



Challenges and Solutions in Green Screen Post-Production: A Narrative Review

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Abstract

Green screen technology, also known as Chroma keying, has revolutionized the film and video production industry, enabling dramatic visual effects and environmental effects but this transformative technology is not without its challenges, especially after filming. This research paper examines the most common challenges faced by professionals working with green screens in post-production and explores solutions and strategies to address these issues. Some of the challenges mentioned include spills removal, color correction and edge finishing. We examine the complexity of these challenges and provide an in-depth review of the various methods and tools used in the industry to overcome them. This paper introduces the latest trends and innovations in post-green screen manufacturing, including AI-powered solutions and real-time processing. By illuminating complex green screen post-production, this research paper aims to provide valuable insights for filmmakers, editors, and researchers, contributing to the continued advancement of this important technology in the world entertainment and content.

Keywords: Green screen technology; Post-production challenges; Visual effects; Chroma keying; Film production compositing; Special effects color; Keying video editing; Matte painting artificial; Intelligence in post-production; Visual effects; Industry software solutions; Foreground-background; Separation lighting challenges; Spill suppression; Keying algorithms; Quality control in VFX digital composition narrative review

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Introduction

Greenscreen technology, also known as chroma keying, has become an important tool in film and video production [1]. The ability to transport actors to exotic locations, place them in historical settings, or immerse them in otherworldly scenarios has reinvented the storytelling of the profession. The advent of green cinema for filmmakers have been able to transcend the limitations of materiality and foster creativity and boundless imagination.

The importance of green screen technology in modern filmmaking and content production cannot be overstated. From Hollywood blockbusters to independent programming, its ubiquity is a testament to its transformative power. But like any technology, the simple magic on a screen often hides complex challenges that arise in the post-build phase [2]. This research paper examines these challenges in detail and examines the solutions developed to overcome them.

The purpose of this research paper is twofold. First, it aims to clarify the most common obstacles that green screens contractors face during construction. These challenges include issues such as spill removal, color repair and edge repair. By breaking down and understanding the intricacies of these challenges [3], we seek to offer a comprehensive view of the challenges behind production behind a green screen.

Second, this paper attempts to present possible solutions and strategies developed to address the aforementioned challenges. With these insights, we intend to provide insight and guidance to filmmakers, video editors, and researchers struggling with green screen post-production. By highlighting best practices and new techniques [4], we hope to empower industry professionals to achieve more beautiful and convincing results when working on green screens.

Background

Green screen technology, commonly known as chroma keying,

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has been a revolutionary force in film and video production [5]. To understand the challenges and solutions to post-green screen production, it is important to first examine the historical context, key features, and broader implications of this technology for contemporary filmmaking and content production.

Greenscreen technology history and development: The roots of green screening technology can be traced back to the early experiments in filmmaking, where filmmakers sought ways to achieve realistic visual effects and structures [6]. Due to the absence of green in human colors and everyday objects, the method Dunn pioneered was also Green screen added for science fiction and fantasy films in the 1960s and 1970s.

Over the years, green screen technology has evolved in parallel with advances in film and video production. The transition from analog to digital technologies has further expanded the possibilities of green screen compositing [7], as high-resolution cameras, sophisticated software and real-time graphics have emerged.

Key features of green screen production

Successful green screen production relies on a combination of key factors, each playing an important role in achieving authentic composites. These factors include:

- a. **Chroma keying:** Chroma keying is the process of removing a particular color (usually green or blue) from the background and replacing it with another image or video [8]. This process requires precise color sealing, often combined with matte construction and spill prevention techniques.
- b. **Lighting:** Proper lighting is key to green screen success. Lighting behind the green screen and on the subject is also important to reduce shadows, color changes and dilation. Understanding the relationship between front and rear lighting is an important part of green screen design.
- c. **Camera setups:** Camera Setups and settings are important to get the desired results. Camera sensitivity to green, aperture [9], shutter speed and frame rate all influence chroma keying and the quality of the final composite.

Importance of green screen technology in modern filmmaking

Green screen technology has become an integral part of modern filmmaking, providing a great canvas for storytelling. Its importance is emphasized by its ability to transport people and audiences to exotic locations, historical moments and iconographic events [10]. This technology allows filmmakers to break free from the limitations of physical objects and locations, allowing for creativity and imagination.

From Hollywood blockbusters to independent films and television shows, green films are everywhere. They empower filmmakers to create immersive and visually exciting content, enhance the viewer experience and push the boundaries of storytelling [11]. Moreover, in the age of digital content, green screen technology has extended its reach to online video, virtual events and educational platforms, making it an essential tool for content production in various media.

Understanding the key elements of the historical development of green screen technology is essential to understanding the challenges and solutions that lie at the core of post-green screen architecture [12]. Often these challenges are overshadowed by the magic of the final product, but by breaking it down we can gain insight into how we can enhance the quality and realism of green screen composites.

Challenges in post-green screen production

Green screen technology has certainly revolutionized filmmaking and video production, creating endless creative possibilities [13]. But the path from shooting on a green screen to a polished, simple final product is not without its challenges. In the post-production phase, operators often encounter many common issues that can affect the quality of composite images. This section explores these challenges in more detail, such as spill removal, color matching, and edge finishing.

Broadcast removal

One of the major challenges in green screen post manufacturing is contamination spills [14]. It pours when the color of the green screen is reflected on the subject or actors, creating a green or colored tinge at the edges. This contamination interferes with proper separation of the front and back and can make the composite look artificial [15]. Spill removal is an important part of the post-processing process, and includes methods to effectively eliminate or prevent spills while coloring the client the integrity of the.

Matching characters

Ensuring that the theme colors match well with the background is the most important part of realistic composites. Color matching involves adjusting the color and brightness of the subject to the lighting conditions, color temperature, and colors of the background. If a true color match cannot be achieved [16], it can have created disjointed and unrealistic composites, reducing the appeal of the final product.

Edge adjustment

Another challenge is preparing the edges of the subject to ensure that they blend naturally with the background. The rough edges, fringing, and uneven mat removal make it all look unnatural and unbelievable. Achieving perfect, clean edges requires careful post-processing including waste matting and roto-scoping to improve the overall quality of the composite.

Impact of challenges on final results

It is instructive to consider case studies or practical examples to illustrate the real-world impact of these challenges. In film and video production, poor handling of spill removal, color matching, or edge adjustment can create visible flaws and reduce the viewer if he does not believe in him. Such flaws reduce the viewer's involvement in the story and cause him to lose the film's overall quality.

Reasons behind these challenges

There are several factors contributing to these challenges in

post-green screen production [17]. Light plays an important role; Incorrect lighting on a green screen or subject can increase diffusion and make color correction more difficult. In addition, actor role is an important variable; Irregular movements and gestures can make edge cleaning difficult. Environmental factors such as location and weather during filming can also create unforeseen effects in the post-production process.

Understanding the roots of these challenges is essential to finding effective solutions and improving post-production efficiencies [18]. The next sections of this paper will explore these solutions, highlighting the strategies, tools, and best practices employees use to overcome these challenges and achieve a simple and attractive green screen composite.

Spill removal methods

One of the major challenges in green screen post manufacturing is contaminant spillage. Pollution spills occur when the color on the green screen reflects on the subject or actors, creating a green or colored edge [19]. This section examines in detail the nature and impact of contaminant spills and examines mitigation and removal strategies.

Diffusion pollution and its effects

Pollution spills are caused by the interaction between the green screen and the background subject. When green or blue light from behind shines on the subject, it changes the color of the display to an unwanted cast. These actors not only destroy the pure separation of subject and background but also destroy the quality and realism of the composite scene as a whole. In particular, spilling dirt can destroy the illusion of that the subject is seamlessly integrated into the virtual environment [20], reducing the suspension of the viewer beyond belief.

Diffusion elimination systems

Preventing pollution spills is an important aspect of post-green screen design. Several methods have been developed to prevent or eliminate expansion, each with its own strengths and limitations. These methods include:

- a. **Color correction:** Color correction involves changing the working colors to neutralize dirt spills. Typically, this approach includes adjusting the color balance and concentration in the subject to combat undesired color effects caused by diffusion [21]. Color correction can be done manually or with the help of computer-aided color editors.
- b. **Spill control:** Spill control techniques aim to contain contaminants in the spill without significantly changing the color of the target. These methods typically require a spill-control agent that separates and neutralizes the spilled color. This method allows for precise control of the spill removal process.
- c. **Despill algorithms:** Despill algorithms are computational solutions that can automatically detect and remove contaminants spilled in an area [22]. These algorithms use advanced spectroscopy and imaging techniques to detect and neutralize spills, generally providing a very efficient and effective method of diffusion elimination.

Analysis of spill removal methods

The effectiveness of spill removal methods can vary depending on the specific characteristics of the site and the challenges they present. It is important to examine how different strategies are used in different situations. Factors such as lighting conditions, intensity of theme colors, location of dirt spills can influence the method of removal of spills.

In practice, the choice of a diffusion extraction method is often based on the balance between accuracy and efficiency. Manual color correction provides excellent control but can be time-consuming, especially for extensive field dirt [23]. Spill suppression techniques provide a compromise between accuracy and automation, while the Despile algorithm provides an efficient and automatic solution.

This section provides an understanding of the available pollutant spill mitigation strategies and the considerations that guide their selection. In the next sections, we'll delve into the challenges and solutions associated with color matching, which are key components to achieving a realistic green screen composite.

Color correction and matching

Green screen post-production relies heavily on accurate color correction and harmony to achieve a coherent and convincing whole. This section examines the importance of these techniques in more detail, examines color corrections and matching techniques, and discusses the role of color space and color patterns in creating a simple green screen.

Importance of color purity in uncut composites

Color correction is an important part of the post-production phase, ensuring that the subject color matches the background perfectly. Cohesive and harmonious colors are necessary to create a composite that the subject seems to be instinctively integrated into the chosen setting [24]. Failure to perform effective color correction can result in disjointed and inaccurate mixtures, reducing the overall quality of the final product.

Coloring, coloring, and coloring

Professionals use a variety of techniques and tools to solve the challenge of color correction and matching:

- a. **Color contrast techniques:** Coloring involves adjusting the color balance, brightness, and contrast of the subject to match the background. This process not only harmonizes the colors but also helps to create an overall mood and mood [25]. Coloring techniques include color balance, transparency adjustment, and contrast enhancement.
- b. **Color Keying:** Color keying is the process of selecting a specific color from the background and replacing it with the desired image or video. It plays an important role in simple composites by accurately changing the color of the movements. This technique is often used in conjunction with color correction to ensure that the subject matches the background.
- c. **Color matching:** Color matching algorithms use advanced graphic techniques to adjust subject colors to match

the background. These algorithms can work efficiently and accurately, providing they have developed a valuable tool for obtaining regular color harmony.

Role of color space and color patterns

An understanding of colors and color theory is important in the search for realistic composites. Colors, such as RGB (Red, Green, Blue) and YUV (Luma, Chroma) are used to better represent and manipulate colors. The choice of color can affect the accuracy of color correction and harmony. Color theory principles, such as color overlap and color harmony, guide the process of color correction, allowing colors to be manipulated into visually pleasing and realistic composites

Research on color correction and complexity in green screen post-production is essential to achieve the desired levels of realism and quality in composites and in the next sections we will further explore challenges and solutions of edge refinement and the use of software tools for greenscreen post-production.

Edge finish with matte removal

Achieving accurate and clean lines in green screen post-production is key to creating authentic composites. This section explores the specific challenges of rough edges, fringing and matte extraction. It presents tools and techniques for edge finishing and matte generation, including the use of waste mats and roto-scoping, and discusses the trade-offs between edge finishing techniques.

Problems with rough edges, fringing and matte extraction

Smooth contrast, fringing, and matte extraction are common challenges in green screen post-production:

Soft contrast: Soft contrast occurs when the shape of the subject is not well defined, resulting in a blurred transition between the subject and the background. It is important to have sharp edges for a simple composite.

Fringing: Typically colored or white fringing around the subject, and fringing results from reported contamination and can compromise the authenticity of composites.

Matte Extraction: Accurate matte extraction is the process of creating a clean separation between subject and background [26]. Flaws in matte can cause issues like rough edges and fringing.

Edge refining and matte extraction tools and techniques

Professionals use a variety of techniques and tools to meet the challenges of edge refining and matte extraction:

Garbage collection: Garbage collection is a mask that helps isolate the subject from problem areas by excluding certain areas from the green screen keying system. By determining which areas should be keyed and which should not if a key is placed upon specification, the garbage can will control the key accurately.

Roto-scoping: Roto-scoping involves manually examining the shape of the subject in each image of the process. This meticulous technique allows for precise matte removal and finishing, but

can be time-consuming especially with complex or fast-moving products.

Correlations between different edge finishing processes

The selection of an edge reduction method is often a trade-off between accuracy and effectiveness. While roto-scoping provides the highest level of edge control, it can be labor-intensive and time-consuming, especially for manufacturers where advanced green screen visibility when garbage cans are used quickly but may not lead to production exactly the same.

The selection of the appropriate method depends on the specific requirements of the project and the time and resources required [27]. Furthermore, the interaction between edge cleaning and spill removal methods should be considered, as the effectiveness of one may affect the efficacy of the other.

In this section, we explore the challenges and solutions associated with edge refinement and matte extraction in green screen post-production. Achieving crisp, clean edges is essential to creating realistic and convincing composites, and understanding the tools and techniques available is critical in the quest for superior results. In the following sections we will explore the software tools used for green screen post-production and discuss emerging products and innovations in Parma.

Software and tools for greenscreen post-production

Professionals in the world of greenscreen post-production rely on a variety of software tools to overcome the challenges discussed earlier in this paper. This section provides descriptions of some common software tools, including Adobe After Effects, Nuke, and dedicated chroma keying plugins. We will highlight their features, strengths, and limitations in addressing these challenges.

Adobe after effects

Adobe after effects is a widely used post-production software known for its complex layout and visual effects. It provides advanced tools for green screen post-production, e.g.

Chroma keying: After Effects includes versatile chroma keying that allows users to key in green or blue backgrounds, making it an essential tool for greenscreen compositing.

Effect and color adjustment: Provides a wide variety of effect and color correction tools for removing after effect spills, edge refining and color matching.

Keying plugins: There are many third-party keying plugins available for After Effects, such as Keylight, that can optimize the green screen keying.

Effort

- Extensive computing and VFX capabilities.
- Population and study materials.
- Integration with other Adobe software such as Adobe Premiere Pro for seamless collaboration.

Limitations

- Translation times can be long for complex compositions.
- Advanced features may require a learning curve for new users.

Nucleation

Nuke is another industry-standard music composition software commonly used in the background of high-end film and television productions. It excels in executing complex composition work and provides tools for green screen post-production, e.g.

Chroma Keying: Nuke offers powerful chroma keying tools for accurate background removal.

Roto and paint tools: Nuke RotoPaint node allows for matte finishes and extensive retouching.

Deep compositing: Nuke supports deep compositing, which is useful for dealing with transparent reflective materials.

Effort

- Exceptional compositing and VFX capabilities.
- Highly customizable and scriptable for complex business processes.
- Full support for file types and character spaces.

Limitations

- Nuke is high-end software, and its licensing costs can be prohibitive for smaller buildings.
- Steep learning curve compared to simple software.

Dedicated chroma keying plugins

In addition to comprehensive compositing software [28], there are dedicated chroma keying plugins available for editing and compositing applications such as Adobe Premiere Pro and Final Cut Pro. Notable examples are:

Red giant keying suite: This suite provides tools for key removal, spill removal, and paint maintenance.

BorisFX Continuum: Continuum includes Primatte Studio, a powerful chroma keying plugin.

Effort

- Interface with existing edit or compose workflows.
- Easy-to-use interfaces for fast results.
- Special elimination of keeling and spill.

Limitations

- Dedicated compositing software may lack depth and versatility.
- The type of keying may vary between different plugins.

Future trends and innovations

The green screen post-production field continues to evolve, with new materials and innovations reshaping the landscape as technology advances. This section examines some of the emerging

technologies and innovations in green screen post-production, such as AI-based solutions, real-time processing, for spill removal and edge refinement. Machine Learning We will also discuss the potential impact of these developments on the industry.

AI-based solution

Artificial intelligence (AI) is gaining momentum in green screen post-production. AI-driven solutions are being developed to automate the functional aspects of the business and make it more efficient, e.g.

Spill removal: AI algorithms can intelligently detect and remove contaminated spills, achieving optimal results with minimal intervention.

Color matching: AI can accurately analyze and adjust colors, ensuring that subject and background match seamlessly.

Edge refinement: Machine learning can help accurately refine edges and remove matte, reducing the need for extensive roto-scoping.

The use of AI in post-greenscreen manufacturing not only speeds up the process, but also improves mix quality by reducing human error and achieving more accurate results.

Real-time applications

Real-time processing capabilities are becoming increasingly important in green screen post-production, especially in live broadcast and virtual production as advances in hardware and software have enabled real-time keying and title sets on virtual backgrounds. This enhancement is particularly useful for media, virtual events, and interactive applications.

The availability of real-time processing solutions allows instant feedback and flexibility during production, streamlining operations and reducing the need for extensive post-production work.

Device Study for spill removal and edge cleaning

Machine learning algorithms are used for advanced spill removal and edge repair. By training models on large datasets of green screen composites, these algorithms can identify and correct for dirt spills, rough edges and fringing [29]. The power of machine learning can be improved and improved over time making it a promising solution for obtaining clean and authentic composites.

Potential impact on services

The combination of these emerging technologies and innovations in post-green screen manufacturing has tremendous potential for the industry:

Efficiency: AI-powered solutions and real-time processing reduce the time and labor required for post-production, resulting in more efficient product development and shorter production cycles.

Quality: Machine learning and AI algorithms can significantly improve the quality and realism of greenscreen composites, enhancing viewer immersion and viewing experience.

Accessibility: As this technology becomes more sophisticated and user-friendly, even small manufacturers and resource-constrained manufacturers can benefit from improved green screen post-production capabilities.

Creativity: Reduced manual labor and the availability of real-time controls open up new creative possibilities, allowing directors and producers to experiment and innovate freely.

Conclusions

In green screen post-manufacturing, we have embarked on a journey to explore the challenges and solutions that underpin this transformative technology. Green-screen technology, also known as chroma keying, has been an unstoppable force in the entertainment industry, offering countless creative opportunities but as we saw, a path from shooting against a green screen to synthetic mixes is beautifully, convincingly so is not without challenges in this paper. The complexity of these challenges and the innovative solutions professionals use to deal with them are well understood.

Challenges discussed

In this paper, we examined the main challenges of green screen post-production, including dirt spills, color correction, and edge repair. Dirt spills interfere with the separation of the subject from the background path, resulting in an undesirable green color. Color correction is important to ensure that the theme seamlessly matches the chosen setting. Edge finishing is important to minimize rough edges and fringing to achieve a clean outline. Solutions explored:

We explored various solutions and approaches to these challenges, including color correction, diffusion suppression, and runoff algorithms. We also discussed tools and techniques for cleaning edges and removing matte such as trash cans and

roto-scoping. Additionally, we looked at common software and tools used in green screen post-production, such as Adobe After Effects and Nuke, to highlight their features and limitations.

Continued importance of green screen technology

The importance of green screen technology in the entertainment industry remains unwavering. This allowed the filmmakers to transport audiences into fantastical worlds, historical periods and fantasy elements. From Hollywood blockbusters to independent productions, green film continues to be the driving force behind the industry's storytelling. In the age of digital content, their influence has expanded to online video, virtual events and educational seminars, cementing their status as a must-have tool for content creators.

Future directions

As technology advances, we have explored future products and innovations, including AI-based solutions, real-time processing, spill removal, edge repair and machine learning. These advances have the potential to make green screen post-production more efficient, flexible and flexible. The industry is poised to embrace these innovations as it matures and shapes the future of green screen compositing.

Concluding with these challenges and solutions required in green screen post-manufacturing, it is clear that the industry has continued growth and development on the way. By understanding the challenges of green screen technology, the challenges they pose and the solutions available, we empower filmmakers, editors and content creators to create compelling and immersive experiences involved in the. In the coming years, we expect greenscreen technology to continue to revolutionize the entertainment industry, providing new avenues for creativity and storytelling.

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