CINE-GT.2920: Moving Image and Sound: Basic Issues and Training

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Format History

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Rouxcolor

Colors are light's suffering and joy.

–Johann Wolfgang von Goethe

Introduction

The development of color cinematography has been an arduous journey with numerous defeats and little success. Hand coloring, stencil coloring, tinting, and toning were employed to give films fantastic hues. However, the audience and filmmakers were not satisfied. They were craving for natural color reproduced faithfully on the screen.

Natural color cinematography became possible through James Clerk Maxwell's discovery that any colors of the spectrum can be created by mixing three primary colors of red, green and blue. [1]There are two methods in synthesizing real color, additive (using red, green, blue) and subtractive (using cyan, magenta and yellow). The first color processes are additive. The RGB colors are separated used a splitting device and exposed simultaneously on one, two, or three black-and-white films. The multiple images will then be superimposed upon each other in projection, synthesizing the real color. However, these methods have been largely abandoned

[1]"Color theory," *Timeline of Historical Film Colors*, https://filmcolors.org/timeline-entry/1320/, accessed December 7, 2019.

by the end of the 1930s mainly due to problems in projections.Subtractive colors as Technicolor, Agfacolorwas adopted in commercial production and won praises from the audience. By the time that Rouxcolor was developed in 1948, they were one of the last additive coloring methods.

Rouxcolor was invented by Armand and Lucien Roux, who were collectively referred to as the Roux brothers. Although the patent for the optical system was registered in France on March 4, 1931, only in 1948 did Roux brothers made their first film with the process and exhibited it with an audience. The quality of color astounded the journalists, color technicians and Hollywood company representatives alike. The French author and director Marcel Pagnolwas so impressed with the coloring effect that he decided to reshoot his film, *The Pretty Miller Girl* (La Belle Meunière, 1948) in full Rouxcolor.[2] The film premiered three months later in Paris and New York. The color process was praised by the critics, although the film itself only received a lukewarm response.[3] After three feature films and several shorts, Rouxcolor never met the success it hoped to achieve and Armand Roux renounced the promotion of Rouxcolor in 1953.[4]

This paper will offer historical research of the invention, application, circulation and eventual demise of the Rouxcolor process as well as some relating preservation issues. The first section will focus on the technic aspects of the Rouxcolor process, including the development of the idea, the design, the optical system, printing process, and playback device. This second section will focus on the obsolesce of Rouxcolor, especially concentrate on the paradoxical

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[2]Michael James, "New Color Process Is Shown in Paris: Roux Brothers' Film Discovery Seen More Accurate Than Present, Just as Cheap," *The New York Times*, June 1, 1948.
[3]Michael James, "New Film Color Process Unveiled in France At Premiere of Story About Franz Schubert," *The New York Times*, November 24, 1948.
[4] Alain J. Roux, "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970," *1895*, no. 71 (December 2013): 211–28. DOI:10.4000/1895.4792.

relationship of production and projection in the film technological development. I will also compare Rouxcolor with other additive color processes at that time in terms of its advantages and disadvantages in production and exhibition. The third section will focus on the preservation issues of additive color films, using *The Pretty Millar Girl* was an example.

The primary resources used in the research are related patents, historical newspapers and some photographs of the devices. The secondary resources including a memoir from Armand Roux's son, Alain J. Roux. Aged 18 in 1948, he retained a memory of what he saw and heard at that time. I also draw information from various publications about early color processes.

History of Rouxcolor

Armand Roux was born in 1916 in a family of three children. Graduated from the newly-founded Institutd'Optique in 1929, he became a specialist in projection booths. In March 1, 1930, he joined the Gaumont company as an engineer to install new devices for sound films and remained as the head of the sound department until in 1931 the company went bankrupt. [5]

During his occupation at Gaumont, Armand Roux started to have the idea of Rouxcolor. At that time there are various competitive color processes in France. One of them is the Chronochrome, a three-color additive process. It was created by using a prism inside the camera to split every black and white image into three frames, which was then projected simultaneously through different filters to form a single image. To save the quantity of film, the height of each frame was reduced from the standard 18 mm and thus require only 2.25 times of quantity of the

[5]Alain J. Roux, "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970," *1895*, no. 71 (December 2013): 211–28. DOI:10.4000/1895.4792.

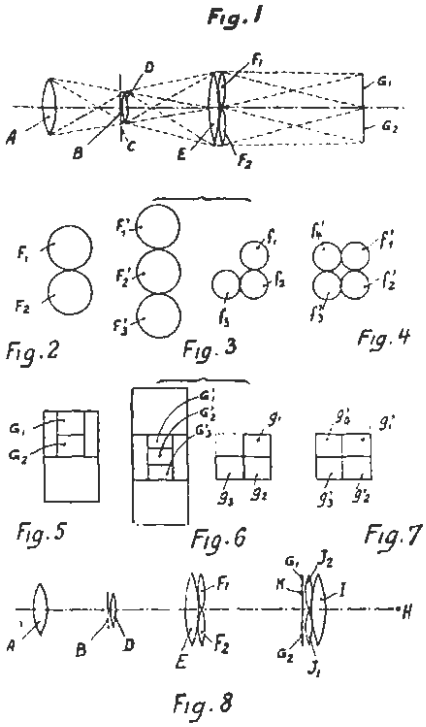
film projection. [6] However, the process also faced significant drawbacks. It still required more footage than a conventional film and the blurred contours were especially noticeable with people in rapid motion.

Being an employee at Gaumont, Armand Roux was familiar with the advantages and disadvantages of Chronochrome. He inherited the idea of spatial synthesis, by using prisms and multiple lenses to achieve the natural color effect, however, he also revised the optical system so that the spatial and temporal parallax will be eliminated. In the previous system, the secondary images that were formed of a group of identical secondary objective lenses that equals the color records that the process intended to create (3 lenses, in the case of Chronochome). Therefore, the image of sufficient sharpness will be given only by images from a close range. Parallax will also be evident because the beam that traverses each secondary object would first pass through a peripheral region of the object and not through the center of the objective.[7]

For the new system, a lens E is placed in front of the secondary objective. In previous arrangements, the sharpness is determined by the focal depth of the secondary objective, while in the new system, it is determined by the focal depth of the lens E. The result is that the focal depth is more effective in determining the sharpness of the focusing. It also significantly reduces parallax. As the image of the object is re-projected by lens E with parallel rays, the images won't have the parallax effect. Roux also claimed that when the same lens E used in cinematography was used in projection, the images will achieve perfect registration on the screen even without adjusting.To project the film, the optical system is simply implemented in reverse. By using an

[6]"GaumontChronochrome", *Timeline of Historical Film Colors*, https://filmcolors.org/timeline-entry/1227/, December 7, 2019.
[7]Adrian Clyde-Maxwell, "Rouxcolor", *Colour Cinematography*. London: Chapman & Hall, 3rd. ed.,272-275, 1951.

additional four-color lens in front of the projector, the individual images are projected as one on the screen, recreating the color. [8]

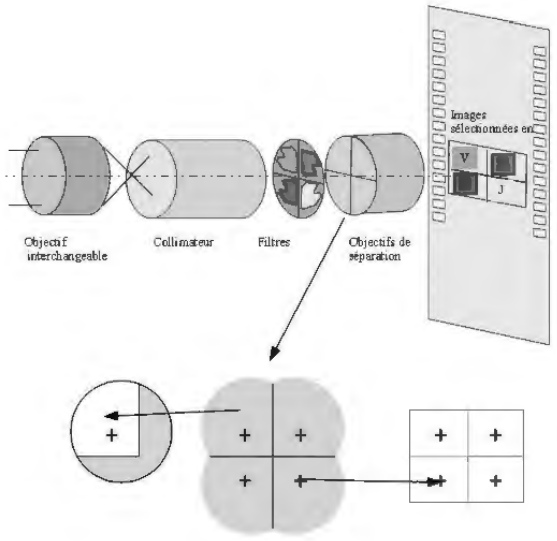


The optical system of Rouxcoloruses a four-color lens to split the images in blue, yellow, red and green. The four separations are recorded on one single frame of a single 35mm film. Each image approximately equals 7.5 x 10.5 mm. The film stock used is the standard black-and-white film which can be processed as one in any lab.

The quadrichrome system of yellow, red, blue, green is a main feature of the system. Richard Thomas, the inventor of Thomascolor, Rouxcolor's biggest competitor in America, criticized that the additional yellow record was useless. Thomascolor used two blue records to compensate for the sensitivity of panchromatic emulsion to blue and ultraviolet light.[9] However, modern scholars analyze that although the RGB system is enough to reproduce all the colors,

[8] Adrian Clyde-Maxwell, "Rouxcolor," *Colour Cinematography*. London: Chapman & Hall, 3rd. ed.,272-275, 1951.
[9]Roderick T. Ryan. A History of Motion Picture Color Technology. London: Focal Press, 1977, pp. 46–47 and p. 49

yellow is a component of almost all colors we see in nature. Roux decided to add the color to increase the saturation of the others between red and green to improve the quality of the color. [10]



The process has many advantages to other color processes at that time. The shooting camera doesn't need to specialized. Only a regular camera with added the lens is needed, which made it easy for cinematographers and budget control. In the shooting, although the added filter would require an increase of light to work better, the use of black and white film means the required light increase was much less than other color processes. Compared to the complex dye-transfer process of Technicolor, Rouxcolor uses standard black-and-white film that can be processed as normal stock in any lab, neither did the prints differs from normal black and white printing. The color quality was also praised as "far more accurate than the present color method" and "able to cope with the harsh contrast between light and shadow"[11]. Furthermore, compared

[10]Pascal Martin. "Le Rouxcolor : un procédéadditif de reproduction des couleurs, *1895*, no. 71 (December 2013): 211–28. doi: 10.4000/1895.4791

[11]Michael James, "New Color Process is Shown in Paris," *The New York Times*, June 1, 1948, 28.

to its biggest competitor, Thomascolor, which uses 65mm film to increase the image quality, the standard 35mm film kept the production expenses under the belt.

Production success and projection failure

The system was first demonstrated in Intsitud'Opticque in Paris in 1934 under the name of Tetracolor. After the first launch, Roux didn't succeed in securing any funding. It was an unfortunate event because there are no real competitors in the market at that time. In 1936, Marc de Gastyne made a film*l'Ile de la solitude* in Tetracolor. It was projected a few times for advertising the color process and never commercially screened. A print is now preserved in the French Film Archives (AFF) of the CNC.

The Second World War and lack of funding delayed the commercialization of Rouxcolor process. Only in 1946 when Armand Roux returned to Paris after unsuccessful experience in Los Angeles did he get funding from his friend Marcel Rieunier to establish ARCO (Roux Cinematography and Optics). After one year working on lighter shooting lens and prism, Roux gathered his demonstrated test and declared the invention of Rouxcolor in the spring of 1948. [12]

The screenings were extremely successful. A representative of a United States studio claimed, "I wouldn't have believed it if I hadn't seen it." [13]There were reports about American companies who want to use the process for their films. Both the press and industry showed great interest and faith in the new coloring process. However, only when the film prints arrived at different cinemas the problems started to arrive.

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[12]Alain J. Roux, "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970," *1895*, no. 71 (December 2013): 211–28. DOI:10.4000/1895.4792.

[13]Michael James, "New Color Process is Shown in Paris," *The New York Times*,June 1, 1948, 28.

Dr. Herbert Humus, president of Technicolor, was among the first people that pointed out the drawbacks of the new process. He said that additive processes that use prisms with color are "ill-adapted to meet the practical requirements of the motion picture industry due to limitation in the range lenses that can be used with it." As the superimposition of the four images had to be mechanically controlled, the projectionists needed to have special training to project a Rouxcolor film. Even so, the perfect registration was still hard to obtain.[14]

An article from the International Projectionist magazine pointed out other problems of the process. High absorption is one of the greatest disadvantages of using color filters as a light-splitting optical system. It results in severe loss of light. To archive normal screen luminance (ten foot-lamberts), the light source has to be at least six to eight times the normal intensity.[15] Also, the tiny frames are only a quarter of the normal frame, therefore are very grainy. Even slight defects in the projector operation are magnified on the screen. [16]

These complications made Rouxcolor projections varying in quality. To solve the problems, Armand Roux or his assistant would adjust the projection lenses before projection to make sure it works properly. However, the projector would vibrate and disrupt the perfect superimposition. One solution is to print the film in the monopack films as Gevacolor or Eastmancolor. The Asco company built an addictive printer which made it possible to put the four images to print in normal color film. However, this solution was expensive and had worse color quality, however, it simplified the projection and was used widely for oversea distributions.

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[14] "Rouxcolor Stirs France, U.S.," Independent Exhibitor's Bulletin, 1948; "Techincolor Chief Says Roxcolor, French Plan, Lacks Practicality", Boxoffice, June 12, 1948, 56.

[15]Quoting Monsieur Vivie of Paris, Adrian Clyde-Maxwell, "Rouxcolor", *Colour Cinematography*. London: Chapman & Hall, 3rd. ed.,272-275, 1951.

[16]"The Magic of Color," International Projectionist vol 26 no.7, July 1951, 34.

Demise and Preservation

After *The Pretty Millar Girl*, three features films were made in Rouxcolor, *Sett el Hosn* (Father wants a Wife, 1950), *Baba aris* (The lady of the Castle, 1950) made by Studio Nahas in Cairo Egypt and *Das WeisseAbenteuer* (The White Adventure, 1952).[17] However, the films were all projected using subtractive prints as Gevacolor to save the trouble of projection. Many shorts films were also made, some of them made by Armand Roux to test the ability of the process and usually screened before the feature film. The last film made in Rouxcolor is a report on the 2nd Rally Algiers-Cape Town, by the Ministry of War in 1953. After 1953, Armand Roux renounced the promotion and the manufacturing of equipment for production and projection of Rouxcolor.[18]

The shorts films were donated by Armand Roux to CNC after his death. However, the film that carried most anticipations and involvements of the Roux brother is *The Pretty Millar Girl*. Marcel Pagnol was a renowned French author and director. According to Alain Roux, the first version of the film didn't meet Pagnol's expectation. Therefore, the arrival of Rouxcolor offered him an opportunity to not only utilize the attraction of Rouxcolor but also remake the film to his satisfaction. The film was a collaboration between Roux brother and Marcel Pagnol. Armond Roux was working closely with the cinematographer to measure the light to achieve the best result of the color effect. In the opening credit of the film, Roux was put in after the directors' name, which proves his importance in shaping the film as it is.

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[17] Alain J. Roux, "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970," *1895*, no. 71 (December 2013): 211–28. doi:10.4000/1895.4792.

[18] Alain J. Roux, "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970," *1895*, no. 71 (December 2013): 211–28. doi:10.4000/1895.4792.

Fortunately, due to the popularityMarcel Pagnolenjoyed as a writer, the film was never forgotten. *The Pretty Millar Girl* was screened in full Rouxcolor with the original lenses at Cinémathèque de Bruxelles and Cinémathèque de Toulouse. It was transferred to Eastmancolor by the CNC Film Archive in 1985. The work was done at Laboratory L.T.C St. Cloud and under the supervision of Jean-Marie Guinot, Roux's camera assistant. This version was broadcasted on January 4, 1987, on FR3 and was released in France on DVD in October 2008. Other Rouxcolor films as *Das weisseAbernteur* is available for online viewing, which was likely the result of digitization for television podcasting.

Compared to other natural color processes, Rouxcolor print is less difficult to restore for several reasons. It was printed in standard black and white film, which eliminates the problem of dye fading with Technicolor and monopack films. Secondly, as Alain Roux kept the original lens Pagnol used in shooting the film, the restorer directly used the lens and optical printer to enlarge and print the negatives in modern color films, which made it easier to make film copies for distribution and preservation.

Conclusion

"The principle of Rouxcolor, in fact, is by far the most economical, simple, and rational in the realm of color film…. But Rouxcolor was doomed to failure from the start, for the sole reason that it complicated the projection of the film."[19]

[19]Andre Bazin, "The Real Crime on La Rue Morgue: They Assassinated a Dimension!" In *Andre Bazin's New Media*, edited by Andrew Dudley, Oakland: University of California Press, 2014, 254-57.

Looking back at the invention and demise of Rouxcolor, it is a text-book example proving how the motion picture industry was and still is reliant on hundreds of thousands of projection booth. Although other factors including the competition, funding, publicity, supports of filmmakers and studios all played a part in influencing on which process eventually gained commercial success and became the industry standard. Even Technicolor was the most complicated and expensive process in terms of production, for the sole reason that the film can be projected using normal projection gave it an advantage over every other additive process.

From the preservation point of view, Rouxcolor was also a reminder of the importance of the playback device. The more easily the format can be playback in a variety of devices, the more easily it will be successful and accessible in generations to come.

Bibliography

American WideScreen Museum. "GaumontChronochrome." 1998. http://www.widescreenmuseum.com/oldcolor/gaumont.htm

The entry for Rouxcolor mistakes Rouxcolor with Thomascolor. It claims that there are two blue records for Rouxcolor and it was printed in large format film, both of which are

characteristic of the Thomascolor process. However, I took inspiration from the analysis of potential restoration.

Bazin, André. "New Screen Technologies." In *Andre Bazin's New Media*, edited by Andrew Dudley, Oakland: University of California Press, 2014, 215-19.

———"The Real Crime on La Rue Morgue: They Assassinated a Dimension!" In *New Media*, 254-57.

———"Will CinemaScope Save the Cinema?" In *New Media*, 267-87.

Bazin reflected on the failure of Rouxcolor about the relationship between projection and production. His argument is similar in the three articles. On the other hand, it also proves that Rouxcolor was influential to his generation as a valid alternative to Technicolor.

Buch. "Film Reviews: La Belle Meuniere." *Variety (Archive: 1905-2000)*, Jan 05, 1949. 58.

Cornwell-Clyne, Adrian. *Colour Cinematography*. London: Chapman & Hall, 3rd. ed.,272-275. 1951.

Cornwell-Clyne's entry for Rouxcolor is a detailed explanation of the patent that was filed in 1932 in Britain, which is helpful for me to understand what the prism system is and how they work. I have to admit I didn't understand all of them, but it's better than reading the patent itself. However, Cornwell-Clyde never saw a Rouxcolor projection, therefore his explanation for other aspect is very scarce.

Flueckiger, Barbara. "Rouxcolor 4 color." *Timeline of Historical Film Colors*. https://filmcolors.org/timeline-entry/1265/#/

——— "Rouxcolor 2 color / Cineoptichrome." *Timeline of Historical Film Colors*. https://filmcolors.org/timeline-entry/1266/

Timeline of Historical Film Colors offers various useful primary and secondary sources. However, I have doubts about whether Cineopitchrome was the two-color version of Rouxcolor, because Alain Roux, Armand's son, referred to the early version of Rouxcolor as Tetracolor. I didn't find evidence on the relationship between Tetracolor and Cineopichrome. Therefore, I didn't include Cineopichrome in the paper.

James, Michael. "New Color Process is Shown in Paris," *The New York Times*,

——— "New Color Processes Create Stir", *The New York Times*

——— "New Film Color Unveiled in France at Premiere of Story About Franz Shubert", *The New York Times,* Jun 01, 1948. 28.

The series of coverage about Rouxcolor recorded the responses from the U.S. to the new processes. The opinions from Technicolor and Thomascolor, Roux's competitors, are especially revealing how the additive processes understood about their limitations and how they tried to overcome them.

Koshofer, Gert R. "Colour Photography: Introduction." *The British Journal of Photography* 123, no. 6042 (May 14, 1976): 509-13.

———"Colour Photography: Its Principles and Processes Part 3." *The British Journal of Photography* 123, no. 6047 (Jun 18, 1976): 524-7.

———"Colour Photography: Its Principles and Processes Part 4." *The British Journal of Photography* 123, no. 6049 (Jul 02, 1976): 568-71.

Koshofer's series of articles on color photography is similar to a previous version of the Timeline of Historical Film Colors, only it's in alphabetical order. The entry for

Rouxcolor was simple and to the point, but didn't offer a lot I didn't get from other sources.

Lobban, Grant. "The Restoration Business." *Image Technology* 87, no. 3 (2005): 12-18.

———"Colour Film Restoration & Preservation." *Image Technology* 88, no. 2 (2006): 26-33.

These two articles are especially valuable for the research because of the illustrations. They showed both the black-and-white film and the color version of *The Pretty Millar Girl*. The second article also mentions the procedure on how to restore a Rouxcolor film, although only in very short paragraphs.

Martin, Pascal. "Le Rouxcolor: un procédéadditif de reproduction des couleurs," *1895*, no. 71 (December 2013): 211–28. doi: 10.4000/1895.4791

Roux, Alain J. "Armand Roux et Le Rouxcolor: Des Années 1930 Aux Années 1970." *1895*, no. 71 (December 2013): 211–28. doi:10.4000/1895.4792.

These two articles are the most useful resource on Rouxcolor. Alain J. Roux was 18 years old when his father, Armand Roux designed the Rouxcolor system. Since Alain later also became an engineer, he not only knew the history of the development but also understand how the mechanism works. The only drawback is that it hardly mentioned what Lucien did for the invention.

Roux, Lucien Henri. Improvements in Optical System for Photographie or Projection Apparatus, filed March 4, 1932; granted Dec. 22, 1932.

This patent only covers the optical system, not the four-color prism.