

# QUIRK, STRANGENESS AND CHARM

By Michael Goldman



The quirky nine-episode Disney+ show, *WandaVision*, has thrown some new and unexpected curveballs into the bloodstream of Marvel's wider, cross property launch of the next phase of its film and TV empire.

The acclaimed show tries something virtually unprecedented - mixing comedy and drama with old and new Marvel plotlines, as well as characters from across the comic-book and motion-picture universes, all whilst paying a loving homage to, of all things, famous family-oriented sitcoms from the 1950s through to the early 2000s.

The show examines whether grief-stricken superheroine Wanda Maximoff (Elizabeth Olson) is good or evil, sane or crazy, and connected to the real world, or consumed by a fantasy sitcom-like world in which she clings to an idyllic life with her supposedly dead husband, a synthetic being known as Vision (Paul Bettany), and their two mysterious children, despite the outside world aggressively barging into her fantasy.

For cinematography aficionados, Wanda's issues are nothing compared to the challenges faced by the show's cinematographer, Jess Hall

BSC ASC, and his crew, in terms of how they filmed a unique show that liberally mixes looks, eras, and stylised 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 Mini 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 evokes 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 feature films captured digitally, in three different aspect ratios, namely 1.33:1, 1.78:1 and 2.39:1.

The cinematographer calls *WandaVision* both "a jigsaw puzzle" and "a hybrid fusion of a show, made at cinema quality," and says the lensing 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 - I needed a simpler approach," Hall explains. "I knew early-on that I was going to be capturing RAW 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 nine episodes, but which could also evolve appropriately as the different sitcom eras 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 more recent Marvel movies, plus doing extensive testing, Hall finally decided, in collaboration with Dan Sasaki, Panavision's VP of optical engineering, that the only way to achieve the myriad of 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 tuning 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 (referencing sitcoms from the 1950's to the 1980's). They were custom-constructed 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 eras 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 from 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 environment - essentially "encoding MCU material within a familiar visual language, and one that enabled a clear differentiation between the various realities inside and outside of Wanda's fantasy world, known as 'The Hex.'"

"By using Ultra Panatar lenses, I switched for the first time in the show from spherical to 1.3X



Jess Hall BSC on set with Director Matt Shakman. WANDA VISION exclusively on Disney+. Photo courtesy of Marvel Studios. ©Marvel Studios 2021. All Rights Reserved.

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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 CG 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."



Sasaki emphasises 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 'reveal lenses' 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 glare resulting from the cylinders. Due to this consideration, we needed a new, modern version of the Ultra Panatars to fill the void."

"We utilised 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 have the look of a stronger-squeeze Anamorphic lens. Next, we had to address the coatings on the cylindrical elements to reduce the amount of flare and veiling-glare artifacts. 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 multiple eras and shows 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 before finishing up in Los Angeles, Hall utilised an astounding 23 different look-up tables (LUTs) during filming.

"Those LUTs included the SDR HDR, and different camera input LUTs for each look," explains the show's 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 parts. Each show LUT consisted of an SDR version, a 600-nits



Main Left: DP Jess Hall BSC  
Left and right: Elizabeth Olsen  
and Paul Bettany  
play Wanda and Vision  
Below: Teyonah Parris  
gets hands on with the Hex.  
Photos courtesy of Marvel Studios

HDR version, and a 1,000-nits HDR 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 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 true 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 Jess the ability to look at all possible outcomes, and have confidence that what he was 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 IS-minis for the HDR side of the world, and regular IS-minis for the SDR material. Since we treated the show like a feature and didn't shoot it 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 material, Hall says a key part of his process was the construction of reference books of still photographs from the various time periods the show pays homage to - "iconic 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

**“ The early B&W looks were based around appropriate film stocks; the ‘80s look had curves more akin to video cameras ”**



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 period integrity. Colour is viewed subjectively, and the period work is extremely subtle, so establishing an absolute scientific value was essential, as it left no room for interpretation, and enabled great cross-departmental collaboration.

"Each episode had that 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 lensing."

Once Hall figured out his colour palette for each era, he and gaffer John Vecchio relied on lighting instruments or approaches "that were period-appropriate, and part of the filmmaking vocabulary of those periods." For example, the show attempted to avoid LED until episode seven.

"We started with early Tungsten fixtures, like Mole Richardson 8K Softlights and Big Eye 10K's," Vecchio explains. "And I used for those sections traditional diffusion materials, as well. Then, as the timeline develops, we go from a traditional high-key lighting style where key lighting is achieved with big 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."

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, also 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 large soft lights provided a very even light in the style of the TV shows of that era."

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 ARRI SC-60 soft-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 rouge gel was used for fill.

"As this 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 gel," Vecchio elaborates.

#### BIG FINISH

With all the different looks, eras, 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 eras and story concerns, ensuring that the HDR gamut and range could be strategically massaged for shots from eras where overt high dynamic range would not have been possible. And so, the DI team avoided baking too many permanent image decisions into entire 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 to fit each period, "but those effects were often dialed-in per shot."

"We opted for a per-shot LUT and CDL approach, instead of baking-in most image 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. Going 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 massaging 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 shows," Watson explains. "For instance, 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 clips 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 further 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 "impromptu DI sessions" along the way, essentially "opening the DI very early in the post process," as Jacobs puts 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."

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 turnover and it gathers and moves all the files needed. It requests any missing shots from our plates lab, builds a DaVinci Resolve timeline for final colour grading, adds metadata like VFX status and notes, along with all the ALE data, and applies the per-shot LUT, CDL 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 conform. This feature allowed us to move much faster than a traditional conform/DI workflow."

