of safety into the system.

This e-book is taking a closer look at what monitor-recorders have to offer, and we're walking through some of their advantages and also hearing from a working hybrid filmmaker who has incorporated an Atomos Ninja V into his medium format rig. We'll hear first-hand why it's become such a crucial part of his workflow, and has added immensely to the flexibility of his set-up while still not adding substantially to its weight and balance.



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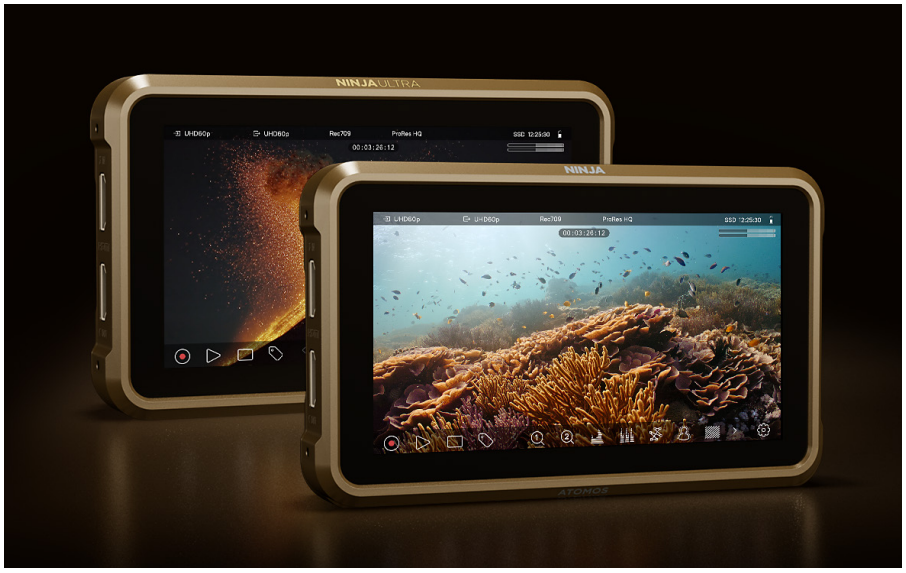
Coming of Age

It might scarcely seem believable, but affordable digital video production is now approaching its thirtieth anniversary. The MiniDV tape format was announced in 1996 and introduced digital video to consumers and professionals alike. Its introduction effectively kick-started the era of desktop video editing and helped cameras like Sony's iconic VX100 and Panasonic's DVX100 become best sellers.

The arrival of the seminal Canon EOS 5D Mark II towards the end of 2008 was another huge moment, and gave us a tantalising glimpse of the future of filmmaking with its cinematic look. Since then, production technology has kept improving to the point where even independent filmmakers can shoot in a format - 8K - that's *eighty-five times* the resolution of DV's Standard Definition.

Now approaching its thirtieth birthday, the affordable Mini DV tape introduced digital video to a whole new audience.

Enter the Ninja...



Monitor-recorders first arrived on the scene with the launch of the Atomos Ninja in 2010. Although relatively basic by today's standards, it recorded to solid-state storage, had a touchscreen monitor and a phenomenally powerful processor that could grab FullHD uncompressed video from a camera and convert it to Apple ProRes in real-time.

In other words that first Ninja was nothing short of revolutionary and, although it's easy perhaps to make such a claim –and we do tend to see seismic moments on a fairly regular basis in technology - in the Ninja's case, it's wholly justified. It was a genuinely giant leap in functionality and form factor, whose direct antecedent was an expensive professional video tape recorder (VTR) like a Sony HDCAM that typically cost US$ 40,000 and weighed up to fifty times more!

Palm Powered

Not only was the Ninja a technological marvel, it also had the further advantage that it could fit snugly into the palm of your hand and was battery-powered. It was also capable of making files you could upload directly into your NLE and start editing right away. Storage was cost-effective computer SSDs, not the expensive (and low capacity) memory cards designed for use in digital cameras, and you could even partner your Ninja with a 2.5-inch hard disk, although this wasn't recommended for mounting on motorcycles for rallycross!

Ninja's architecture made it an extremely flexible, upgradable

Today the Atomos monitor-recorder is still recognisable, but it's bigger, lighter and vastly more capable than its Ninja ancestor, and has become an essential gateway to whole new way of working.

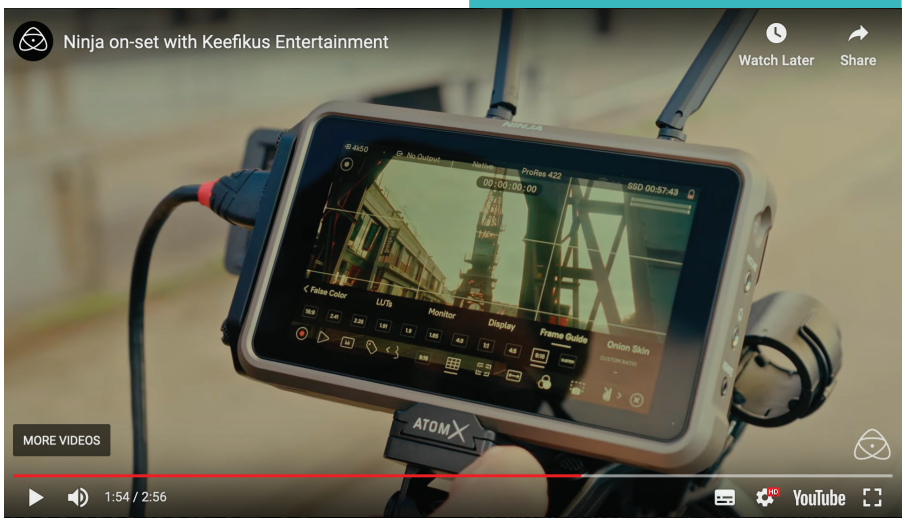
device. With a touchscreen monitor and a programmable high-speed processor on board, the entire device was upgradable by software. It was a paradigm Atomos chose to stick with, and it gave its products the crucial advantage of longevity, meaning that the monitor-recorder was going to stick around.

Today, the Atomos monitor-recorder is still recognisable, but it's bigger, lighter and vastly more capable than its Ninja ancestor. Technology has moved on, and 4K is now mainstream while high-end productions are captured in 8K. As filmmakers start to embrace the cloud – and we know that not everyone will, and we will naturally always cater for them as well – the Ninja has become an essential gateway to a new way of working, building on its decade of close technical cooperation with camera makers.

For many cameras, an Atomos monitor-recorder is not just the best way, but the *only* way for the pro to connect to the cloud.

▶ VIDEO SPOTLIGHT

Watch this video introduction to the latest Atomos Ninja monitor-recorder by leading filmmaker Keith Eccles, in which he walks through what it has to offer serious filmmakers.



Why Use an External Recorder?

This is the million-dollar question of course and, to answer this, we need to look deeper into how the facility to record has moved the whole arena of filmmaking on a significant notch.

Cameras have always used removable storage. If you think about it, even silver halide film was removable storage in its way, while it also served as the camera's sensor! Traditional cameras were precision devices, but had very little to do with storing images. Their role was limited to mounting a lens, supporting a shutter mechanism and providing a light-tight enclosure that could control the exposure of the film.

Digital cameras might look similar but, internally, they're fundamentally different. Simply to understand the advantages of using an external recorder, let's take a look at the building blocks you'll find inside the typical digital camera.

The Lens

There's nothing different here. Lenses are in the analogue domain, and their job is to focus an image on the light-sensitive element, namely the sensor.

The Sensor

Camera sensors are essentially large chips with light-sensitive elements. Even though they are at the heart of digital cameras, only part of a sensor is digital, and the light-sensing part remains analogue. Each light-sensing element outputs a voltage that's proportional to the intensity of the light falling on it. The next stage, which

turns it into a digital signal, is an analogue-to-digital converter. But even then, you can't 'see' the image. What follows is some quite convoluted processing that converts the RAW, unmodified, uncorrected output from the sensor into digital video. And because video inevitably involves tens of frames per second, that's a lot of data to be coping with.

Compression

We'll look at compression in more detail later, but essentially, you'll need this because video

SEE THE FULL ATOMOS MONITOR-RECORDER RANGE ON PAGE 14

files are absolutely huge. For now, the thing to remember is that the less you compress, the better the result. So-called 'mild' compression, like Apple ProRes, preserves virtually all the visual quality of the original video, but most cameras can't use ProRes and, even if they did, the files would still be too big to be accommodated on a camera's memory card. So they tend to use more severe compression to make the files tens of times smaller, which leads to some quality loss.

To be fair, cameras have better internal compression today than they had ten years ago, but Atomos has moved on as well in that time, and there are now more reasons than ever why it makes sense to be investing in a monitor-recorder.

How to Avoid the Camera's Compression

Most cameras conveniently have a way to get uncompressed video out of them and either onto a screen or into a recorder. The HDMI port carries a signal that's as close as you're going to get to the original sensor's output without dealing with RAW video.

Uncompressed video is a universal format that's also known as 'baseband,' and it doesn't matter whether it's on HDMI or the professional equivalent SDI; the video is the same, it's just transported differently. So, if you have a choice of working with HDMI or SDI, it genuinely doesn't matter, because the result is always going to be the same.

> "It's always possible to record on the camera and on an external recorder at the same time. There's almost no reason not to do this and, for the professional operator in particular, it's always good to be creating a back-up."

Broadcasters tend to use SDI because they're wired up for it, and because it has some operational advantages , such as the ability to deal with longer cable runs. HDMI is primarily a consumer format designed to work , say, between a set-top box and your television. This means that distances are strictly limited, and it you ever have problems recording through HDMI, checking the cable should be your first, not your last, port of call!

Once inside a Ninja or Shogun, an extremely fast processor turns the video into a compressed file in real time. With built-in Apple ProRes encoding from day one, Atomos monitor-recorders have always had the ability to capture the best possible picture quality directly from your camera's sensor.

Remember that it's always possible to record within the camera and on an external recorder at the same time. In fact, there's almost no reason why you wouldn't do this and, for the professional operator in particular, it's always good to be creating this kind of back-up if you can.

Recording RAW

The digital signal direct from a camera's sensor (after analogue to digital conversion) contains the maximum possible information about the original scene. But you can't watch it like you can uncompressed video and, even if you were to try, it wouldn't look very good since RAW video is always going to need processing before it becomes viewable.

Because of this it's not surprising that HDMI was never intended to carry RAW video - what would be the point? Luckily, Atomos monitor-recorders are able to receive RAW video over HDMI (and SDI, where available), owing to the fact that years have been spent talking at length to camera manufacturers and bringing them on board with the idea that capturing RAW video to an external recorder is going to deliver huge benefits to the end user. As a result, Atomos products can record manufacturer and camera-specific RAW from a vast range of DSLR, mirrorless and cinema cameras.

The payoff from this is immense since, just as with still photography, the ability to capture a RAW file means that you have all of the information from the capture stage at your fingertips, and can alter things such as white balance, ISO and all kinds of other parameters *after* the footage has been shot. It gives you so much more control over the final editing.

Some cameras, such as the Sony FX3, don't record ProRes RAW internally but do make it available to an Atomos monitor-recorder. This means that with an Atomos workflow, it's possible to capture significantly greater quality than the camera on its own is capable of. To give some idea of the importance of this, *The Creator*, an AI-themed science fiction drama, was able to use this capability to reduce camera costs and increase creative options by using a very

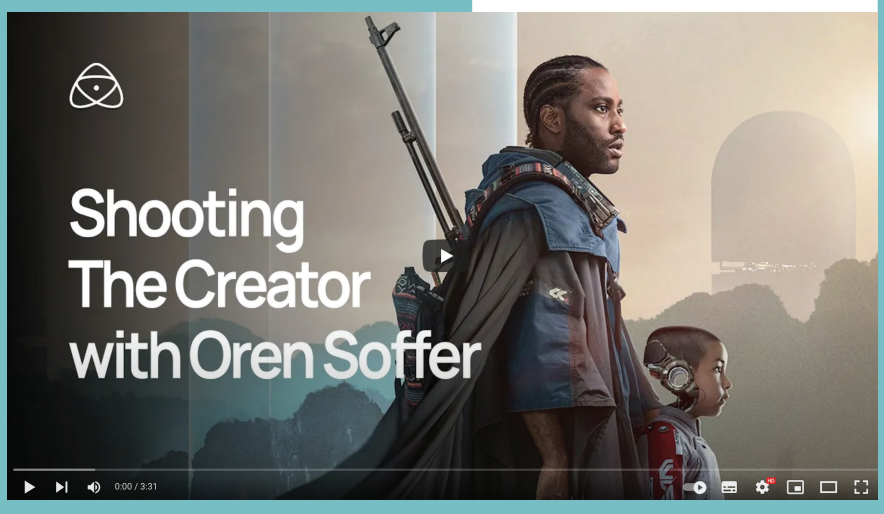
small camera rig on location. The film quality is so good that the production has been shown to ultra-critical audiences in IMAX cinemas, to great acclaim. Working with RAW is not for everyone. If you have the time for a RAW workflow, then by all means, go for it - the results can be incredible. However, if you need fast results, recording the uncompressed signal from an HDMI feed into a Ninja or Shogun will still be a really good option that could ultimately save you time.

The Best of All Worlds? Apple ProRes RAW

Moving on, what if you could combine the ease of editing with ProRes with the unfettered flexibility of RAW video? And with ProRes RAW that's exactly what's possible. It means you can retain all of the flexibility of a RAW recording, with smaller file sizes, and, just like the original version of ProRes, you then have the advantage of easy editing. Recent versions of ProRes RAW carry metadata that allows camera-specific information to be carried forward into post-production. There's a lot to take in here, and we'll come back to it later.

▶ VIDEO SPOTLIGHT

Catch up with Creator DOP Oren Soffer as he explains why small is beautiful.



Atomos Monitor Recorders come in a variety of shapes and sizes and include models that are set up and ready to connect to the Cloud.

Ten Reasons to Choose a Monitor Recorder

1 Record Direct From Your Sensor

Capture video directly from your camera's sensor through HDMI or SDI – both uncompressed 10-bit video connections. By bypassing in-camera processing, you can access the sensor's pristine video signal, ensuring the maximum colour and brightness fidelity. You can capture RAW video as Apple ProRes RAW for maximum flexibility in post-production.

2 Higher-Quality Recording Codecs

Apple ProRes and Avid DNxHR provide better colour and brightness, less invasive compression and higher bit rates compared to the highly compressed formats used in many cameras. With external storage, there's more space to capture these cinema-quality codecs and, for most purposes, ProRes and DNxHR will be as good as uncompressed video. At higher bit rates, they're visually lossless, and – this is a lesser-known fact – they're extremely resilient to multiple encodings and decodings. This really matters because, in a complex production, your NLE might encode and decode your footage many times during processing – even a simple dissolve or fade to black will require decompression and recompression. With ProRes and DNxHR, this isn't a worry. How good are these codecs? Well, good enough for the majority of film and TV productions, which means that they're right up there!

3 Direct-to-Edit Workflow

Apple ProRes, ProRes RAW and Avid DNxHR are all designed to be efficient, so you get professional quality, but with smaller file sizes that are easier on your computer. This means you can edit directly using the captured video files from the monitor recorder – often from the same removable storage. You'll find there's no compromise in the workflow, only benefits: speed, efficiency and with less time spent data wrangling.

4 Longer Recording Times

Storage keeps evolving, but SSDs are still a great format in terms of price and capacity. With Atomos' multi-codec talents, you can always choose a codec like H.265 to give you greatly extended recording times, even if you boost the bit rate to give you extremely high quality. You can read all about using H.265 in our eBook [here]. H.265 is ideal for capturing long events where it's not possible to swap storage media, and with network-enabled Atomos ›

recorders, you can always send your footage directly to the cloud for infinite storage!

5 Sharing Your Shoot

Connect a monitor to your camera and suddenly you've got a far bigger viewing screen to work with, enabling crew members and clients to share your live view and to add their input. Seeing your image on a bigger monitor also enables you to see the wider surrounding context, which you don't get by peering into a tiny viewfinder. This can help you avoid issues you might otherwise miss, such as someone inadvertently walking into shot.

6 Larger HDR Monitors Also Come With Production Tools

AtomOS 11 provides filmmakers with a comprehensive set of monitoring tools for greater control over the image, exposure and composition. These advanced features contribute to an efficient and precise production workflow, ultimately improving the quality of the final production.

- Ensure everything is in focus with focus peaking
- Frame the shot for social platforms with frame guides
- Ensure accurate exposure with waveform, zebra, false colour and histogram
- Capture in Log, with the option to preview with a LUT

It can be tricky to monitor HDR video, since you need a very bright monitor to show all the highlights. All current Ninja, Shogun and Sumo products have HDR displays, and AtomOS 11 supports HDR monitoring. Users can accurately assess and capture scenes with a wider dynamic range, which is crucial for productions that prioritise high-quality visuals and want to take advantage of the increased detail and contrast available in HDR workflows.

7 Back-up Recording

The best recording is the one that exists! It's essential to have a good back-up strategy, just in case. All Atomos monitor-recorders can capture video at the same time as the camera, so it's easy to make two copies. With Camera to Cloud, you can even make three copies simultaneously, by uploading to the cloud or downloading to a remote computer. With Atomos monitor-recorders, backing up your valuable footage is easy.

8 Flexible Mounting Options

All Atomos monitor-recorders have flexible mounting options that allow them to be fixed on the camera or set up separately. There are lots of options available, so it's up to you which one you choose.

9 Live Streaming

It's never been easier to set up and manage a live video stream with Zato Connect, any Ninja, Ninja Ultra or Ninja V/V+ fitted with Atomos Connect , or Shogun and Shogun Ultra, all of which have a streaming/network interface built in. Attach almost any digital cinema, mirrorless, DSLR, web, or mobile camera with an SDI, HDMI, or USB connection and you're ready to stream.

10 Camera To Cloud

With Camera to Cloud (C2C) workflows, remote editors can start work as soon as the footage uploads, while their co-workers can review and comment on the footage from any location. With Atomos Cloud Studio, connected monitor-recorders can access different C2C platforms, including Adobe's Frame.io, Sony's Ci Media and EditShare's MediaSilo. This is a very different concept for video production, and you can learn more about it in our Camera to Cloud eBook [here].

Food vlogging with the Zato Connect.

USER REPORT:

The Monitor Recorder in a Pro Workflow

Hybrid photographer turned filmmaker JIM MARKS talks through the impact Atomos monitor-recorders have had on his life as a solo operator, and explains how he's customised his Ninja monitor to deliver a finely tuned performance that's perfectly in line with his chosen way of working.

Filming fashions change but one thing is constant: the march of the mirrorless cameras continues to grow with their adoption across the industry. From feature films such as *The Creator* through to stadium-based live sports and events, the cameras we're all using are getting smaller and faster as they push the boundaries with larger sensors in bodies that appear to be ever-shrinking.

Hand in hand these advances create new tensions for the working operator. As the cameras get smaller, having less real estate on the camera body can present fresh challenges. How, for example, can you monitor and rig these miniaturised handheld devices while still maintaining the highest possible recording quality in your workflow?

For some years now Atomos has offered one of the most portable and accessible off-camera RAW recording solutions. Whether it's the many versions of the Ninja, the SDI-capable Shogun or the giant on-set behemoth that is the Sumo, there's an option available for most productions.

As a working filmmaker who ›

ABOVE: Hybrid creative Jim Marks is enjoying the move to medium format filmmaking.

works regularly with the latest generation of hybrid mirrorless models, the monitor-recorder has long been a staple of my everyday workflow. For the last few months, for example, I've been developing a small Tilta-based Fujifilm GFX 100 II rig, which marries the magic of this camera's incredibly light form factor and awesomely powerful medium format sensor with the versatility of the Atomos Ninja V+ recorder monitor, giving me a set-up where I can seamlessly capture ProRes RAW HQ.

Recently I was given the opportunity to offer feedback on the latest Atomos firmware 11.06 update, which I'm delighted to say has led to the introduction of a proper F-Log 2 monitoring workflow. In practical terms this means that, with the use of the rear external SDI module on my Ninja monitor, I can output a Bt709 feed in an F-Log2 colour space (2020 is also available).

This facility then allows my director or client to see the RAW footage using an F-Log2 show LUT of my choice. It's all helping the cause of F-Log2 being accepted, whether that be in FCPX or the beta version of DaVinci 19. Time and again I see F-Log2-enabled Fujifilm XH2s and GFX 100 II's being used as B and C cameras on larger ARRI based productions, since it's such an easy and natural partner to this established player.

Features and Reliability

Of course, the recording hardware is but one element of the overall picture, and the operating software likewise plays a vital role in providing the features and reliability we all need when filming. Atomos' latest Onion skin UI is a big improvement on previous iterations, with a cleaner look and simplified controls. I personally like being able to add my guides and waveform with the option to keep it small and to the side, with the opacity increased and brightness knocked back so it's there but not distracting.

Having access to that level of customisation is really important. In the same way as your camera might feature custom buttons you can utilise for your favoured shortcuts, everyone has their personal viewing preferences, so it's great we have a menu and screen options that allow users to customise their device.

On the Ninja itself you can have an unbaked look, bt709, or add a show LUT, which tends to be my approach. I always securely erase my drives on the unit, and a 500GB gives you 27 minutes in ProRes HQ at 4K 24 fps, while a 1GB will give you 54 minutes, again my choice. I set the waveform to be small bottom left, and have peaking, zebras and false colour to assist my exposure choices. Once you've worked with any screen for a while you get an instinctive feel

for where things should be. On the guides front I can set safe areas and composition frames, and I tend to use the 2.35 crop guide a lot. I even sometimes use the frame grab button if I want to just capture what a scene might look like. For anamorphic glass I definitely appreciate the desqueeze options, and they're all covered, from 1.25, 1.33, 1.5. 1.65, 1.79, 1.8 and 2 times.

In the future it would be great to create custom ones. Using timecode, I would jam the GFX 100 II with an Ultraysnc blue box and its iPhone app, and this then would carry over into the recorder over HDMI. If you have the black Ultrasync One with its hard-wired mini port you can also mix this camera with others on tentacles, or even use an external audio recorder as your master clock.

The two ports people most often overlook are the headphone and remote inputs. The former is crucial to monitor if your audio is going directly into the Ninja as your master copy, while the latter is actually really useful if the camera is stuck in a hard-to-reach place, as you can trigger your recording by using a long cable.

Building a Rig

Centred on my Fujifilm GFX 100 II, I've created a camera build that tries to strike that delicate balance of keeping weight down yet being ready to go straight out of the bag. I use a Tilta cage system with a small top handle and a 15mm rod support below. I have actually now downsized the cage connector to the basic Tilta Arca one, since it allows the camera to be hot swapped off the rig quickly.

"The two ports people overlook are the headphone and remote sockets. The former is crucial to monitor audio, and the latter if your camera is in a hard-to-reach place, since a cable can then trigger the recording"

At the front of the rig I'm running a Tilta Mirage matt box with variable or fixed ND, and Promist filters. I love that I can roll the ND on the top easily if I'm having to adjust levels on the fly. It has a small support to connect it to the bars for stability and, crucially, it's not too wide, so it fits in a carry bag while fully assembled.

On the rear of the set-up, I have one of the latest Tilta V lock power plates. This powers the camera via a dummy battery-to-dtap cable, while the other dtap runs to the power adaptor mounted on the SDI accessory on the Ninja V+. I've chosen to do this to get as much weight off the Atomos as possible, since it tends to be set up high. This helps the overall balance and allows me to power the entire design from one PAG battery.

In addition, the rear power unit has a couple of USBc ports to help power other accessories, such as, for example, a Nucleus Nano follow focus. One of the trends I only see accelerating is the wide spread adoption of the USBc socket for data and power.

I'm really pleased to see how all these components are gelling together to create a small punchy cinematic powerhouse. As for the future, well, older readers might possibly remember a product called the Ninja Star. I'd personally love to see an updated version of that: smaller than a packet of cigarettes, passive cooling, Cfast type B, with lockable USBc, SDI and HDMI inputs. Go on Atomos, you know you want to!

More information: marks.co.uk

▶ VIDEO SPOTLIGHT

Watch as Jim Marks talks through his incredibly compact medium format rig.

Check Out The Atomos Line-up

The original Atomos Ninja was the first ProRes recorder to feature a touchscreen monitor and, therefore, the first product to accurately be described as a monitor-recorder. Its development offered several huge advantages, for both filmmakers and those shooting stills.

For those recording video the first and most obvious advantage the Ninja offered was the ability for creatives to see what they were recording. Previous devices recorded a timecode, but you couldn't see the footage. It was like building a Sony Walkman without a headphone socket.

Another big plus is the fact that an external monitor lets you see what you're filming but in the context of the world around it: in other words, you can see beyond the edges of the monitor. When you're looking at a tiny camera viewfinder, your eye is enclosed, and you literally have tunnel vision. And, of course, multiple people can view the external monitor, perfect for those working in a team situation.

With a touchscreen there's also the fact that you don't need many physical controls, because they can be accessed via the screen, a much more intuitive way to work.

Ninja

Dimensions: 151x91.5x31mm
Screen size: 5.2ins
Screen resolution: 1920x1080
Brightness: 1000 nits

For more information

Ninja Ultra

Dimensions: 151x91.5x31mm
Screen size: 5.2ins
Screen resolution: 1920x1080
Brightness: 1000 nits

For more information

Shogun

Dimensions: 198x133x40mm
Screen size: 7ins
Screen resolution: 1920x1200
Brightness: 2000 nits

For more information

Shogun Ultra

Dimensions: 198x133x40mm
Screen size: 7ins
Screen resolution: 1920x1200
Brightness: 2000 nits

For more information

More information: atomos.com/creators

It also means you can update the user interface at any time to include new features or improve existing ones as a result of customer feedback. Thanks to the use of FPGA-based architecture – which employs what are essentially very fast blank processors - Atomos monitor-recorders are super upgradable.

A well-featured monitor will also include exposure, colour and HDR monitoring aids in the package. All Atomos monitor-recorders now feature extremely bright, high-quality HDR and daylight-visible screens, which are exactly what the professional requires.

A screen of this quality also serves as the perfect basis for a suite of monitoring tools that make your Atomos device indispensable. Tools currently on board include focus peaking, aspect ratio overlays, zebras and false colour.

Finally, you can use an Atomos monitor-recorder simply as a viewfinder. All come with a variety of on-camera mounting options and feature at least a 5-inch high-quality screen. Atomos also offers a line-up of monitor-only products called Shinobi. If that's all you need right now then this range is the perfect choice, for both stills and hybrid operators.

Sumo 19SE

Dimensions: 504x310x63mm
Screen size: 19ins
Screen resolution: 1920x1080
Brightness: 1200 nits

For more information

Zato Connect

Dimensions: 151x91.5x29.5mm
Screen size: 5.2ins
Screen resolution: 1920x1080
Brightness: 1000 nits

For more information

Ninja Phone

Dimensions: 98.2x85.4x17.4mm
Screen size: variable
Screen resolution: 460ppi
Brightness: 1600nits

For more information

Shogun Studio 2

Dimensions: 490x152x280mm (with rack ears)
Screen size: 2 x 7in
Screen resolution: 2 x 1920x1200
Brightness: 1500/3000nits

For more information

ATOMOS

SUN DRAGON

Enter the Dragon

The world's first sun spectrum, HDR, waterproof, wireless DMX, 2000 lumen, 5-color LED, flexible and lightweight production and cinema cable light

COMING SOON