IMAGICA ENTERTAINMENT MEDIA

Our Film Restoration Projects

from 2003 to 2021

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Imagica Entertainment Media Services, Inc. has a long history of meeting the challenges of restoring films to pass on those valuable cultural assets to future generations. With the advancement of digital technology since the turn of the twenty-first century, we have entered a new phase of our film restoration endeavor.

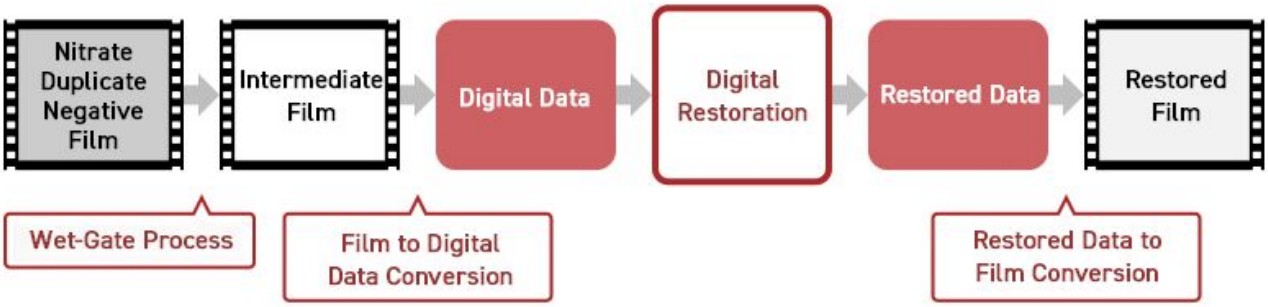
We have been engaged in a broad spectrum of film restorations by applying our accumulated film lab knowledge and innovative video technology, integrating analog and digital skills.

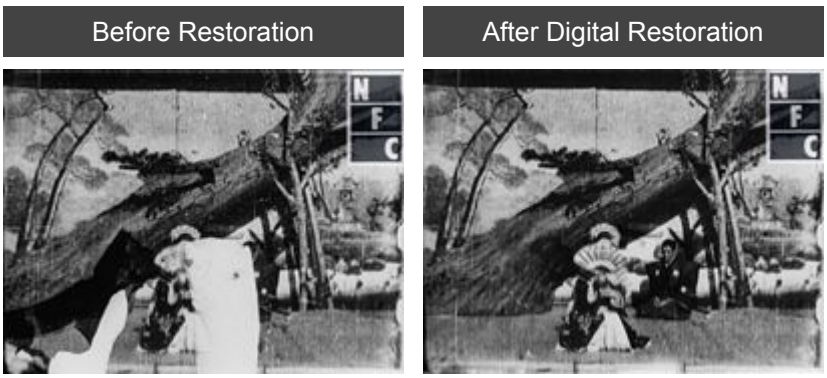
In this report, we would like to share with you some of the examples of film restorations that we have done in the past, where we have taken a diverse range of restoration approaches to work on films, including a Japanese film designated as Important Cultural Property and some significant foreign films.

This document is a PDF document that has been added and reorganized from a collection of video restoration case studies that were available on the official website of IMAGICA Corp. (at that time).

In 2009, *Momijigari* (*Autumn Leaf-Hunting*, 1899) became the first motion picture to receive the designation of an Important Cultural Property.

This film designated as an Important Cultural Property was in a form of a nitrate duplicate film and we handled the entire process of restoring the film digitally, under the supervision of the Film Center.





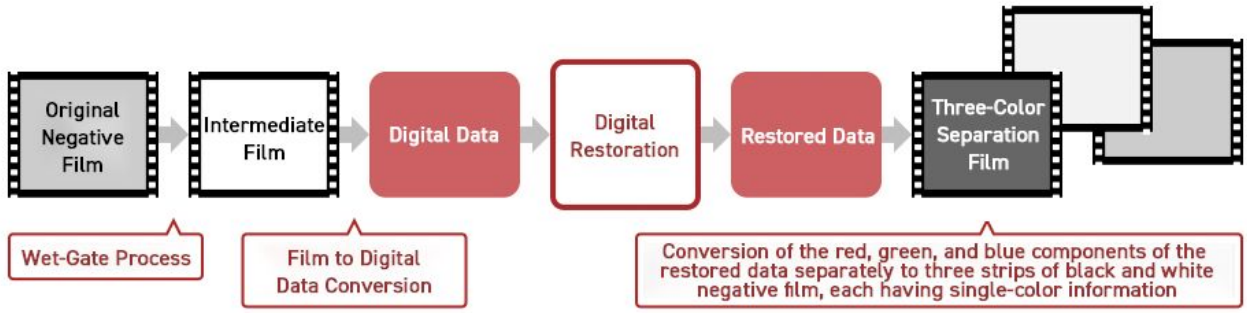
Momijigari. Images Courtesy of National Film Archive of Japan

For restoring this film of an Important Cultural Property, we respected the film's cultural heritage aspect throughout the restoration process. Our top priority was not to cause any further damages to the highly delicate film while working. It was also crucial to revive the images as if they were from the original film when it premiered.

Ginrin (*Bicycle in Dream*, 1955) is a representative work of film director Toshio Matsumoto, a pioneer of Japan's experimental film.

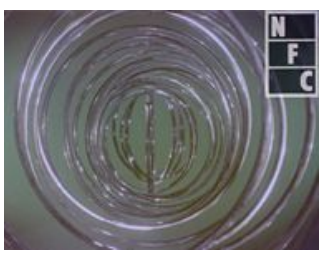
We handled the film's digital restoration and the creation of tri-color film to enable its long-term preservation.

Image Restoration



Sound Restoration

Restoration of this work was carried out under the supervision of the film director himself. To revive the original film's delicate colors that had faded, we developed a proprietary color management system and created a Three-Color Separation Film. This enabled us to accurately revive the original colors as digital data on film, DVD, and many other media.

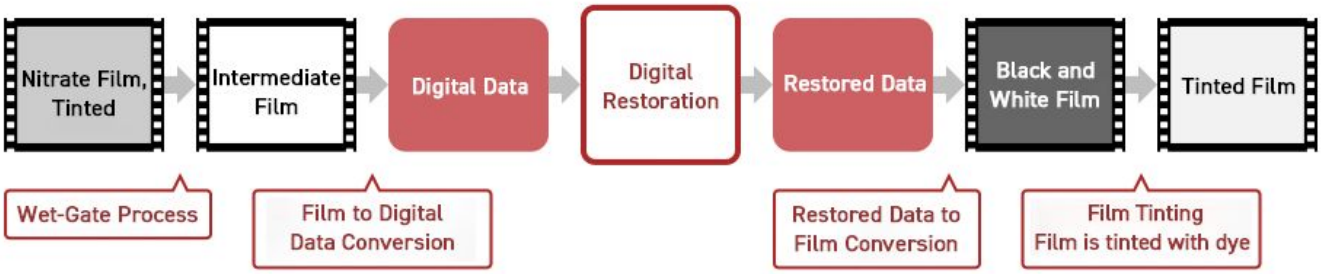


Ginrin. Images Courtesy of National Film Archive of Japan

In 1917, Japan's first stop motion film was released. *Namakura* (*The Dull Sword)* was released that same year, and *Urashima Taro* in the following year.

The two films are the forerunners of Japanese animation films. They were discovered by Natsuki Matsumoto, and with his cooperation, we worked on their digital restoration and tinting.

Examples of Film Tinting



To digitally restore these two tinted animation films in which the films were tinted with dye, we first applied the wet-gate process on the source films to create intermediate films, and then, converted the intermediate films to digital data. For tinting of the film that followed, we used our proprietary tinting machine.

We build the best integrated workflow for each of the films we restore by combining traditional analog processes and leading digital technologies.

In 2008, we researched on digitalization of old-style recordings and video resources archived in the National Diet Library.

The following types of materials were the subjects of our research.

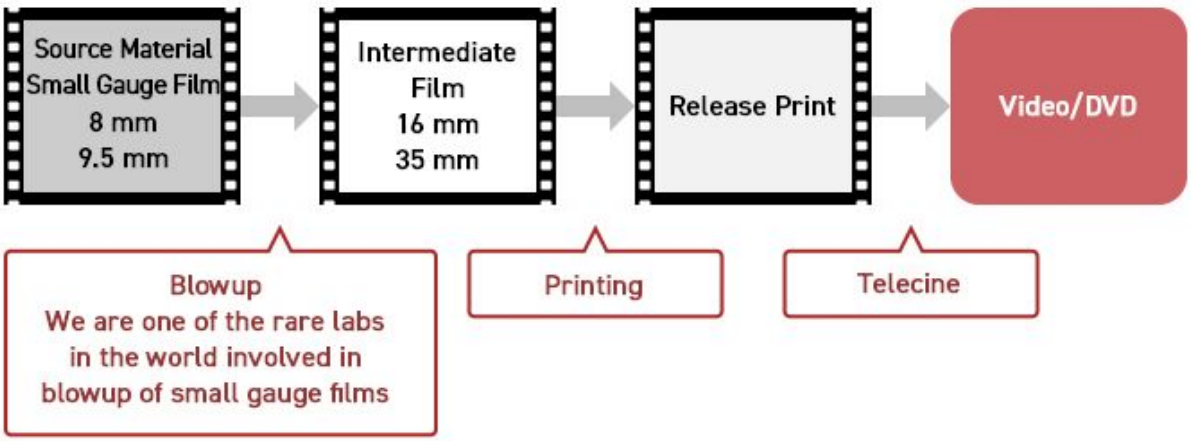
Recordings and Video Resources

Cassette Tape
Reel-to-Reel Audio Tape (6 mm magnetic tape)
VHS Video
Betamax Video
U-matic Video
Laser Disc
VHD
16mm Film
8mm Film

We sampled each resource type and digitized them by altering sampling waves, formats, and other conditions, and reported the quantitative and qualitative findings and assessments. The report was released on the National Diet Library's webpage.

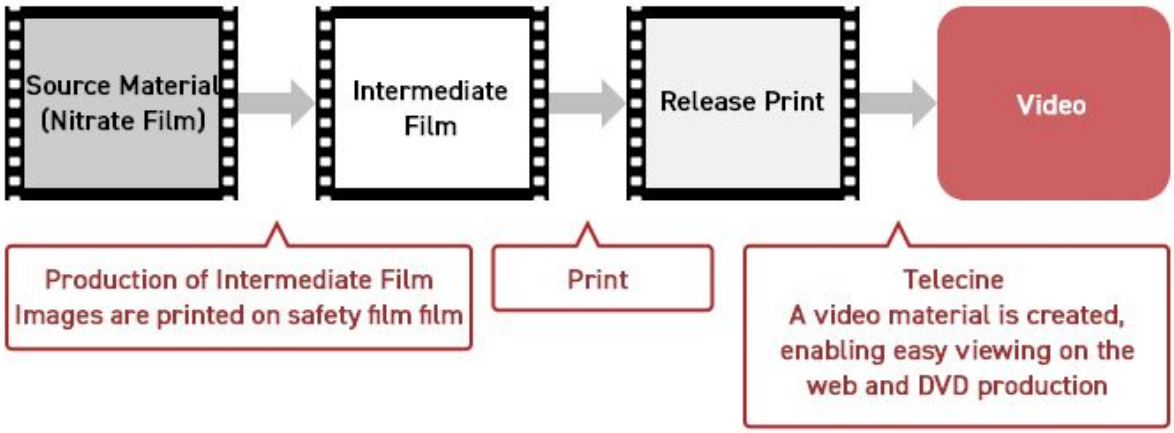
We handle media conversions from various source formats and the above-mentioned audio and video resources. We would be pleased to hear from you about your needs regarding digitalization, duplication and/or data migration from the audio and video source materials that you may have. Let us help you figure out what type of format to store resource in or what the type of format your resource is.

An 8mm film related to Etona Eiga-sha movie company and a 9.5mm home-movie with a strong regional flavor that belongs to the film collection of Ritsumeikan University Art Research Center were duplicated into 35mm films at our lab.



We began by thoroughly checking the condition of the source films to determine whether to proceed with the blowup process. We made necessary fixes and used equipment that was precisely controlled for focus and image quality to make the intermediate film and the release print. As for the handling of perforations in the center of the 9.5 mm film, we had several conversations with our client before conducting the blowup process. The perforations were left in the duplicate film, to retain the original imagery information as much as possible.

Since 2003, we have been involved in a toy film project known as the Toy Film Restoration Project of the Osaka University of Art. We have transformed toy films to non-flammable films (creating duplicate negatives and release prints). Our accomplished engineers have restored almost nine hundred toy films to this date.

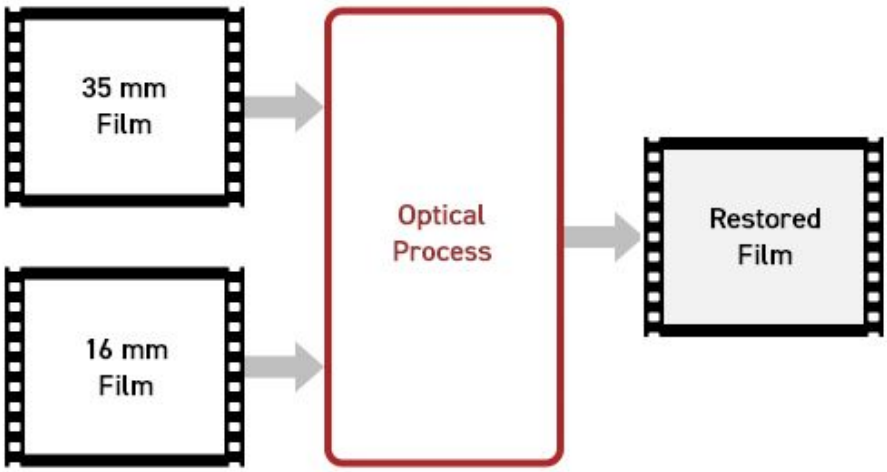


Since most toy films were made before World War II, aging has caused serious film deterioration. Successfully converting these toy films to safety films to safety films depended on how well those physical defects could initially be removed. We thoroughly worked on this initial stage and then temporarily filled the scratches on the source film using the wet-gate process to create the intermediate films. These steps lead to a beautiful finish of the restored films.

Directed by Jeon Chang-Kun in 1959, King Gojong and Martyr An Jung-Geun (109 min.) is a South Korean film that was produced with the biggest budget of the time and received numerous national awards, setting the country's fifth-highest box office record.

Image courtesy of Korean Film Archive

We handled the analog restoration of this film using the optical printing process.



There were two types of source films, one 35 mm and the other 16 mm. We selected the best parts from both films to create one composite print, the restored film. We also employed optical work (an optical composite technique) to overcome the challenges posed by the source films. Such were the film parts that were composed together using a special technique that is no longer in use today and the film parts that were severely damaged that they could not be used for restoration.

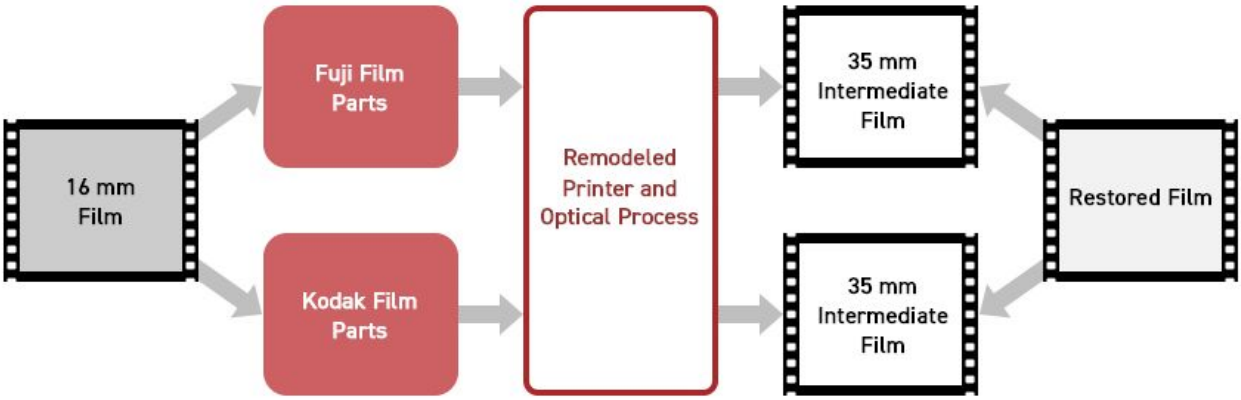
South Korean Film, *Sorrowful Youth*

Sorrowful Youth (99 min.), directed by Dae-jin Kang in 1967 is a movie made from a novel of the same title written by Rae-seong Kim in 1953. The movie was the top box-office hit of the year of its release and the ninth highest of the 1960s.

South Korea's famous actress Yun Jeang-hee, who was deemed one of the Troika, the three starred actresses of the late 1960s, debuted in this film and received South Korea's most prestigious The Grand Bell Film Award for New Actress.

We handled the analog restoration of the original film using the optical printing process.

Image courtesy of Korean Film Archive

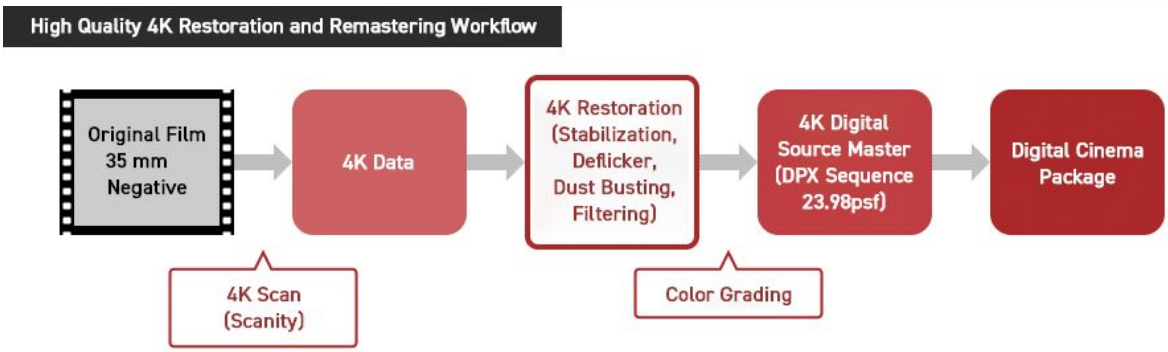


As the 16 mm source film was created using two brands of film stock, Fujifilm and Kodak, and between them, the level of deterioration significantly differed, the first step for us was to separate the source film by brand and work on them separately.

We were challenged by the instability of images caused by the severe deterioration of the 16 mm source film during the process of making a 35 mm intermediate film. We found a solution to remodel the printer, a machine for making duplications.

We also needed to deal with the right sizing the edges to restore the film. The original film was scaled down from 35 mm to 16 mm film, using a process which probably was inadequate. To overcome this issue, we applied optical composite technology.

Released in 1987, *Daughter of the Nile* is a film directed by Hou Hsiao-hsien. He is known for directing *The Assassin*, Jury Special Prize, 5th Torino International Film Festival and *Café Lumiere*, Best Original Film Score, 24th Golden Horse Award. In this restoration endeavor, we handled the process of scanning the original film into 4K, digitally restoring audio and visual elements, and producing a digital cinema package (DCP).



Restoration of *Daughter of the Nile* was our first endeavor of digitally restoring a foreign film. While the source film was relatively new, many hours of manual work were put into fixing the flickers and numerous stains it contained. For audio restoration, lip-synch as well as noise reduction needed some adjustment. As for color grading, we overcame the challenge created by the physical distance between Taiwan and Japan, by receiving release print and notes from the cinematographer in charge and using them as a reference to complete the restoration in Japan. The restored version of the film was screened at the Berlin International Festival in 2016.

Restoration of Japan's oldest existing color talkie movie *Senninbari* (The *Thousand-Stitch Belt,* 1937), using analog and digital technologies to retrieve the colors of the two-color film

On March 7, 2016, Tomohiro Hasegawa, Color Management Advisor of IMAGICA(the current Imagica Entertainment Media Services, Inc.) and Masaki Daibo, Researcher of the National Film Center(NFC), The National Museum of Modern Art, Tokyo gave a presentation at the Joint Technical Symposium (JTS) 2016, held at the National Museum of Singapore (NMS).

Images courtesy of the National Film Center, The National Museum of Modern Art, Tokyo (the current National Film Archive of Japan)

Outline of the Presentation

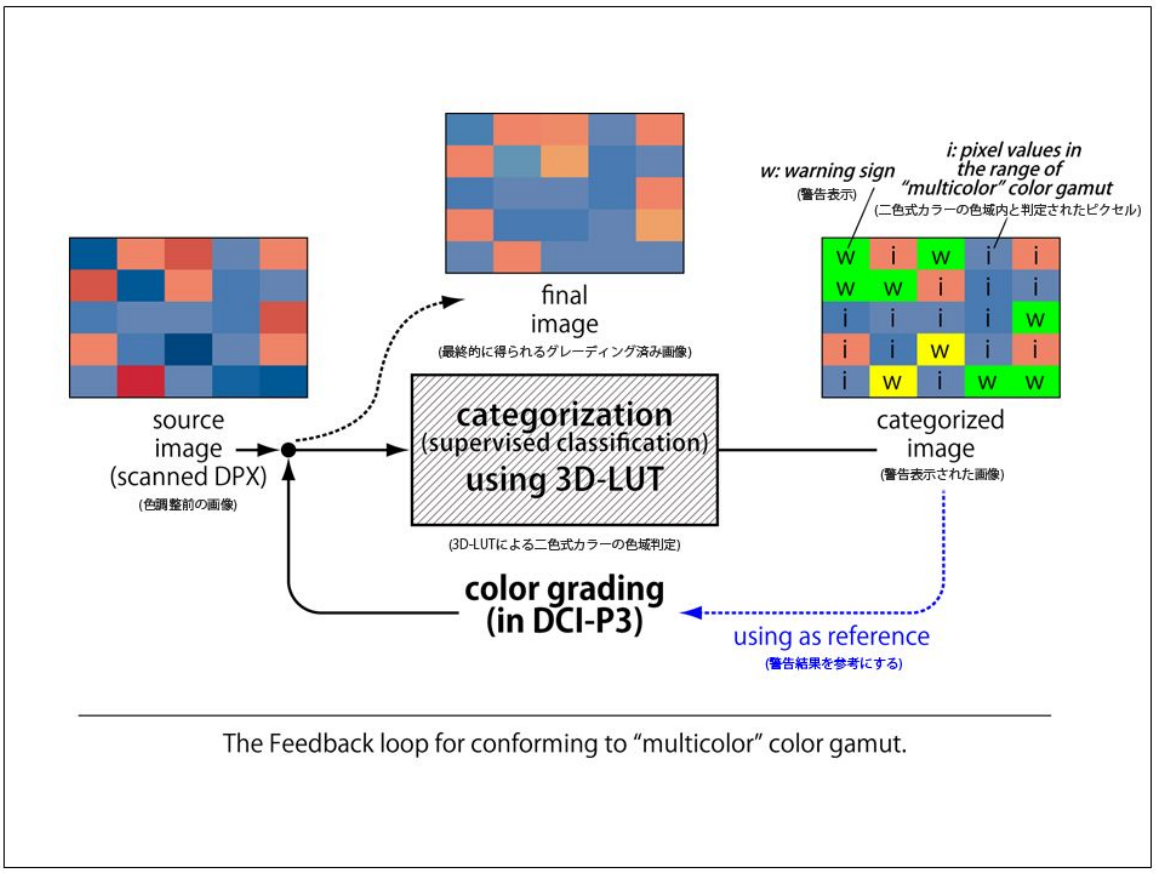
The 20-minute presentation titled "The Restoration of *The Thousand-Stitch Belt* (1937): Utilizing Analog and Digital Techniques to Retrieve the Colors of a Two-Color System" was given at the Gallery Theater of NMS. First, NFC's Masaki Daibo described the background of our endeavor to restore The Thousand-Stitch Belt and the state of optical simulation at the time. Then, Tomohiro Hasegawa explained about the world's first process that was employed for digitally restoring *The Thousand-Stitch Belt*.

Details of our report titled “The Restoration of *Senninbari*: Reviving a Two-Color System through Analog and Digital Technologies” can be found in the Bulletin of the National Modern Art Museum, Tokyo (No. 20, 2016, pp. 22-34).

URL:https://www.momat.go.jp/ge/research/#section1-3

Here is an excerpt of the presentation which describes the part of the restoration endeavor we handled.

Restoring Colors that Two-Color System Cannot Achieve



Color Grading Using Dedicated Lookup Table (LUT)

The key to restoring Senninbari (The Thousand-Stitch Belt) was how to leave out the colors that the two-color system could not have produced. We conducted a photochemical simulation (restoration of the original film element using the chemicals and film stock available today), measured and analyzed the result, and created a Lookup Table (LUT)*. This LUT was designed to give an alert signal in green or yellow whenever those colors that could not have been created with the two-color system appeared during the restoration process.

*LUT is a file used mostly for color grading in image processing.

Effective Color-Grading Process with LUT

The dedicated LUT was used at different steps of the color-grading process: Before color-grading for the image on the left and during color-grading for the image on the right.

LEFT: Before color-grading / RIGHT: After color-grading
The dedicated LUT is applied for both.

Images courtesy of the National Film Center, The National Museum of Modern Art, Tokyo

The image on the left results from applying the LUT to the image before the color grading process, which is taken by colorists and technical specialists in color images. The green areas indicate that colors that appeared in these areas for various reasons could not have been produced with the two-color system. In comparison, the LUT was applied to the image on the right during the color grading process, and as a result, the green alert areas were significantly reduced. Moving the colors around to decrease the green alert areas could revive the original colors and naturally balance out the colors of the entire image. Effective restoration of colors can be achieved by having the colorists get a feel for conducting this type of color adjustment.

Creation of LUT

When creating the LUT, we needed to consider how to employ the photochemical simulation results. We verified the simulation results from multiple angles and arrived at an appropriate way to treat the color differences. If the color differences measured less than a particular threshold value, those groups of colors were categorized as colors belonging to the color gamut of the two-color system. The LUT was created with a computing process to keep those color groups within the color gamut and to differentiate those colors outside of the color gamut by tinting them in green or yellow.

In this restoration endeavor, we could understand the characteristics of the two-color system, determine its color gamut, and effectively utilize the color gamut in the color-grading process. As a result, we could restore the colors of the time of the premiere of *Senninbari (The Thousand-Stitch Belt).* This restoration knowledge can be applied to other works, even if a detailed analysis of the source material is challenging or if the original production members or supervisors cannot give directions about the coloring of the original works. We are also hopeful that this technique will effectively restore other special colors.

Restoring colors is a crucial element of film restoration. This project has given us valuable experience and an encouragement to continue building our film restoration expertise at IMAGICA.

*A color gamut is a range of the brightness of colors that can be produced on a device, and there are many different types of color gamuts depending on the device and the standard being used.

Note: Names of the companies in this article are as they were when it was written, which was before they were merged into Imagica Entertainment Media Services, Inc.

(Film Title, Director, Release Year, Restoration Type, Restored Year)

Fighting Friends, Yasujiro Ozu, 1929, 2K restoration, 2003
Zanjin Zanba Ken, Daisuke Ito, 1933, 2K restoration, 2003
Castle of Sand, Yoshitaro Nomura, 1974, 2K restoration, 2004
The Water Magician, Kenji Mizoguchi, 1933, 2K restoration, 2006
Gakusei Sandaiki, Masahiro Makino, 1930, 2K restoration, 2007
The Dull Sword, Junichi Kouchi, 1917, 2K restoration, 2008
Urashima Taro, Seitaro Kitayama, 1918, 2K restoration, 2008
The Yellow Handkerchief, Yoji Yamada, 1977, 2K restoration, 2009
Momijigari, Tsunekichi Shibata, 1899, 2K restoration, 2010
Bicycle in Dream, Toshio Matsumoto, 1955, 2K restoration, 2010
Chuji's Travel Diary, Daisuke Ito, 1927, 2K restoration, 2010
The Sun in the Last Days of the Shogunate, Yuzo Kawashima, 1957, 2K restoration, 2011
Gate of Hell, Teinosuke Kinugasa, 1953, 2K restoration, 2011
Carmen Comes Home, Keisuke Kinoshita, 1951, 2K restoration, 2012
An Autumn Afternoon, Yasujiro Ozu, 1962, 2K restoration, 2013
The Road, Federico Fellini, 1954, HD restoration, 2013
Cruel Story of Youth, Nagisa Oshima, 1960, 4K restoration, 2014
Shall We Dance ?, Masayuki Suo, 1996, 2K restoration, 2014
The Beast to Die, Toru Murakawa, 1980, 2K restoration, 2014
The Girl Who Leapt Through Time, Nobuhiko Obayashi, 1983, 2K restoration, 2014
Sailor Suit and Machine Gun, Shinji Somai, 1981, 2K restoration, 2014
Japanese Expedition to Antarctica, Yasunao Taizumi, 1910-12, 2K restoration, 2014
Her Brother, Kon Ichikawa, 1960, 4K restoration, 2014
Early Summer, Yasujiro Ozu, 1951, 4K restoration, 2015
Lion City, Cathay-Keris, 1960, 2K restoration, 2015
Momotaro, Sacred Sailors, Mitsuyo Seo, 1945, 2K restoration, 2015

Gamera: Guardian of the Universe, Shusuke Kaneko, 1995, 4K restoration, 2015

Gamera 2: Attack of Legion, Shusuke Kaneko, 1996, 4K restoration, 2015

Gamera 3: Revenge of Iris, Shusuke Kaneko, 1999, 4K restoration, 2015

The Thousand-Stitch Belt, Genjiro Saegusa, 1937, 2K restoration, 2015

Daughter of the Nile, Hou Hsiao Hsien, 1987, 4K restoration, 2015

Nobody Knows, Hirokazu Koreeda, 2004, 2K restoration, 2016

Merry Christmas Mr. Lawrence, Nagisa Oshima, 1983, 2K restoration, 2017

Tokyo Story, Yasujiro Ozu, 1953, 4K restoration, 2017

Floating Weeds, Yasujiro Ozu, 1959, 4K restoration, 2017

Muddy River, Kohei Oguri, 1981, 2K restoration, 2017

The Dull Sword (the longest version), Junichi Kouchi, 1917, 2K restoration, 2017

Kobayashi Tomijiro Sogi, (Important Cultural Property), 1910, 4K restoration, 2017

Chushingura, Shozo Makino, 1910-17, 4K restoration, 2018

It's Tough Being a Man (movie series), Yoji Yamada and others, 1969-97, 4K restoration, 2018

Street of Shame, Kenji Mizoguchi, 1956, 4K restoration, 2018

To Sleep So as to Dream, Kaizo Hayashi, 1986, 2K restoration, 2019

The Daughter of Japan, Nyi Pu, 1935, 4K restoration, 2019

Tange Sazen and the Pot Worth a Million Ryo, Sadao Yamanaka, 1935, 4K restoration, 2020

Priest of Darkness, Sadao Yamanaka, 1936, 4K restoration, 2020

Yokai Monsters: Spook Warfare, Yoshiyuki Kuroda,1968, 4K restoration, 2020

The Tale of Zatoichi, Kenji Misumi, 1962, 4K restoration, 2020

Daimajin, Return of Daimajin, and Wrath of Daimajin, Kimiyoshi Yasuda, Kenji Misumi, and Kazuo Mori, 1966, 4K restoration, 2021

The Moon Has Risen, Kinuyo Tanaka,1955, 4K restoration, 2021

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