WANDAVISION • JESS HALL BSC ASC

The quirky nine-episode Disney+ show, WandaVision, has thrown some new and unexpected curveballs into the bloodstream of Marvel’s wider, cross-platform and drama with old and new Marvel platitudes, as well as characters from across the comic-book and motion-picture universes, all whilst paying a loving homage to, at all things, famous family-oriented sitcoms from the 1950s through to the early 2000s.

The show examines whether grief-stricken superhero Wanda Maximoff (Elizabeth Olsen) will ever win the love of her ex-husband Vision (Paul Bettany), and their two mysterious children, despite the outside world aggressively barging into her fantasy.

For cinematographer Jess Hall BSC ASC, and his crew, in terms of how they filmed a unique show that liberally mixes looks, eras, and stylized visual references to famous TV sitcoms and multiple Marvel movies, Hall’s WandaVision journey may well be as complex as anything seen on television in a long time, if ever.

That journey included a lengthy prep involving, amongst other things, extensive study of the history of classic sitcoms from various eras. He spent a great deal of time analysing images from such shows to figure out how best to combine elements of those looks for certain sections of the programme with his own aesthetic sensibilities, which would ultimately fit the show’s unique narrative.

Hall also had to sort out a wide range of on-set workflow and lighting issues, unique post-production requirements, and more. He first chose ARRI’s Alexa LF Studio and Film systems as his camera platform, capturing everything in Open Gate Mode. But his biggest initial task lay in figuring out how to lens a show that weaves programmes captured on film in different periods of history – including a B&W debut episode shot live in front of a studio audience – along with major VFX-oriented features captured digitally, in different aspect ratios, namely 1.33:1, 1.78:1 and 2.39:1.

The cinematographer calls WandaVision both “a juicy puzzle” and “a hybrid fusion of a show, made at cinema quality,” and says the lasting piece of the puzzle was crucial to unlocking solutions to various other creative and technical challenges.

“I knew I would have to use one camera platform, because I didn’t want to try and use 10 different formats – it would have been a simpler approach,” Hall explains. “I knew early on that I was going to be capturing B&W colour data on the Alexa platform, and then employing all the tools of cinematography to bend that data into a period envelope. There was a huge range in the material we would be shooting, which added great complexity. However, the hardest thing we needed to do was to create some sort of unity across that palette, something that was coherent and balanced over many episodes, but which could also evolve appropriately as the different sitcom areas were developed. In that regard, I had a lot of lensing choices to sort through.”

ADAPTIVE OPTICS

After spending significant time “excavating the vaults” at Panavision Woodland Hills for both vintage lenses and glass used on some of the more recent Marvel movies, plus doing extensive testing, Hall finally decided, in collaboration with Don Sasaki, Panavision’s VP of optical engineering, that the only way to achieve the mythical visual goals set out before him was to turn to the concept of adaptive optics. Hall says this essentially means “adding elements to existing lenses, rather than trying to modify period lenses” in order to achieve performance and flexibility that goes beyond traditional lighting methods – in this case, adapting the technology from Panavision’s Primo line of lenses.

“All told, I used 47 different lenses across the production, which were grouped into three series,” Hall states. “The series one lenses covered episodes one, two, three and five (reminiscent sitcoms from the 1950’s to the 1980’s). They were custom-construction lenses that I worked with Dan to develop, with characteristics from those eras. They were adjusted in terms of softness, edge-to-edge focus fall-off, lens curvature, highlight halation, and softening in selective colour. These lenses were also configured on a scale that increased the lens characteristics in relation to T-stop. I could vary the lens personality by shooting at a specific stop, thus enabling me to create different looks across four areas using just one set of glass.”

Hall elaborates that the second block of lenses were an existing set of high-speed Panaspeeds, used for episodes six and seven to emulate more modern sitcom visuals. The third block of lenses consisted of a set of Ultra Panatars, originally developed to shoot the Marvel features Avengers: Infinity War (2018, DP Trent Opaloch) and Avengers: Endgame (2019, DP Trent Opaloch), albeit strategically altered by Panavision. Hall says their use enabled him to better capture the look of the familiar MCU that fans were used to seeing in the Marvel films for portions of the last three episodes, as well as sections of other episodes that take place outside of Wanda’s magical sitcom existence – especially, replacing MCU material within a familiar visual language, and one that enabled the camera to move between the various realities inside and outside of Wanda’s fantasy world, known as The Hexagon.

“By using Ultra Panatar lenses, I switched for the first time in the show from spherical to 1.3X Anamorphic to give the audience a perspective change in terms of spatial distances,” Hall relates. “Of course, when it came to actual execution, we certainly used more camera movement, more CGI camera moves, more interactive lighting, and more contemporary framing than the sitcom sections of the show, more like the Marvel movies. So we have an aspect ratio transition as the show goes along, but also a lensing shift. By introducing Anamorphic lensing for the critical differentiation between the sitcoms and the MCU, I was actually trying to change the way the audience perceived space, perspective and depth within the frame due to the inherent compression and unique characteristics of the Anamorphic format.”

By Michael Goldman

Jess Hall BSC on set with Director Matt Shakman. ©Marvel Studios 2021. All Rights Reserved.

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Sasaki emphasizes that adapting the Ultra Panatar lenses to create the MCU look was the project’s “most challenging exercise” on Panavision’s side of the equation.

“Jess wanted to use the Ultra Panatars as the ‘revel lens’ that made use of a larger format sensor and presented an image with higher clarity, but with an organic, cinematic feeling.” Sasaki explains. “However, although the Ultra Panatar lenses are Anamorphic, Jess wanted to avoid photographing too much horizontal flaring, and also to reduce the amount of flare resulting from the B&W look. Due to this consideration, we needed a new, modern version of the Ultra Panatars to fill the void.

“We utilized the same technology that is at the heart of all our Anamorphic lenses, but the path we used to create the WandaVision Ultra Panatar lenses was an educational one that paved the way for other lens ideas. We started by increasing the progression of power to make the weaker 1.3X Anamorphic squeeze how the look of a stronger Anamorphic Anamorphic lens. Next, we had to add the coatings on the cylindrical elements to reduce the amount of flare and veiling-glare in the opticals. The hardest challenge was addressing the apparent sharpness of the lens. Jess wanted a lens that had good contrast and resolution, yet at the same time, he was leaning toward a look that would not be interpreted as being synthetic and flat. So the idea behind using the Ultra Panatars was to provide an enhanced look that offered a noticeable visual difference from the images of the other timelines.”

LOTS OF LUTS

Meanwhile, in order to keep track of looks from one shot to the next and during production, Hall worked closely with Technicolor colour scientists Josh Pines and Chris Kutcka. With their help, in a digital intermediate environment at Pinewood Studios in Atlanta, where much of the show was shot, Hall implemented 23 different look-up tables (LUTs) during filming.

“Those LUTs included the SDR HDR, and different camera input LUTs for each look,” explains Hall, whose digital imaging technician, Kyle Spicer. “For me, as you can imagine, this created an interesting challenge in terms of keeping up with all the moving pieces. Each show LUT consisted of an SDR version, a 600-nit CIFEMATOGRAPHY WORLD MARCH 2021 35

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HDR version, and a 1,000-nit SDR version. We ultimately decided on 600 nits as our on-set master. We all felt this gave us the best range, whilst also allowing the HDR to have a very cinematic effect.”

Spicer adds that one goal for WandaVision was for the entire show to be mastered in HDR from beginning to end. “That’s different from most current TV shows, which still use SDR as the master, with a trim pass being applied to the HDR in the DI process.”

To allow-on-set monitoring that would clearly pick up such nuances, Spicer says the production used two Sony BVM-HX310 monitors on-set, viewing everything in two 4K HDR, and two Sony PVM-A250 monitors to simultaneously view imagery in SDR.

“The Sony BVM-HX310 monitors really are a gold standard for all HDR viewing and finishing on-set and in the DI,” Spicer elaborates. “Using both HDR and SDR monitors gave the ability to look at all possible outcomes, and have confidence that what we were seeing on-set would translate to the final image. However, that also meant we had to view both the HDR and SDR versions of the LUTs at the same time, and that, in turn, doubled the amount of LUT boxes needed. I used TVlogic 4K 15-min for the HDR side of the world, and regular 15-min for the SDR material. Since we treated the show like a feature and didn’t shoot episodically, we jumped around a lot. To make things as consistent as possible, we took thousands of stills, both in HDR and SDR, to reference as needed.”

“Speaking of reference materials, one key part of his process was the construction of reference books of all photographs from the various time periods the show pays homage to “comic-looks,” as he puts it. “When it came to the colour work, I was able to take those stills and actually analyse RGB values in the colours I was seeing, and basically refine them into a 20-colour palette for each era,” Hall says. “This formed a template which I shared with the art department, costume designer, and VFX supervisor. I knew that restricting the colour palette was the best way to take control of the image, and give it a period integrity. Colour is viewed subjectively, and the period work is extremely subtle, so establishing an absolute scientific value was essential, as it left room for interpretation, and enabled great cross-departmental collaboration.”

“Each episode had its own process. I would look at the reference material, refine it into key still frames, extract the RGB values of the colours within the stills, and then refine them in collaboration with our production designer, Mark Worthington. Then, we built the LUTs working with Technicolor, and worked on them.”

Once Hall figured out his colour palette for each era, he and gaffer John Vecchio relied on lighting instruments as approaches: “That were period-appropriate, and part of the filmmaking vocabulary of those periods. For example, we shot the opening with Technicolor and worked on lighting.”

Jacobs adds that Marvel’s software development team made important strides to help finish WandaVision. “One of the exciting things about building our internal DI was that our software development team was able to deploy a system we call Jarvis,” Jacobs explains. “That started as essentially an automated timeline generation tool. You feed it an editorial timeline and it gathers and moves all the files needed. It requests any missing shots from our plates tab, builds a DI workflow timeline for final colour grading, adds metadata like VFX shots and notes, along with all the AIE data, and applies the per-shot LUT, CCL and framing.”

“However, our team then extended Jarvis to leverage a little-known DaVinci Resolve feature called Take Selector. For each VFX shot, Jarvis can load Take Selector with all previous VFX versions, as well as the original plate, so that our team can quickly compare other versions of a shot, or even change versions on the fly, without going back to a conform. This feature allowed us to move much faster than a traditional conform/DI workflow.”

By episode three, the first episode in colour, the show begins to cut back-and-forth from particular sitcom eras to the MCU universe, and the lighting focus therefore transitions accordingly. Vecchio used ABEI SC-60 with top boxes at 5,000K, Big Eye 10K key lights with a combination of cosmetic peach and burgundy gels, and 4K Softlight with a cosmetic gel was used for fill. As the was the first episode in colour, Jess took full advantage of mixing soft blue top-light with cosmetic gels on our key lights, and then filled with soft rouge gels. Vecchio elaborates.

**BIG FINISH**

With all the different looks, era, styles, colours, shifts and visual effects (about 3,000 VFX shots over the whole series, more than in the entire Avengers: Endgame movie) in the nine WandaVision episodes, the digital intermediate/ mastering process was of crucial importance. The show is the first one finished entirely in-house at Marvel’s new DI Facility in Burbank, and the first Marvel show finished exclusively using HDR files.

Evan Jacobs, Marvel’s post-production supervisor on the project, emphasises that colourist Matt Watson had to adjust numerous shots to fit particular era and story concerns, ensuring that the HDR gamut and range could be strategically managed for shots from eras where over high dynamic range would not have been possible. And so, the DI team avoided baking too many permanent image decisions into inter-sequences.

When files came in for finishing, Marvel often had to add grain, chromatic aberrations, gate weave, and so on. Jacobs says the studio utilised a suite of image degradation tools that the Takes Selector with all previous VFX decisions, which we had never done before.”

Jacobs says, “We were also tracking the different aspect ratios. All this required a lot of organisation to track from the shoot to Technicolor’s dailies team, to our internal plates lab, VFX vendors and ultimately our finishing team. Gising this route helped Matt Watson avoid getting backed into a corner from a colour standpoint.”

Watson says that a lot of his efforts revolved around managing looks from each era as specified by Hall.

“The looks themselves were designed around both the original capture format and transfer method of those original shots,” Watson explains. “For example, the early B&W looks were based around appropriate film stocks and very early telecine processes; the 80s look had curves more akin to video cameras, with more aggressive highlight highlights and heavy chroma crosstalk. Then, the early 2000’s look incorporated a 16mm curve, as well as a harder telecine clip. The advantage of dialling-in these looks early meant that Jess had full confidence that his lighting would hold true from the images he was seeing on-set to when he was in the DI. In the final grade, we were able to take these looks farther by dialling spatial components into the looks, chroma bleed, film halation, telecine weave, resolution restriction, and more.”

Watson and Jacobs add that Marvel utilised a remote workflow to allow all relevant parties to weigh in on shots, sequences and episodes earlier and more often than would be the case with a typical television workflow. This allowed the production to engage in what Watson calls “improvised DI sessions” along the way, essentially “opening the DI very early in the post process.”

Jacobs adds it put it: “We were doing VFX tests in DI well before a typical show would turn over a conform,” Jacobs says. “And we had episodes up on their feet in DI much earlier in the process, which really meant more hours of grading and a more refined final look.”

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Vecchio says that for the first B&W episode shot in front of a live audience, his team rigged 8K Softlights as key lights on catwalks, 4K studio Softlights as fill on catwalks, and 2K studio Fresnels with tough-spun diffusion as backlights.

“All those lights were on dimmers for adjustment, as well as scene changes,” Vecchio notes. “The traditional diffusion materials, as well. Then, as the filming progressed, we added a little more practical lights on the floor to using a more modern environmental approach, which was largely motivated by practical lights. The point was to create clear contrasts between the eras.

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