Restoring a Danish Silent Film - Nedbrudte Nerver

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On February 25th, 1923, *Nedbrudte Nerver* had its premiere at Det lille Teater in Copenhagen. The film was directed by A. W. Sandberg for Nordisk Films Kompagni. Sandberg had started as cinematographer with Nordisk Films Kompagni in 1914, but was soon asked to also direct films. In the 1920s he had risen to be the leading director with the company, and is probably today best known for his Dickens adaptations of the early 1920s.

Nedbrudte Nerver has a comical mystery plot set in contemporary time in an unnamed Western country. It is like most of Sandberg's films directed with great visual quality, and even has the director himself in a cameo appearance as director. However, the international feature-film market had been taken over by the Americans at this time, and without a major theatre chain, Nordisk Films Kompagni could not expect its film to do more than moderate business internationally.

The film was, as most films in the silent period, produced to be assembled as a positive-cut film. Thus, the negative had written instructions regarding tinting, intertitle numbers, and continuity assembly numbers. Silent film production was truly an international affair, and therefore films were distributed with title numbers or flash titles rather than full intertitles to foreign markets, where they were supplied with titles in the local language.

THE RESTORATION

The purpose of restoring *Nedbrudte Nerver* was to achieve a new print resembling the premiere print as closely as possible. Also, the project was an aim to research and document the materials and sources of the reconstruction, in order to reach a best practice model for future restorations at the Danish Film Institute.
The reconstruction of a new print was based upon two primary sources: the original nitrate negative and the Nordisk Films Kompagni title books.

CHOICE OF RESTORATION TECHNIQUE

There were three film elements held at the DFI. The original nitrate negative, an acetate duplicate positive/fine-grain master and an acetate print. The original negative dates from 1921, whereas the two safety elements had been struck in 1958. The elements all contained the same image information. Based on the surviving elements, three routes of restoration were considered.

"Nedbrudte Nerver" (Sandberg, DK, 1923). Posterartist: Palle Wennerwald. Nordisk Film/DFI

"Nedbrudte Nerver". Photo Nordisk Film/DFI

1. The traditional positive-cut method, with or without tinting:
   Original negative > b/w or color print (edit)
2. Producing a duplicate negative, which would then be edited:
   Original negative > duplicate positive > duplicate negative (edit) > b/w or color print
3. A digital intermediate to re-record a new negative:
   Original negative > 2K scan > workstation (edit) > duplicate negative > b/w or color print

Many possible objections and benefits can be assigned each of the above processes, and one cannot as such be considered better or worse than the other.

The first method has been the one traditionally used at DFI, probably because of the relatively low cost of the materials involved. It is also the method closest to the original way of producing prints. One of the drawbacks of this method is the fact that the final print is a spliced print. Tape-splices have a tendency to become sticky with time. Cement splices are therefore to be preferred. However, cement splices may be poorly done, and many projectionists do not trust cement splices and therefore reinforce them with tape, which then causes further frustrations. Also, the inevitable slow deterioration and final destruction of the print, will lead to having to redo the restoration all over again, thus losing many weeks or months of work. This method was rejected, primarily because of the shift in cost of labor versus film stock.

The second route has the benefit of producing several intermediate materials, which can be considered an extra safeguarding of the original negative. If there had not already been struck a preservation master from the original negative, this would have been the preferred course of the restoration. However, since a preservation master already existed as a photochemical safeguarding of the negative, the last route was chosen, not the least due to the wish to explore the possibilities in the digital domain.

Using a digital intermediate for a straightforward reconstruction of a film is still an unusual route to follow. Because of the relative high cost this path seems only to have been used once before on a silent feature, namely in the case of *Metropolis* (Fritz Lang, DE, 1926), restored by Murnau Stiftung and Bundesarchiv-Filmarchiv in 2001. However, in the case of *Metropolis*, the reason for choosing a digital intermediate was the possibility of cleaning up and matching images deriving from many different sources. For *Nedbrudte Nerver*, the negative was in excellent condition, and it was decided not to remove any errors present in the image. This of course made the restoration work much cheaper than the restoration of *Metropolis*, though it still did not quite match the price of a conventional photochemical restoration. In my opinion, it is nevertheless very possible that the ease and preview possibilities in the digital intermediate process save the archivist so much time that it is highly competitive with a conventional photochemical restoration process.

It is possible for the restorer to attend more stages in the digital restoration process than with an ordinary laboratory. There is however still a large degree of 'black box' uncertainty. With an ordinary photochemical lab, you send your material in and check the negative and print when it comes back. In a digital duplication you follow the pre-recording stages to the end, using analogue knobs without any log file. Then the duplicate negative is re-recorded, which is a new process with which we have very little experience, especially with black and white stock. Apart from the discussion about whether a 2K/10 bit resolution is adequate, there are thus a number of undocumented and new processes that we have to master before we can use digital restoration as the basis of film preservation work.

THE DIGITAL INTERMEDIATE PROCESS

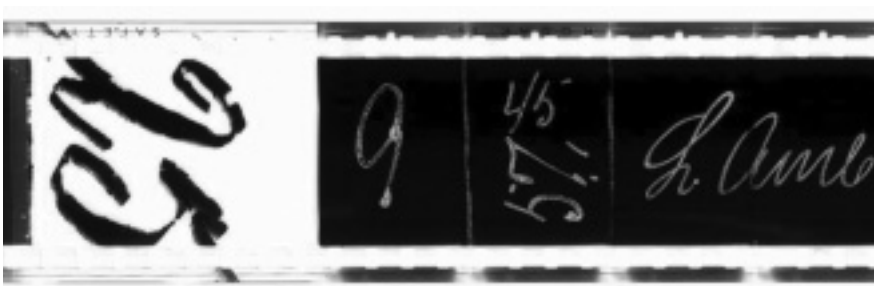
The digital intermediate restoration took place at Digital Film Lab in Copenhagen. The negative development and Desmet printing was handled by Soho Images in London. The actual restoration process went through six stages in order to give the highest level of control and to use as few costly resources as possible:

- First the original negative was scanned at television resolution in order to get a synchronized 'work print.'
- The material was then edited in an Avid workstation. The material was brought together in continuity order and intertitles were inserted.
- The original negative was scanned in a Spirit scanner in high definition (1920x1440).
- The Avid EDL was conformed to an Inferno workstation and the high definition scan and titles were brought together in 2K resolution.
- A new negative was re-recorded on an Arrilaser, using black & white Eastman Pan separation polyester stock (5238).
- Two prints were struck from the negative, a flash-tinted (Desmetcolor) print with Amber and Blue tints on Eastman Vision acetate print stock (5283) and a black & white print on Eastman acetate stock (5302).

The entire restoration from the initial scan at broadcast resolution to the final print ran from July 23rd 2001 to November 11th 2001. The total cost was DKK 260.000 (not including time spent by the DFI), which makes it comparable to a traditional photochemical restoration, considering the time-efficiency of the digital process on behalf of the restorer. This cost included all scanning, workstation time and a new black and white duplicate negative (1700 meters), a black and white print and a Desmetcolor print. The black & white negative re-record cost at the time was DKK 1.56 per frame excluding development.

SOURCES AND RESEARCH

A number of primary sources were available for the preparation of the restoration work. Primarily the original nitrate negative was used. The negative was intact with tinting indications, continuity numbers and title numbers. Also the title books from Nordisk Films Kompagni survive and are an invaluable source to the wording of the original intertitles. The actual tinting was determined from a match of surviving frames from other Nordisk films of the period with tinted frames held at Soho Images as reference.



The illustration above is a frame-enlargement of the negative indications as they appear in the safety print from 1958. The first number '25' is an intertitle number. The '9' is a roll or sequence number, the '45' is the edit or shot number, and the '57.1' is the length of the roll in meters. The tinting is indicated with the inscription 'L Amb', which is taken to be Light Amber. The actual tint aim was Wool Orange, which was used with the same density in the print for both the Light Amber, and the Amber scenes. The tint aim for the Blue scenes was a Direct Blue.

The original wording was used for the Danish titles, which thus appear with capital letters in nouns and old spelling. The English translation and the font are new additions, and no attempt was made to frame the titles or try to match a contemporary look.

DOCUMENTATION

One of the primary goals of the restoration was to create a best practise as to the documentation of this and future restorations performed at DFI. The negative indications were noted down in a spreadsheet. These indications then served as a guideline for a rough Edit Decision List (EDL), which determined where the individual sequences should go in the continuity. In a few instances guesswork was needed. These instances have been noted for future reference.

Table 1 on the following page describes the contents of the original negative. Title numbers have almost completely been omitted in the documentation, since they are fairly easy to detect in the video editing. The indications themselves are relatively easy to follow, and there is an internal logic once the general continuity has been established.

Table 2 is based upon the information in Table 1 and gives the same information, but organised in continuity order. Also the choices and decisions made in connection with the actual edit have been noted. The rough EDL is thus a description of the archivist's decisions in connection with the reconstruction. Though it is in a shorthand form, it is nevertheless possible to trace the process from the film's original state, through the editing process to the final print.

An actual EDL was also generated from the Avid workstation, which gives all time codes for edits.

CONCLUSION

In general an off-line edit on video must be considered the most convenient and efficient way to edit or restore any film. The process gives excellent video preview, and allows archivists and management an opportunity to decide if the film should in fact go all the way to print or if a restoration at tv-resolution is adequate for the title in question. The two first steps (720 scan and video edit) could thus be the same for both a conventional photochemical restoration and the 2K process chosen in this case. Though not used in this case, the digital domain offers a wide range of image manipulation possibilities, which are not available in conventional duplication. Also, the digital process at Digital Filmlab is directed at producing a one light negative conforming to densitometric standards, thus minimizing the introduction of errors at the printing stage.

Though the restoration of *Nedbrudte Nerver* has proven that 1920 x 1440 resolution is adequate for the transfer of a 1921 negative to a new duplicate negative, there are still a number of issues remaining that hinder using a 2K scan as a preservation.

The new negative is an edited negative in continuity order. Thus all indications in the original have been lost. Also, only the image area has been transferred to the new negative, and therefore all edge codes, perforation information and the like have not been transferred. The titles inserted are newly produced and can therefore only be an introduction of a foreign element in a film from 1923. What we now have is thus a version, albeit hopefully a good and durable version, but nevertheless only a version. The reversibility of the process is assured by the continued safekeeping and preservation of the original negative and the safety duplicate positive from that negative. Only by saving the original as it is on film can true reversibility be secured. However, for presentation there is no doubt that cinema can benefit from the emergence of digital intermediate technology. When used with respect for the integrity of the original, it is possible to reach a result that matches a conventional fully photochemical duplication.

Nedbrudte Nerver / The Hill Park Mystery (A.W. Sandberg, DK, 1923)
Nordisk neg. 1853
Nitrate negative 1440 meters, 6 reels BON.35.MUTE-1.33/6

FCC	Rl.	Scene	Meters	Tint	Notes
Reel 1 - TC 01:00:00:00 - 01:08:16:12					
	1	2	59,9	L. Amber	˜1 Title nr. 1 - 7
	3	4			
	4	21	58	Amber	˜3
	8	44			
	9	45	57	Amber	˜6
	11	57			
	10	56	2,3?	Amber	˜7
	12	67	59		˜8
Reel 2 - TC 02:00:00:00 - 02:05:16:04					
	42	327	58		˜25 (2)
	43	346	56,9	Amber	˜26
	44	356	37,1	L. Amber?	
Reel 3 - TC 03:00:00:00 - 03:09:48:11					
	15	92	53,6	L. Amber	˜9
	16	113	50	L. Amber	˜10
	17	124	57,6	L. Amber	˜11
	18	141	60	Amber	˜12
	22	149			
	23	162	58	Amber	˜14
	25	164			
	27	166			
	29	169			
	31	176			III 88 89
Reel 4 - TC 04:00:00:00 - 04:10:09:14					
	37	262	55,6	L. Amber	˜20 Title nr. 119?
	38	276	60,6	L. Amber	˜21
	39	284	60	Amber	˜22
					V 144 145
	40	299	55,8	Amber	˜23
	41	313	59,1	Amber	˜24
Reel 5 - TC 05:00:00:00 - 05:09:58:13					
	32	182	55	Amber	˜15 Title 92
	33	202	54	L. Amber	˜16
	34	213	60	Amber	˜17
	35	233	60,5	Amber	˜18
					IV
	36	249	58		˜19
Reel 6 - TC 06:00:00:00 - 06:03:18:16					
	2	12	61,9	Blaa/blue	˜2 (6)
	19	142			Title 74
	21	144			
	24	163			
	26	165			
	28	168			
	30	173			
	7	43	6,5	L. Amber	˜5 Avistekst - Vibeleje Mordet
	20	143	7	Blaa/blue	˜13 Heri indkopieres skyer
	5	40	11		˜4 Tekst: Mordet opklaret
			7,5		˜13 Skyer til nr. 143

Table 1

Nedbrudte Nerver, EDL

TC	Scene	Tint	Notes
Title 1-7		L. Amber	
01:00:00:00 - 01	2	L. Amber	˜1
06:00:00:00 -	12	Blue	˜2
1:00	21	Amber	˜3
6:00	40	L. Amber	˜4, Title 24a: The murder solved
6:00	43	L. Amber	˜5, Title 24b
1:00	44	Amber	
1:00	45	Amber	˜6
1:00	57	Amber	
1:00	56	Amber	˜7, switchboard before bird trader
1:00	67	Amber	˜8
03:00:00:00 -	92	L. Amber	˜9
3:00	113	L. Amber	˜10
3:00	124	L. Amber	˜11
3:00	141	Amber	˜12
6:00	142	Blue	Title 74
6:00	143	Blue	˜13 Inferno logical operation: screen
6:00	144	Blue	
3:00	149	Amber	
3:00	162	Amber	˜14
6:00	163	Blue	
3:00	164	Amber	
6:00	165	Blue	
3:00	166	Amber	
6:00	168	Blue	
3:00	169	Amber	
6:00	173	Blue	
3:00	176	Amber	
III Title 88, 89			
05:00:00:00 -	182	Amber	˜15, title 92
5:00	202	L. Amber	˜16, Check tint (Amber?)
5:00	213	Amber	˜17
5:00	233	Amber	˜18
IV			
5:00	249	Amber	˜19
04:00:00:00 -	262	L. Amber	˜20, Title 119?
4:00	276	L. Amber	˜21
4:00	284	Amber	˜22
V Title 144, 145			
4:00	299	Amber	˜23
4:00	313	Amber	˜24 2 frames trimmed out (punch)
02:00:00:00 -	327	Amber	˜25
2:00	346	Amber	˜26

Placement of following titles is based upon continuity:

10b
24b
93a
141

Negative seems to lack footage between title 180 and 181, editing script indicates the opposite.

Table 2