

Analog and Digital: Strategies for Emulating 16mm Aesthetics in Contemporary Workflows. Case Study: Scarlet (2022)

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Abstract: *This study investigates the emulation of analog aesthetics in digital cinematography, focusing on the "human artifact" qualities of 16mm film. Using Pietro Marcello's Scarlet (2022) as a primary case study, the research analyzes how chemical imperfections – such as grain and halation – integrate documentary-style realism with the film's lyrical, fairy-tale dimensions. The practical experiment employs vintage zoom optics on a RAW digital workflow to capture organic textures and natural optical artifacts "in-camera". Findings from collaborative grading sessions demonstrate that achieving a cohesive filmic look requires bespoke, artisanal interventions rather than standardized digital profiles. This approach preserves the materiality of the image, countering the clinical nature of modern sensors through a deliberate, frame-specific reconstruction of the analog soul.*

Keywords: *film emulation; Pietro Marcello; L'Envol, 16 mm film aesthetic; digital cinematography; pictorialism, color science;*

Introduction

At the core of many filmmakers' artistic vision lies an irrepressible desire to imbue their works with a distinct cinematic aesthetic, rooted in the visual heritage of analog film. For many, the classic cinema of past decades served as a primary source of visual education, with its colors and textures becoming a foundational reference point. Consequently, directors and cinematographers often seek to reconcile the technical precision of modern digital sensors with the evocative, organic qualities of celluloid, striving to recreate that specific "look" as a means of historical and aesthetic continuity².

Today, shooting on film has become an expensive luxury, dictated by the rising costs of film stock, camera rentals, and the specialized laboratory processes of development and digital scanning. Beyond these financial hurdles, the significant logistical constraints – particularly the long waiting periods between the initial purchase of the stock and the delivery of the final scanned product – add a layer of complexity to the medium. Consequently, the ability to accurately emulate the look of film using modern digital cameras represents the most practical and cost-effective option for contemporary filmmakers³.

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² Sergio Russo. 2024, April 8. „Filming on 16mm these days”. YouTube video. Retrieved May 1, 2026, from https://www.youtube.com/watch?v=jyGk7FezN_k&t=313s.

³ *Ibidem*.

1. Film emulation

According to Ollie Kenchington⁴, film emulation is a technique that has seen widespread popularity and sustained demand since the transition from photochemical film to digital technology. Initially, as cinematographers were compelled to adopt digital systems, emulation served as a vital means of preserving the distinctive atmosphere of celluloid. While this trend experienced a period of relative decline, it has recently seen a significant resurgence, driven by a renewed interest in the texture, color science, and organic qualities inherent to film.

Current discourse regarding film aesthetics is often clouded by idealized or nostalgic perspectives on historical practices. Nevertheless, the technical advantages of how film handles color and highlights remain distinct. When a specific cinematic vision requires these attributes, digital emulation becomes the most viable methodology. There are several approaches to achieving this aesthetic, each involving different technical workflows which will be analyzed in the following sections.

2. The unique properties of film

The three main characteristics of film are texture, color, and “halation”. The latter is essentially a physical aberration inherent to how film captures light: in high-contrast areas where highlights meet shadows, a “blooming” or “halo” effect occurs, bleeding across the boundary. This is an unavoidable peculiarity of the medium’s chemistry. While always present to some degree, halation becomes more pronounced as the film gauge decreases; it is a dominant feature in 16mm or 8mm, yet remains a subtle, distinctive hallmark of 35mm stock.

Tobby Tomkins suggests that the emotional connection many feel toward film – or digital footage emulating it – stems from the psychological response evoked by its color treatment. Like Sergio Russo and other cinematographers, he believes this nostalgia is rooted in our collective visual history: “*when you're looking at images shot on film, or that look like film I think it taps into that sort of childlike response to a world and I think you might associate film with celluloid*”⁵. This association is deepened by the fact that, having grown up in an era where film-originated content dominated television through the '80s, '90s, and early 2000s – our brains are conditioned to associate that look with professional storytelling. Despite differences in period-specific props, costumes, or the evolution of various film stocks, the enduring commonality remains the unique texture and, most crucially, the organic rendering of skin tones.

The “color treatment” mentioned by Tomkins is not accidental; it is the result of a paradigm shift that occurred at Kodak in the 1950s. Led by researcher David McAdams, engineers discovered a profound truth about visual media: optimum reproduction is not exact reproduction⁶.

When Kodak tested a “scene-referred” workflow – aiming for perfect colorimetric accuracy – the results were overwhelmingly rejected. As Gianmarco della Calce notes, accurate

⁴ Ollie Kenchington. 2018, September 5. „Mastering Color with Ollie Kenchington: Film Emulation”. MZed Course video. Retrieved September 8, 2025, from <https://www.mzed.com/courses/mastering-color>.

⁵ Tobby Tomkins. 2018, September 5. „Mastering Color with Ollie Kenchington: Film Emulation”. MZed Course video. Retrieved September 8, 2025, from <https://www.mzed.com/courses/mastering-color>.

⁶ David L. McAdam. 1951. „Quality of Color Reproduction”. *Proceedings of the IRE* 39 (5): 468–485.

skin tones were described as “beefy”⁷ or undesirable. This led to the realization that photography and cinema do not function as mirrors of the physical world, but as surrogates for memory. Because a viewer compares an image not to the original scene, but to their internal “encoding” of it, Kodak shifted its focus from the physics of the external world to the psychophysics of the internal one. Under the guidance of C.J. Bartleson⁸, the engineering goal became mapping the “color of memory”⁹. This explains why film emulation feels so “right” or “emotional” today: film was never designed to capture what was there, but rather how we felt about what was there, prioritizing the organic, idealized rendering of skin tones over mathematical precision.

3. The Image as a Human Artifact

The shift from physical accuracy to psychological resonance suggests a deeper truth about the nature of the medium: an image is not a neutral record of reality, but a human artifact. As Gianmarco della Calce argues, for most of history – from the first cave paintings to the meticulous canvases of the Flemish masters – images were never intended to be a sterile reproduction of the physical world. They were an abstraction of reality, a product of the artist's perception filtered through their tools.

The invention of photography briefly disrupted this philosophy, introducing a “black box” that seemingly captured reality “as it was”. However, as early photography and the chemical engineering of Kodak later proved, this objectivity was an illusion. Photography did not end the era of human interpretation; it simply changed the pigments. In this light, film emulation is not an attempt to cling to an obsolete technology, but a conscious choice to return to the image as a crafted artifact – an interpretation that feels “true” because it acknowledges the human presence behind the lens.

This philosophy finds its historical roots in the Pictorialist movement of the early 20th century. Practitioners like Edward Steichen “eschewed the crisp, exact record of reality in favour of images imbued with mood and emotion”¹⁰ arguing that true photographic art required the “infusion of the photographer’s subjectivity”¹¹. Rather than viewing the camera as a mere scientific tool, Pictorialists used “manipulated surfaces” and “deliberate imperfections” to challenge the “authenticity of unmediated realism”¹².

Nowadays, film emulation operates on a similar premise. By intentionally reintroducing the imperfections of film – such as its specific grain, halation, and non-linear color response – the modern filmmaker echoes Steichen’s challenge. We are not merely documenting a scene; we are using these analog-inspired qualities to blur the line between mechanical capture and traditional fine arts, reclaiming the frame as a space for human sensitivity.

⁷ Gianmarco Della Calce. 2025, April 26. „Why We Don’t Take Good Pictures Anymore”. YouTube video, 02:20–03:53. Retrieved April 27, 2026, from <https://www.youtube.com/watch?v=GfhdKyyGU74>.

⁸ C.J. Bartleson. 1960. „Memory Color of Familiar Objects”. *Journal of the Optical Society of America* 50 (1): 73–77.

⁹ Gianmarco Della Calce. 2025, April 26. „Why We Don’t Take Good Pictures Anymore”. YouTube video, 04:10–05:13.

¹⁰ Alexandru Șerbănescu. 2025. „Aesthetic Aspects in Pictorialist Photography”. *Învățământ, Cercetare, Creație* 11 (1): 463–475, p. 464, from CEEOL database.

¹¹ *Ibidem*, p. 472.

¹² *Ibidem*.

4. Ontology of Texture: From Silver Grain to Digital Noise

Texture is not merely a visual artifact, but the very element that communicates to our sensory system that an image is “real”¹³. In the physical world, uniform perfection does not exist; therefore, the imperfections of a surface are what grant tangibility and authenticity to a work of art. This relationship with materiality predates cinema, being deeply rooted in the history of visual arts. From the earliest cave paintings, the interaction between pigment and the roughness of the wall – and later, the texture of the canvas – has defined the essence of the image, transforming the materiality of the medium into an intrinsic component of aesthetics¹⁴.

4.1. The Digital Clarity Paradox and Frequency Perception

The transition to the digital era brought about a paradigm shift: what was once considered “grain” became “noise” – a technological enemy that had to be eliminated. Manufacturers of sensors and cinema cameras succeeded in creating images so sterile that digital cinematography often became indistinguishable from a static photograph, losing its organic “soul”.

This need to reclaim reality is demonstrated by the use of the film-out process in major productions, such as *Dune: Part Two* (dir. Denis Villeneuve, DoP Greig Fraser). Although shot digitally, the footage was transferred onto film and rescanned exclusively to integrate the textural properties of the analog medium. Indeed, many other filmmakers continue to utilize the film-out process after shooting digitally to faithfully replicate the unique qualities of celluloid, a workflow extensively documented by creators like Blaine Westropp¹⁵. This technique is not merely a form of nostalgia; it is based on the way grain modulates image frequencies. As demonstrated in the study regarding the analysis of visual acuity and sharpness¹⁶, the presence of texture perceptually attenuates high-frequency details (such as clinical skin imperfections), while simultaneously making mid- and low-frequency areas appear better defined and more natural to the human eye. This phenomenon can be observed in practice when filming a subject slightly out of focus. [insert imagine]. While the optical softening removes high-frequency edge information, the subsequent addition of film grain in post-production creates a powerful perceptual illusion. The sharp texture of the grain provides the eye with a new high-frequency reference point, which the brain interprets as a recovery of overall clarity. Paradoxically, the subject appears better defined not because of restored optical detail, but because the texture provides a structural consistency that was missing from the blurred digital signal.

4.2. The Stochastic Modeling of Organic Chaos

The recognition of texture as a fundamental element has forced the hardware industry to re-evaluate noise reduction. ARRI cameras, widely considered the gold standard in digital cinematography, now include the “Textures” function, based on the premise that a truthful image

¹³ Gianmarco Della Calce. 2025, October 27. „Why Movies Don’t Look Real Anymore”. YouTube video, 00:45 – 02:41. Retrieved April 27, 2026, from <https://www.youtube.com/watch?v=XptD8ohC77w>.

¹⁴ *Ibidem*.

¹⁵ Blaine Westropp. 2025, Dec 4. „Turning digital slime into Film”. YouTube video. Retrieved May 10, 2026, from <https://www.youtube.com/watch?v=v-OOcRAEdY>.

¹⁶ Xiazi Wan & Naokazu Aoki & Hiroyuki Kobayashi. 2014. „Improving the Perception of Image Sharpness Using Noise Addition”. *Bulletin of the Society of Photography and Imaging of Japan* 24 (2): 19–26.

requires a baseline level of active texture directly from the sensor. This approach validates the idea that texture is not a superimposed layer, but the very “flesh” of the image¹⁷.

The major challenge in the contemporary digital workflow remains the faithful replication of this phenomenon. Unlike uniform digital noise, analog grain is the result of a complex chemical process where silver crystals aggregate differently depending on exposure. To achieve authentic emulation, recent research proposes stochastic grain reconstruction models¹⁸, which mathematically simulate how silver particles react to light in shadow areas versus mid-tones. Such an algorithm does not merely apply a filter; it reconstructs the digital image based on the physical principles of film, ensuring that the texture appears as an integral part of the frame's structure, rather than just an artificial overlay.

5. Methodological Paradigms in Film Emulation: From Ready-Made Solutions to Mathematical Modeling

The transition from analog to digital has sparked a continuous effort to replicate the organic texture of celluloid. In contemporary cinematography, two major paradigms for achieving the "film look" have emerged: the traditional approach, rooted in intuition and commercial tools, and the revolutionary approach, based on rigorous mathematical data modeling¹⁹.

5.1 The Traditional Approach: Expert Intuition and Plug-and-Play Solutions

The most widespread method relies on the experience of Directors of Photography and Colorists. For independent filmmakers or those operating under budget constraints, the market offers sophisticated "ready-made" solutions such as FilmBox, Dehancer, FilmConvert or CineDREAM plugins. These tools allow for granular control over grain size, halation, and film stock profiles (8mm, 16mm, 35mm), bridging the gap for those who may not have the technical expertise to build complex pipelines from scratch.

In this workflow, references are often sourced externally. Artists like Marieta Farfarova utilize platforms such as ShotDeck for visual benchmarking²⁰, while others, such as Sergio Russo²¹ or Mathew O'Brien²², record their own side-by-side comparisons (Canon EOS M or Blackmagic Pocket Cinema Camera original vs. Krasnogorsk-3) to calibrate their digital assets against physical 16mm film.

¹⁷ Della Calce, „Why Movies Don't Look...”, 03:12 – 06:44.

¹⁸ Alasdair Newson & Julie Delon & Bruno Galerne. 2017. „A Stochastic Film Grain Model for Resolution-Independent Rendering”. *Computer Graphics Forum*, Volume 36 (2017), Number 8, pp. 684–699.

¹⁹ Florin-Alexandru Iordache. 2021. „Film Vs. Digital: New Paradigms in Emulating Film Features through Digital Cameras”. In *Entrepreneurship and Research Conference: Digital Transformation*, third edition, 382–388. Cluj-Napoca: Editura Presa Universitară Clujeană, p. 382.

²⁰ Marieta Farfarova. 2024, November 26. „Get the 16mm Film Look with Dehancer Pro in DaVinci Resolve”. *YouTube* video. Retrieved February 1, 2026, from <https://www.youtube.com/watch?v=sucGGGa3Ppg>.

²¹ Sergio Russo. 2024, November 11. „EOS M vs Krasnogorsk-3. 16mm film”. *YouTube* video. Retrieved May 1, 2026, from https://www.youtube.com/watch?v=r_L9oYIIzcE&t=2s.

²² Matthew O'Brien. 2022. November 2. „Comparing 16mm Film to Video. Is the MAGIC of Film Worth It?”. *YouTube* video. Retrieved May 1, 2026, from https://www.youtube.com/watch?v=jWgDTI_Yelw&t=1635s.

5.2 The Revolutionary Approach: Data Sculpting and Mathematical Mapping

Conversely, pioneers like Steve Yedlin²³ and Lopez²⁴ argue that relying on commercial "looks" limits the filmmaker to the status of a "mere purchaser"²⁵. They advocate for a shift toward the "filmmaker as author" where the camera is viewed not as a device with an inherent "look," but as a data acquisition machine.

This approach involves three rigorous phases: the empirical phase: identifying perceptual attributes through experimentation; data collection: stress-testing camera sensors to ensure sufficient information is captured; data sculpting: applying custom algorithms via BlinkScript in Foundry's Nuke or Matlab²⁶.

Instead of intuitive grading, this method uses tetrahedral interpolation to map the color space of a digital sensor onto that of a specific film stock with mathematical precision, ensuring that the grayscale remains untouched while the color cube is reshaped²⁷.

6. Choosing *Scarlet (L'Envol)* as a Case Study

Since this study includes a practical dimension – emulating the film look through digital image processing – selecting a film shot on celluloid (specifically 16mm) became imperative. The necessity of a clear aesthetic reference is supported by the methodologies analyzed in the previous chapter; all these approaches emphasize the importance of calibrating digital imagery in relation to the physical properties of film. Unlike the methods employed by Sergio Russo or Matthew O'Brien, I did not resort to simultaneous filming of the same scenes with both systems (analog and digital). Instead, I chose the film *Scarlet (L'Envol)*, 2022, dir. Pietro Marcello) as an aesthetic benchmark.

For this case study, my approach aligns technically with the traditional method, yet it is informed by the philosophical rigor of the revolutionary paradigm. While I do not employ the complex mathematical scripting of Yedlin or Della Calce, I adopt their principle of "sculpting data" by treating the digital image as a malleable medium. Following the methodology popularized by Marieta Farfarova²⁸, I prioritize a high-fidelity visual reference – the film *L'Envol* itself – as the primary benchmark. By utilizing modern professional tools (DaVinci Resolve) and emulation plugins, I aim to demonstrate that the "film look" can be achieved with professional precision without a custom coding infrastructure, provided the colorist maintains a deep understanding of the underlying attributes of the 16mm medium: its specific color response and grain structure.

To achieve this, I have tested and implemented several advanced techniques for replicating film texture, particularly concerning the subtle degradation of image sharpness. This includes exploring the "Modulation Transfer Function" (MTF) as described by Farfarova²⁹ – which addresses the organic loss of detail in high-frequency areas to avoid a "clinical" digital appearance

²³ Steve Yedlin. 2016, June 20. „On Color Science“. *Nerdy Film Tech Stuff*. Retrieved May 2, 2026, from <https://yedlin.net/NerdyFilmTechStuff/OnColorScience/>.

²⁴ J. J. Lopez. 2020. Analysis & Test of Image Acquisition Methods for Cinematography. Retrieved May 1, 2026, from *Universitat Politècnica de Catalunya Web site*, <https://upcommons.upc.edu/entities/publication/8c1f726e-b3ae-4c84-9e57-06b705c559a7>.

²⁵ Florin–Alexandru Iordache. 2021. „Film Vs. Digital...“, p. 384.

²⁶ *Ibidem*.

²⁷ J. J. Lopez. 2020. *Analysis & Test of Image...*

²⁸ Marieta Farfarova. 2024. „Get the 16mm Film Look...“.

²⁹ Marieta Farfarova. 2024, June 25. „Realistic Film Emulation Texture with MTF in DaVinci Resolve“. *YouTube* video. Retrieved February 1, 2026, from <https://www.youtube.com/watch?v=sucGGa3Ppg>.

– as well as the specialized workflows for film texture replication proposed by Evgenia Loli³⁰. A crucial conceptual link established by Loli is the parallel between film grain and classical painting techniques. She argues that both film and painting rely on a "perceptual illusion": they provide the spectator with the impression of immense detail where, in reality, there is none³¹.

This approach allows me to test the capacity of the technical tools at my disposal in reproducing an authentic texture, using a finished reference material as a starting point.

Pietro Marcello is renowned for his rejection of standard digital cinematography, opting instead for the texture and imperfections of analog film to cultivate a distinct atmosphere.

He consistently works with film, maintaining a deep-seated preference for the medium throughout his entire filmography, often taking on the role of cinematographer himself³². Even in his first fiction feature, *Martin Eden* (2019), Marcello chose to shoot on film, acting as his own director of photography to cultivate an aestheticized, "archaic" and imperfect look. This style is inspired by his background in documentary filmmaking and the "Rossellini method"³³ - characterized by improvisation, skeletal scripts, and a film that evolves during production. Furthermore, my preference for Pietro Marcello's work is rooted in his hands-on approach; he develops his own film stocks to better grasp the physical and chemical process of image impregnation. He is also deeply invested in the intersection of cinema and painting – a connection previously noted in the methodology chapter by cinematographers such as Gianmarco Della Calce and Evgenia Loli, who have likewise sought to emulate the film look in the digital realm.

His insistence on this aspect is also rooted in his academic background; much like Alexander Dovzhenko, Pietro Marcello studied painting before turning to film direction³⁴. This formal training in the fine arts informs his cinematic language, as he approaches the screen not merely as a recording surface, but as a canvas where light and chemical texture function as pigments.

Marcello himself explains this aesthetic philosophy: "Regarding my choice of shooting this on film, I have always shot on film and when I didn't have the money to purchase new film, I would use film that had expired. I love film, I also develop the film myself, as I am interested in the chemical aspects of it. Film is linked to another time. I am not opposed to shooting on digital, but I believe that there is a relationship between cinema and painting, and a deeper glance into picturesque cinema"³⁵.

Furthermore, I have observed - alongside other critics such as Loayza³⁶, Cassey³⁷, and Seitz³⁸ - that the documentary archive inserts within his fiction films possess a distinct, pictorial quality. These segments are aggressively tinted in post-production to seamlessly integrate with the

³⁰ Evgenia Loli. 2020. June 9. „Film Texture – From Positive Look to Negative Film”. YouTube video, 11:10 – 11:40. Retrieved May 2, 2026, from <https://www.youtube.com/watch?v=vBVRG4fHTTU&t=1s>.

³¹ *Ibidem*.

³² Film at Lincoln Center. 2020, October 13. „Pietro Marcello on Martin Eden, Transposing Jack London to Italy, and the Rossellini Method”. YouTube video, 11:10 – 11:40. Retrieved May 2, 2026, from https://www.youtube.com/watch?v=caVDY_oua2k.

³³ *Ibidem*.

³⁴ Blake Williams. 2015. „Archive Fever: The Films of Pietro Marcello” [Electronic version]. Cinema Scope, 64, p. 35.

³⁵ „Martin Eden: Luca Marinelli and Pietro Marcello Form a Supreme Bond”. 2023, January 30. MovieMaker. Retrieved May 2, 2026, from <https://www.moviemaker.com/luca-marinelli-and-pietro-marcello-formed-a-transcendent-actor-director-bond-on-martin-eden/2/>.

³⁶ Beatrice Loayza. 2023, June 9. „Scarlet”. 4Columns. Retrieved May 2, 2026, from <https://4columns.org/loayza-beatrice/scarlet>.

³⁷ Michael J. Cassey. 2023, July 6. „Scarlet”. Michael J. Cinema. Retrieved May 2, 2026, from <https://michaeljcinema.com/2023/07/06/scarlet/>.

³⁸ Matt Zoller Seitz. 2023, June 9. „Scarlet”. RogerEbert.com. Retrieved May 2, 2026, from <https://www.rogerebert.com/reviews/scarlet-movie-review-2023>

contemporary footage shot on film, achieving a cohesive and organic overall aesthetic. As Seitz notes, “those tinted scenes look like they were pulled from silent movies from the late 1910s”.³⁹

In the same interview where Pietro Marcello mentions that the first and only audition for *Martin Eden* was shot on film and developed by himself, lead actor Luca Marinelli was questioned about his perception of working on digital versus film. His perspective is compelling; he likens the analog camera to a creature approaching, as if it were a living being – an ensouled view of the analog medium. This mirrors Marcello’s own conviction regarding the necessity for a film to possess a “soul”⁴⁰. At the same time, both emphasize that they are not inherently opposed to digital technology.

It is crucial to highlight Marcello's conception of film as an artifact that ages over time. He posits that he could not elevate his work above the archives without the medium itself, stating that his cinema is one that actively creates and produces archives for the future: „For me, the act of filming is already the act of filming history; my material, my cinema will become an archive”⁴¹. In essence, his logic suggests that one cannot authentically capture the past – or create for the future – without the physical presence of film.

Another compelling argument lies in Marcello's preference for the unique texture of film – a key characteristic that remains difficult to replicate in the digital domain, as previously explored in the chapter regarding film emulation methodologies. He emphasizes the materiality and illusionistic power of image and sound, projecting archival footage onto the screen to foster a creative dialogue between eras, effectively filling the gaps of the documented with the performed⁴².

This “picturesque” quality and the use of texture as a bridge between eras are not exclusive to *Scarlet*; rather, they constitute a defining trait of Marcello’s cinematic language, as previously evidenced in *Martin Eden* (2019). In both films, the texture acts as the connective tissue that allows the viewer to transition seamlessly between history and myth. By treating the image as a physical artifact – subject to aging, tinting, and chemical “imperfections” – Marcello manages to unify contemporary fiction with documentary archives, creating a timeless space where the distinction between the recorded past and the performed present begins to dissolve.

The director’s philosophy resonates deeply with filmmakers like Gianmarco della Calce or Evgenia Loli. For Marcello, the choice of film is a bridge between cinema and painting—a rejection of the clinical transparency of digital sensors in favor of an image that possesses a tactile, interpreted quality. By viewing the frame as a canvas rather than a data set, the filmmaker reclaims the craftsmanship and sensitivity that define art as a human, rather than purely mechanical, endeavor. (aici mă pot lega de ce spuneam în articolul precedent, despre Yedlin).

The aesthetic of *Scarlet* (*L’Envol*), much like that of *Martin Eden*, possesses a unique “look” that is exceptionally difficult to replicate in the digital domain without aggressive post-production. These conclusions emerged from technical discussions and collaborative tests with Simon Atilla (Neogray Films) and Cristian Dinu (Ortofilm), who were involved in the practical task of replicating this specific filmic appearance.

³⁹ *Ibidem*.

⁴⁰ „Martin Eden: Luca Marinelli and Pietro Marcello Form a Supreme Bond”...

⁴¹ Pietro Marcello, *il cinema della libertà*. 2019, November 21. Il Manifesto. Retrieved May 2, 2026, from <https://ilmanifesto.it/pietro-marcello-il-cinema-della-liberta>

⁴² Janick Nolting. „Scarlet (*L’Envol*)”. Artechock. Retrieved May 2, 2026, from <https://www.artechock.de/film/text/kritik/s/scarle.htm>

We observed that standard Kodak emulation profiles do not perform uniformly across all sequences when measured against Marcello's references. This inconsistency led to the deduction that his workflow is inherently artisanal; it suggests a bespoke approach to image manipulation that defies automated or "out-of-the-box" digital solutions. Rather than a linear color transformation, the aesthetic appears to be the result of a deliberate, frame-specific intervention that mirrors the unpredictable nature of chemical development.

Another reason for selecting this film lies in the possibility of capturing scenes with a similar *mise-en-scène*, production design, and cast. The film's location in Normandy, Northern France, abounds in rural landscapes that closely mirror the topography of my own native surroundings. This criterion of accessibility was equally vital in the casting of extras for the experiment. In the film, the casting is remarkable: "the casting shines. The villagers are not Hollywood faces, and similar to how actors and characters share names, there is a sense of realism grounding this fairy tale"⁴³. By finding local counterparts that resonate with Marcello's aesthetic, I was able to ensure that the digital source material possessed the necessary organic qualities for a successful film emulation process.

Regarding the cinematography, a handheld approach predominates, accentuating the film's magical realism and the natural landscapes of Northern France. This technique, coupled with the use of natural light, imbues the film with a pictorial texture reminiscent of the works of Rembrandt or El Greco⁴⁴. As Cassey observes, "Marcello and Graziaplena concoct frames of everyday people doing everyday things that look like paintings by Rembrandt or El Greco. The deep shadows, the soft, warm light from single sources, the way sunlight pours through battered leaves"⁴⁵. Ultimately, the author concludes that "*Scarlet* is a world of textures"⁴⁶.

7. Identifying the Appropriate Technical Setup for the Corresponding Sequences

Analyzing the cinematography and shooting style through the lens of my experience as a producer, director, and cinematographer, I was able to promptly identify the technical means required for this practical experiment. To validate my professional intuition, I consulted specialized literature regarding the film's imagery. In this regard, critic Matt Zoller Seitz emphasizes that: «Cinematographer Marco Graziaplena's soft, grainy, 16mm camerawork favors classic handheld "documentary-style" shots, relying on zoom lenses and shake to suggest immediacy»⁴⁷.

This theoretical confirmation enabled me to select from my own technical arsenal not only the digital camera best suited to record comparable scenes but also the appropriate optics for this specific aesthetic. The lens chosen for the experiment was the Schneider-Kreuznach Variogon 18-90mm f/2 zoom.

This lens, which covers a sufficiently wide focal range, is extremely popular among Blackmagic Pocket Cinema Camera users – owing to a sensor size comparable to the Super 16mm format – and is renowned for its distinct visual style that evokes an analog aesthetic⁴⁸. By utilizing

⁴³ Michael J. Cassey. 2023, July 6. „Scarlet”. Michael J. Cinema. Retrieved May 2, 2026, from <https://michaeljcinema.com/2023/07/06/scarlet/>.

⁴⁴ Beatrice Loayza. 2023, June 9. „Scarlet”.

⁴⁵ Michael J. Cassey. 2023, July 6. „Scarlet”.

⁴⁶ *Ibidem*.

⁴⁷ Matt Zoller Seitz. 2023, June 9. „Scarlet”. RogerEbert.com. Retrieved May 2, 2026, from <https://www.rogerebert.com/reviews/scarlet-movie-review-2023>.

⁴⁸ Alan Besedin. 2013, October 29. „Schneider-Kreuznach Variogon 18-90mm f2 C-Mount Zoom Lens Review”. Vintage Lenses for Video. Retrieved May 2, 2026, from <https://www.vintagelensesforvideo.com/schneider-18-90mm/>.

this lens, my objective was to achieve as much of that organic texture as possible “in-camera” thereby minimizing the reliance on post-production adjustments.

A revealing technical detail in constructing the film’s visual poetics is the persistent use of hexagonal flares⁴⁹. This characteristic was a determining factor in choosing the Variogon lens, allowing me to capture natural optical artifacts rather than attempting to generate them artificially during the editing phase. Beyond rendering a “soft” image – where “softness” denotes a reduction in aggressive digital micro-contrast, the very foundation of 16mm film emulation – the lens’s specific colorimetry exhibits a subtle shift toward green tones. I considered this trait essential for emulating the color palette and “look” of Scarlet (L’Envol), as vintage lenses often feature chemical coatings that oxidize over time, providing that sought-after nostalgic tint.

The ability of this setup to produce an image with filmic qualities has been well-documented since the camera’s release, notably through visual tests that have become benchmarks within the cinematography community, such as Peter Prevec’s “Crazy Green”⁵⁰. In this footage, one can clearly observe how the Schneider Variogon lens interprets vegetation and natural light, providing a dense texture and a green chromatic shift that effectively mitigates the clinical, sterile output of the digital sensor.

Complementary to the optical selection, in order to attenuate the excessively analytical rendering of fine details and to manage image degradation before the light flux reaches the sensor, I proceeded to install an Optical Low Pass Filter (OLPF), defined in specialized literature as an “anti-aliasing” filter⁵¹. This technical decision was motivated by the need to neutralize the risk of moiré artifacts or chromatic aliasing⁵²—phenomena that occur frequently in sensors lacking optical low-pass filtration, particularly in scenarios involving complex textures or the use of deep focus. As Brown notes, digital sensors are inherently prone to aliasing due to the photosite structure within a color filter array⁵³.

Unlike conventional capture systems, the original generation of Blackmagic Pocket Cinema Camera and Micro Cinema Camera models are equipped by default only with an infrared-cut filter (IR Cut)⁵⁴. The omission of the OLPF was a deliberate choice by the manufacturer to maximize perceived sharpness⁵⁵. However, in the context of emulating an analog film aesthetic, the presence of this filter becomes indispensable; it contributes decisively to achieving an organic look through the controlled diffusion of high spatial frequencies. Thus, hardware optimization allowed for a significant reduction of the digital “footprint” directly during the acquisition phase, eliminating the need for invasive post-production interventions that might have compromised the integrity of the image texture.

Regarding data acquisition, I opted for the CinemaDNG RAW format, a decision grounded in the necessity for maximum flexibility during post-production and the rigor required for analog aesthetic emulation. As Kurt Lancaster notes, this format functions as a software “container” that

⁴⁹ Matt Zoller Seitz. 2023, June 9. „Scarlet”. RogerEbert.com.

⁵⁰ Peter Prevec. 2013, September 24. „Crazy Green - BMPCC + Schneider Varigon 18-90mm” [Video]. YouTube. Retrieved May 2, 2026, from <https://www.youtube.com/watch?v=InTMhTQz1vU>.

⁵¹ Blain Brown. 2016. *Cinematography: Theory and Practice: Image Making for Cinematographers and Directors*, third edition. London & New York: Routledge, p. 137.

⁵² ALT CINE. 2024, April 19. „NEW Blackmagic OLPF Filter”. YouTube video, 0:33 – 1:07. Retrieved May 4, 2026, from <https://www.youtube.com/watch?v=NgvbMxExOLw>.

⁵³ Blain Brown. 2016. *Cinematography*, p. 137.

⁵⁴ ALT CINE. 2024, April 19. „NEW Blackmagic OLPF Filter”. YouTube video, 0:33 – 1:07. Retrieved May 4, 2026, from <https://www.youtube.com/watch?v=NgvbMxExOLw>.

⁵⁵ Blain Brown. 2016. *Cinematography*, p. 138.

encapsulates raw data directly from the sensor, representing the most faithful manifestation of an unprocessed digital negative⁵⁶.

From a theoretical perspective, the selection of this format represents a symbiosis between cutting-edge technology and classical cinematography. CinemaDNG fragments the filmed material into individual frames – a succession of static images, typically 24 per second – a mechanism that Lancaster describes as “a throwback to old-school filmmaking” where the illusion of motion was generated by the rapid projection of discrete frames from a film reel⁵⁷. This frame-by-frame structure not only facilitates superior chromatic manipulation but also preserves the organic integrity of the image by avoiding the temporal compression artifacts inherent in modern video formats.

The post-production process, aimed at the visual harmonization of the newly filmed material with the sequences extracted from the film *Envol*, was based on a series of preliminary tests conducted on the *Sixty Five* powergrade. This tool was developed prior to the experiment by Simon Atilla (founder of Neogray Films, cinematographer, and colorist)⁵⁸, drawing inspiration from the aesthetics of 1960s Kodak Eastman film stocks used in productions such as *The Sound of Music*, *Swiss Family Robinson*, or *Pollyanna*. The aesthetic capabilities of this powergrade are demonstrated in the following test videos^{59 60}, which were filmed and color-graded by the author during the preliminary stage of the research.

Although the aforementioned powergrade was not directly applied in the current experiment, its preliminary testing was essential to validate the capacity of Blackmagic sensors to emulate analog media – results that have already been shared and recognized within the “original” generation Blackmagic camera community.

Consequently, based on the conclusions of these tests and Simon Atilla’s expertise, the image acquisition methodology was adapted to optimize results for this new experiment. Settings of 24 fps, ISO 800, and an optimal shutter angle of 180° were employed. The selection of the native ISO 800⁶¹ is critical; while the sensor maintains a constant dynamic range of 13 stops across its ISO scale, this specific setting provides the most balanced distribution of exposure latitude. At ISO 800, the available range is allocated with approximately 5 stops above and 8 stops below middle gray⁶². This allocation is essential for protecting highlight information while simultaneously capturing the organic, film-like noise floor that defines this sensor’s aesthetic.

Furthermore, the capture process sought to exploit a technical observation identified by Atilla in previous tests: at ISO 800, the sensor generates a specific texture whose digital noise simulates the aesthetic behavior of chemical film grain. This phenomenon confirms Gianmarco della Calce’s hypothesis regarding the “in-camera texture” of Arri Alexa systems, demonstrating that, by utilizing native settings, Blackmagic cameras can produce an image with organic and

⁵⁶ Kurt Lancaster. 2014. *Cinema Raw: Shooting and Color Grading with the Ikonoskop, Digital Bolex, and Blackmagic Cinema Cameras*. New York: Focal Press, p. 28.

⁵⁷ *Ibidem*.

⁵⁸ Atilla J. Simon. 2025, June 17. „The Painted Lady. The SIXTYFIVE PowerGrade. Bmpcc-og”. YouTube video, Retrieved June 19, 2025, from <https://www.youtube.com/watch?v=Dbxdt0Ejq14&t=13s>.

⁵⁹ Florin – Alexandru Iordache. 2025, September 25. „Excursie Lacul Rosu Tabăra Catharsis”. Vimeo video, Retrieved September 25, 2025 from <https://vimeo.com/1122653082>.

⁶⁰ Florin – Alexandru Iordache. 2025, December 24, „Dor de munte”. Vimeo video, Retrieved December 24, 2025, from <https://vimeo.com/1149157895/bed1e7d3ba>.

⁶¹ Blackmagic Design. 2018. *Installation and Operation Manual Blackmagic Design Compact Cameras*. Fremont, CA: Blackmagic Design Inc., p. 22.

⁶² Cinecracy. 2017, January 7. „The Logic of RAW: Why it’s better to overexpose than to underexpose with the Blackmagic Cinema Cameras”. Guerrilla Film Soldier Blog.

tactile properties, thereby facilitating the seamless integration of new material with archival sequences.

During the actual image acquisition phase, a broader selection of visual references (shots) from the film *L'Envol* was evaluated. Out of these, the most representative benchmarks were chosen for detailed analysis, based on their degree of reproducibility regarding mise-en-scène, production design, costumes, and lighting conditions (Figures 1–15). Given the film's naturalistic style, which favors rural landscapes and natural light, the selection was guided by pragmatic considerations, targeting the accessibility of locations and props. The film's structure, which includes poetic inserts of natural elements, facilitated the reconstruction of similar frames without the need for a complex production infrastructure.

Regarding the selection of shots involving characters, the analysis focused on compositions featuring a single actor (close-up or single shot) or at most two (two-shot) – configurations that are recurrent in the aesthetics of the studied work (Figures 2, 3, 5–7, 9–11, 13–15). Although the majority of the scenes were filmed outdoors, several interior shots were also included to reflect the structure of *L'Envol*, which frequently utilizes both types of settings.

The primary objective of this spatial diversification was to obtain a chromatic palette as complex as possible, thereby facilitating the visual matching process between the new material and the selected references. Efforts were made to respect perspective, composition, camera movements and the blocking of elements within the frame, correlated with lighting conditions, without resorting to an identical replication of the original scenes. This approach allowed for the integration of key elements present in the references – such as sky texture, skin tones, vegetation details, or elements of decor and costume – all contributing to the foundation of an organic chromatic unity. Thus, by correlating objects and background elements (buildings, accessories, and optical phenomena such as lens flares), a balanced chromatic diversity was ensured, reflected equally in both types of sequences.

The overall complexity of this experiment stems from its comprehensive coverage of all cinematic production stages: from pre-production (planning) and image acquisition to post-production (color grading). This type of practical framework serves as a significant pedagogical tool for cinematography students and novices alike, offering a profound understanding of the professional workflow.

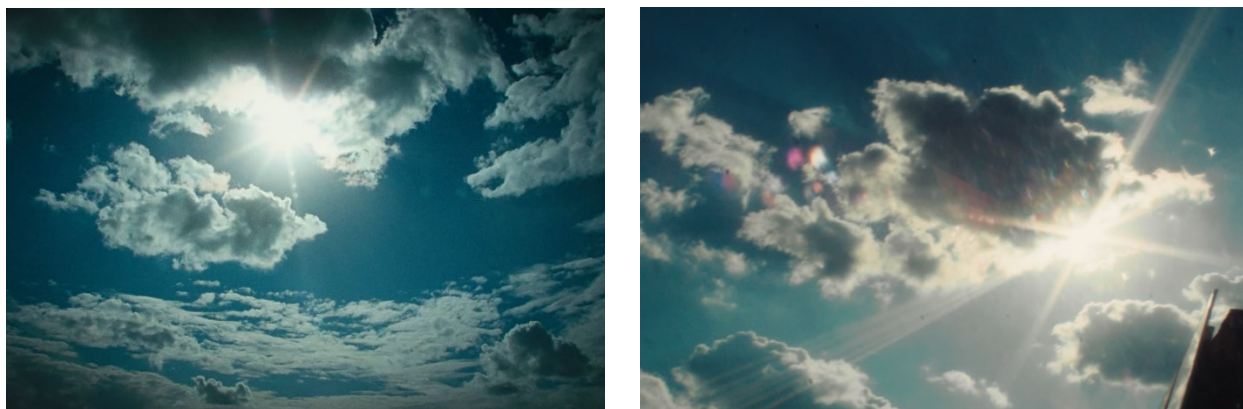


Fig. 1. *Reference shot 1: Pietro Marcello.2022.,L'Envol*”[Film on DVD]. France: Le Pacte (left), compared with *Emulation shot 1: author's original digital reconstruction* (right).



Fig. 2. Reference shot 2: Pietro Marcello.2022., „L'Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 2: author's original digital reconstruction (right).



Fig. 3. Reference shot 3: Pietro Marcello.2022., „L'Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 3: author's original digital reconstruction (right).

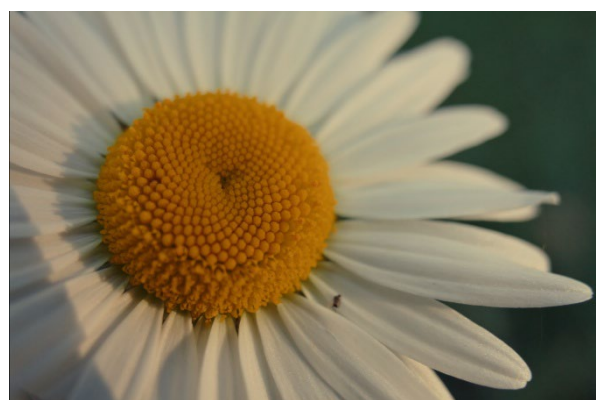


Fig. 4. Reference shot 4: Pietro Marcello.2022., „L'Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 4: author's original digital reconstruction (right).



Fig. 5. Reference shot 5: Pietro Marcello.2022., „L’Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 5: author's original digital reconstruction (right).

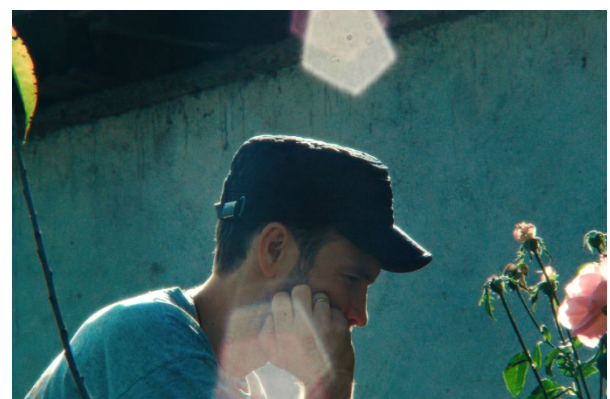


Fig. 6. Reference shot 6: Pietro Marcello.2022., „L’Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 6: author's original digital reconstruction (right).

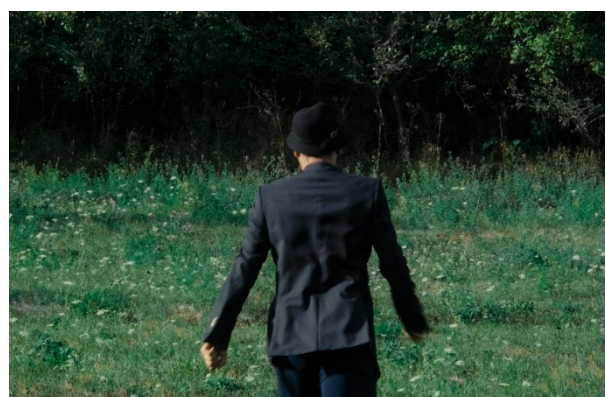


Fig. 7. Reference shot 7: Pietro Marcello.2022., „L’Envol” [Film on DVD]. France: Le Pacte (left), compared with Emulation shot 7: author's original digital reconstruction (right).



Fig. 8. Reference shot 8: Pietro Marcello.2022.,*L'Envol*”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 8: author's original digital reconstruction (right).



Fig. 9. Reference shot 9: Pietro Marcello.2022.,*L'Envol*”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 9: author's original digital reconstruction (right).



Fig. 10. Reference shot 10: Pietro Marcello.2022.,*L'Envol*”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 10: author's original digital reconstruction (right).



Fig. 11. *Reference shot 11: Pietro Marcello.2022., „L’Envol”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 11: author's original digital reconstruction (right).*



Fig. 12. *Reference shot 12: Pietro Marcello.2022., „L’Envol”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 12: author's original digital reconstruction (right).*



Fig. 13. *Reference shot 13: Pietro Marcello.2022., „L’Envol”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 13: author's original digital reconstruction (right).*



Fig. 14. *Reference shot 14: Pietro Marcello.2022., „L’Envol”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 14: author's original digital reconstruction (right).*



Fig. 15. *Reference shot 15: Pietro Marcello.2022., „L’Envol”[Film on DVD]. France: Le Pacte (left), compared with Emulation shot 15: author's original digital reconstruction (right).*

The preliminary stage required a rigorous location scouting process and a meticulous analysis of the reference scenes, focusing on light quality, compositional rigor, and color rendering. Observing the selected locations at various times of day was essential to determine the optimal shooting window relative to the sun's position. To accurately identify the direction of the primary light source in outdoor scenes, the presence of lens flares was used as a diagnostic tool. Facilitated by the deliberate absence of a matte box and the use of specific vintage optics, this method allowed for the precise replication of lighting conditions based on the flare patterns observed in the original reference frames.

8. Conclusions

The selection of Pietro Marcello's *Scarlet* (2022) as the primary case study for this research is predicated on its deliberate use of film as a "human artifact". Unlike many contemporary productions, *Scarlet* employs the specific qualities of 16mm stock not merely for technical capture, but as a textural language that bridges the gap between modern cinematography and the pictorialist tradition. By prioritizing the organic rendering of memory over clinical precision, the film provides

a perfect canvas for analyzing how film emulation can reclaim the “infusion of subjectivity” in the digital age.

The practical framework conducted in this study demonstrates that replicating this pictorialist quality requires moving beyond surface-level color matching. By evaluating 15 representative visual benchmarks, the research highlights that true emulative fidelity relies on a symbiotic relationship between an organic texture and a nuanced color response. As posited through the parallel between classical painting and film grain, the perceived richness of the image does not stem from high-frequency digital resolution. Instead, it arises from a dual perceptual illusion: on one hand, the chaotic structure of film grain tricks the human eye into interpreting depth, volume, and micro-details where none mathematically exist; on the other hand, the meticulous calibration of color harmony and tone replication strips away the clinical linearity of the digital sensor, anchoring the final image in a tactile, painterly reality.

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