

THE FUTURE OF VIDEO PRODUCTION TODAY

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by those in the know

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The way the camera interprets lighting in film is extremely important to know. If you don't understand the physics, you will not be able to predict the outcome

The future of lighting in cinematography will involve a combination of technological innovation and creative experimentation. We ask our round table of experts how they see the evolution over the next few years

INTERVIEW. Robert Shepherd

THE INTERVIEWEES



SASCHA JAZBINSEK CPO innovations & mechanical design Sumolight



JEREMY HOCHMAN Founder Megapixel VR



CESAR CACERES Product lead Brompton Technology



SASCHA JAZBINSEK: Physical LED lighting technology will be more and more integrated into digital workflows such as image-based lighting, digital light planning, pre-vis, tech-vis and, of course, virtual production. As these technologies are developing very quickly, workflows need to be established, and physical tools like lights need to accommodate.

This integration will then lead to new operational standards that will help gaffers and DOPs to plan and deploy a lighting set-up more efficiently. Digital twins of fixtures will help to refine and organise shoots and lighting set-ups.

JEREMY HOCHMAN: LED is advancing at an extremely rapid pace year over year. Colours are better, black levels have improved and driver chips allow faster signals. I know, I said black level in relation to lighting – but it can make a difference if the source is supposed to be high contrast and image based! Combining these attributes means better on-camera performance and improved colour accuracy. More importantly, the better the technology, the easier it is for creatives to achieve their goals - when the tech is a tool that's embraced and not something that has limitations and requires workarounds. Whether LEDs are in frustum, moving lights overhead, or fixtures on C stands moving around shot by shot, the improved refresh rates and colour performance make the process much smoother with less technical trial and error on-set.

CESAR CACERES: One benefit of shooting a scene in a virtual production LED volume is the realistic reflections and lighting from the LED panels themselves. This such is an important element of achieving realistic in-camera visual effects that many volumes have LED ceilings or flanking walls that will never be in shot, but are there solely to contribute to the lighting of the scene. However, in practice, the RGB panels we use today are great for direct view, but not actually very good for lighting a scene. Their spectral output is different from normal lighting sources, so skin tones in particular can look unnatural and some colours are shifted. This is changing with advancements in LED, such as panels with RGBW emitters for better spectral quality.



Making sure that this advancement maintains colour accuracy and gives users the control they need will bring the next lighting evolution to VP volumes.

Can you discuss any recent breakthroughs or innovations in lighting technology that you feel will have significant impacts on cinematography in the future?

SJ: Apart from general digitalisation of workflows, I see potential in image-based lighting that will have an impact. Also, reflective lighting, although around for a while now, is taking over more and more. Because of their extremely narrow beamangles, laser-based light engines will develop further.

Lighting has become more of a joint effort of VFX and the lighting department. That leads to solutions on-set that need to be understood from both departments. With the Sumosky, for example, you can light a set but also use it for IBL or green/ blue screen – or feed it Unreal Engine content for reflections when on VP stages. The knowledge you need to use these systems in the best way is still spread across departments, which will lead to new roles or workflows in the future.

JH: Prior to this year, LED video panels were only produced using RGB LEDs. Lighting has utilised a broader

"Lighting has become a joint effort of VFX and the lighting department"

spectrum with additional colours such as white, cyan and amber, but the control systems differ to the extent that making a unified system is cumbersome and complex. As of this year, manufacturers are starting to build RGBWW-based panels which provide much better colour reproduction. As such, these panels can be used as both video and lighting tools, integrated on the same control network, and all driven from the same game engine instance. In order to 'sell' that an actor is in a real environment, it's imperative that the foreground and background lighting actually matches, and these new RGBWW panels will help with this tremendously. Helios is the only LED-processing platform that can support a native fivecolour pixel, and we've put significant R&D into future-proofing our colour pipeline to ensure video-driven lighting is a natural element in our ecosystem.

CC: Per-pixel control to create dynamic lighting has been extensively tested in VP studios, with mixed results, but the benefits are major. Using LED panels that have this function is just the natural evolution and simplifies the process greatly. When everything is calibrated to the exact same targets, the starting point in terms of colour accuracy is greatly improved. This is what Brompton is bringing to the table with TrueLight – it's the first technology capable of achieving fully calibrated LED panels with extra emitters for the most accurate experience when using LED panels for lighting.

How do you see lighting design evolving to accommodate new formats such as virtual reality and augmented reality?



"As it stands, lighting and video design are already being combined into a single workflow on some projects"

SJ: There will be digital twins of fixtures that can be used to design lighting in virtual and augmented reality. Also, reproductions or captures of natural light such as different day times in different places around the globe will be available for these kinds of applications.

JH: As it stands, lighting and video design are already being combined into a single workflow on some projects. Creative directors are often replacing the independent roles of lighting designer and video designer. By having a single creative director in charge of the vision for the production, they can manage the complexities of picking the right pieces of technology and using that technology to paint the creative vision they have. Virtual and augmented reality are just tools in the toolbox of creatives. Augmented reality allows artists to extend the scenery from the physical space into the virtual space and enhance the storytelling experience along the way.

What do you believe is the future of lighting in terms of sustainability and energy efficiency?

SJ: LED technology already helps save energy and will replace more and more traditional fixtures. The downside of LEDs is that the fixtures changed from comparatively simple designs to complex electronic devices. If we don't want to create another pile of electronic waste, lighting manufacturers need make their products last for a long time. So, hardware needs to be sturdy, repairable and updateable. It doesn't make any sense to create fixtures that are cheap but not futureproof. With the Sumomax, we created a modular design that is very sturdy and functional, and sub-assemblies can be swapped fairly easily in service. For example, if there's a failing LED, we have a process that allows us to repair the lightengine as opposed to just exchange for a new one. In addition, Sumomax is not only our most technologically advanced light, it's the first product we've made that is 100% net zero.

JH: Lighting is certainly becoming more efficient each year with better diodes



and phosphors. It's also interesting to think about how cameras interpret lighting. With virtual productions somewhat training creatives to look at a camera feed rather than what they see by eye on set, it's then possible to optimise lighting for the camera and not the human observer. For example, if a camera is set to a 180° shutter, then half of the time it's closed – and therefore light does not actually need to be emitted for the benefit of the camera – this means a light with proper camera sync could be on for 50% of the time. This can translate to enormous power savings.

CC: When talking about LED,

sustainability is often at the bottom of the list. A volume can have hundreds of panels – that number can even go into the thousands. Creating products that have a longer life and are more efficient can make a big difference. In the case of LED panels used for lighting that have extra emitters, those emitters are usually white, which has much higher efficiency than the RGB combination used until now.

Can you discuss the importance of colour theory in lighting design and how it plays into creating the atmosphere for a scene?

SJ: Colour theory is one of the more complex topics in lighting for film. Of course, there's a very strong technical side, which helps gaffers, DOPs and graders to understand the impact their tools will have on the workflow from shoot to post. The way the camera interprets lighting in film is extremely important to know. If you don't understand the physics you will not be able to predict the outcome, and therefore take high risks of making a wrong decision during the shoot. Also important is being able to communicate colours with set design and make-up to make sure their choices will make it to the end without being degraded by the way digital film works.

JH: Colour theory is quite important to create a well-lit scene, but also important is a strong understanding of colourimetry. In addition to the differences between additive and subtractive light sources, it's imperative that users have a grasp of the quality of light and how different types of sources appear different to human observers and cameras. With such a variety of lighting on set, metamerism can be a significant challenge to overcome – and creatives must fully adopt either an



"Lighting that mimics the human eye's perception in darkness gives a subtle, natural look"

in-person or camera-specific approach to maintaining colour accuracy.

CC: Lighting can dramatically affect colour and is extremely important in ensuring the desired result is achieved. In virtual production, where the aim is realism, this involves making sure the colours of the foreground elements and the colours of the background scene match. The background is illuminated in the virtual world, not lit by the physical lights on set. Multiple devices are used and this results in a variety of colour representations that need to be matched with the scene. Understanding what colour each light can achieve and the quality of the spectrum of light are important additions to knowledge of lighting techniques and artistic approach.

How do you approach lighting for night shoots/scenes, and do you think technology will evolve to make these scenes easier to shoot?

SJ: I am not a cinematographer, but there are very interesting techniques being used. Using two cameras, one for normal footage and one recording infrared, for example. This allows for good contrast and being able to see colour by combing the footage in post. Also, lighting scenes that mimic the human eye's perception in darkness by getting gradually brighter as the scene evolves, is something really

clever that gives that subtle, natural look you want to have for night scenes.

JH: Cameras are getting better and better at recording clean images in low light, but the sensor itself is the driving factor for how low that level can be. For extreme low-light scenes, we've implemented a special feature in Helios called 'theatre mode'. It requires tiles to have special calibration at various output levels, but a user then has the ability to maintain full bit depth at hyper-low near-black levels. As more panel manufacturers adopt some of these newer features – which are being added constantly, as each major shoot is a learning process for everyone involved – the more the general industry will benefit.

CC: I'm no expert in film lighting so can't comment on approaching night scenes. However, when it comes to advancements in technology, we have a fantastic new feature – extended bit depth – which typically offers two to three stops of additional dynamic range on camera, which is a huge advantage when filming an LED screen displaying dark, shadowy content. This additional range can also be used to achieve brighter, more realistic lighting – as when using extended bit depth the camera exposure can be increased substantially, which makes the panels - and any lighting from them appear much brighter on camera.

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