

Hungarian Filmlab

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Restoration Ethics and Practice

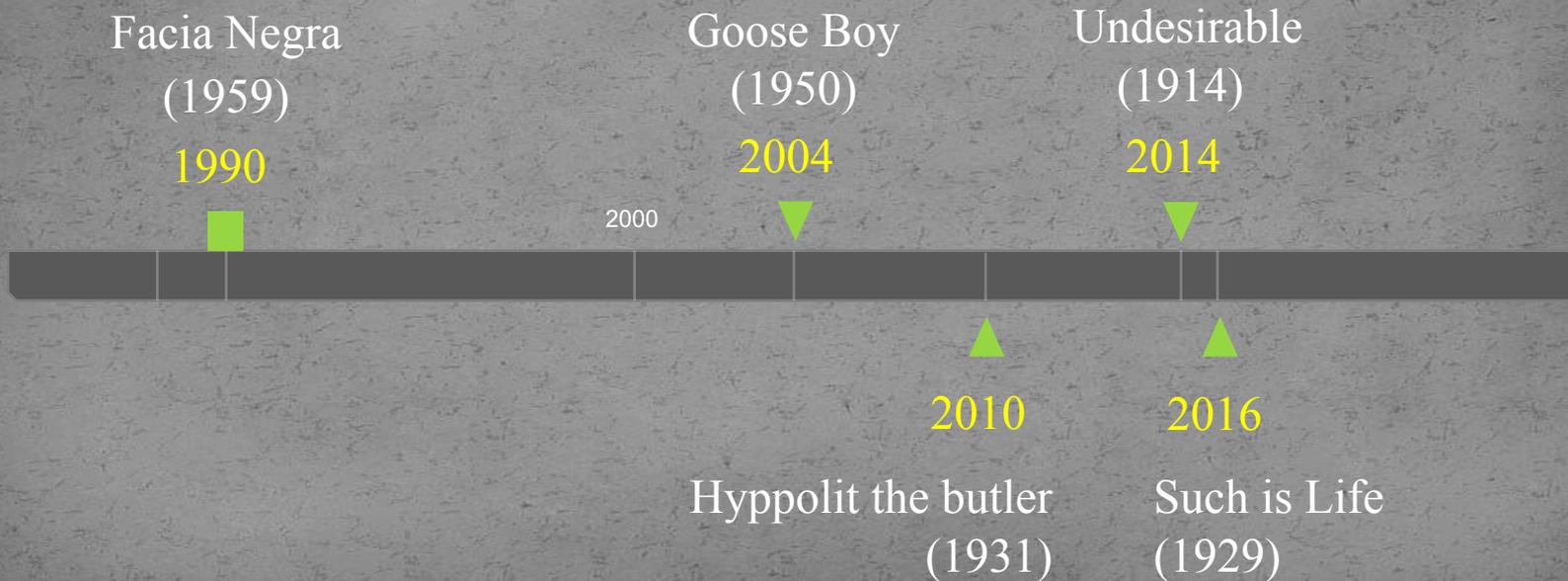
Concepts and dilemmas when restoring
100-year-old movies.

Hungarian Filmlab

- Founded in 1951
- In 1964 moved to a new building, which was built to be a filmlaboratory
- Since then it has developed into an up to date full service digital and photochemical laboratory



Timeline of main restoration projects at the Hungarian Filmlab



1959 Fatia Negra (restored in 1990)

- Color separation negative
- No electronic stabilisation , Step printing
- Separation negs by wetgate against scratches
- New positives by dry printing

*copying = conservation,
copying ≠ restoration*



R



G

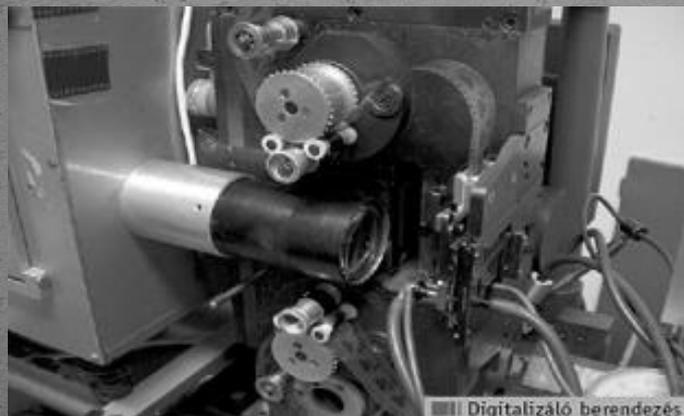


B



1950 Ludas Matyi (Goose Boy) (restored in 2004)

- Source was color nitrate negative, 98% color information lost
- Scanning with Oxberry wetgate
- Self developed software
- Developed our own algorithm for color restoring



1931 Hyppolit, the Butler (restored in 2010)

- Source Kodak nitrate negative
- 2 K scanning with Oxberry wetgate
- Double exposure on each frame
- Scratch removal technique in the old times was done by polishing



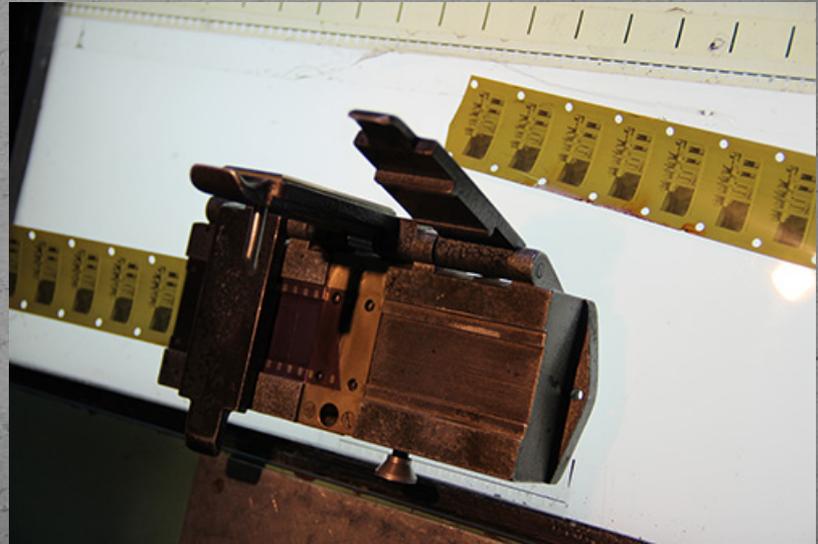
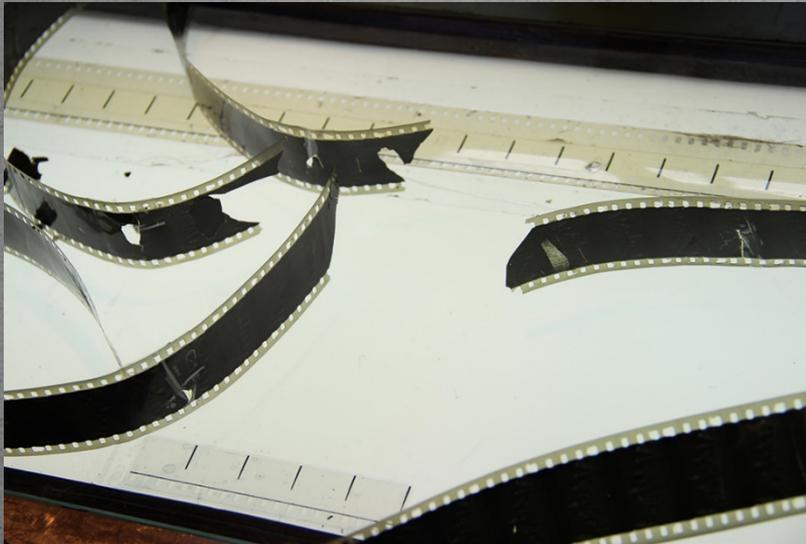
What have we learned?

Let's walk through some of the main steps presenting
our possible dilemmas!

Why is restorations primarily an ethical question?

The importance of traditional lab background

- Preparing the film for scanning (leaders, perforations, assembling)

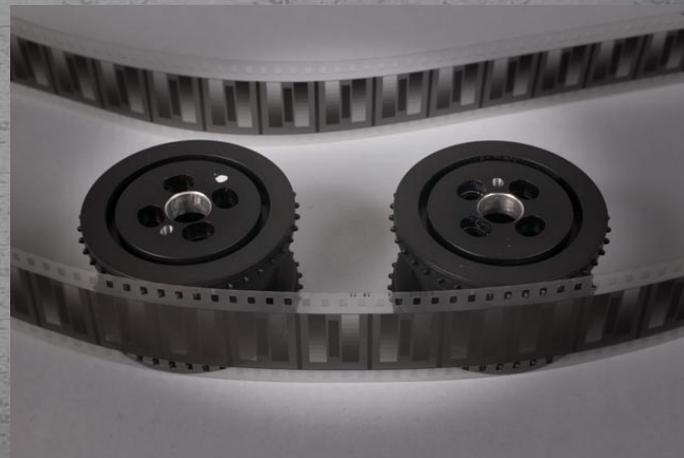


Challenges of scanning

- Shrinkage
- Physical damage
- Image stability
- Non-standard image position
- Non-standard film types
- Nitrate film
- Black and white film

Shrinkage

- Shrunken pins
-0.5%, -1.5%, -2.5%
- Shrunken sprocket wheel
- Pinless scanning



Physical damage

- Capstan
- Pinless archive gate

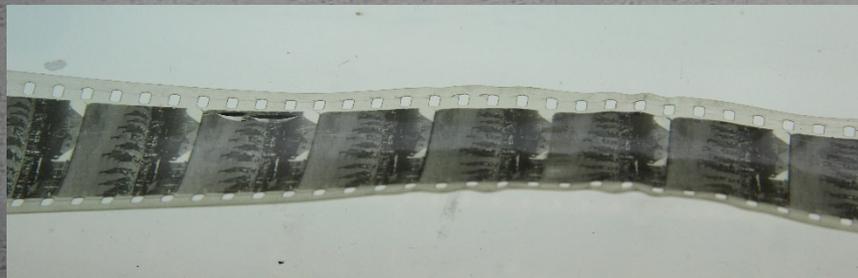
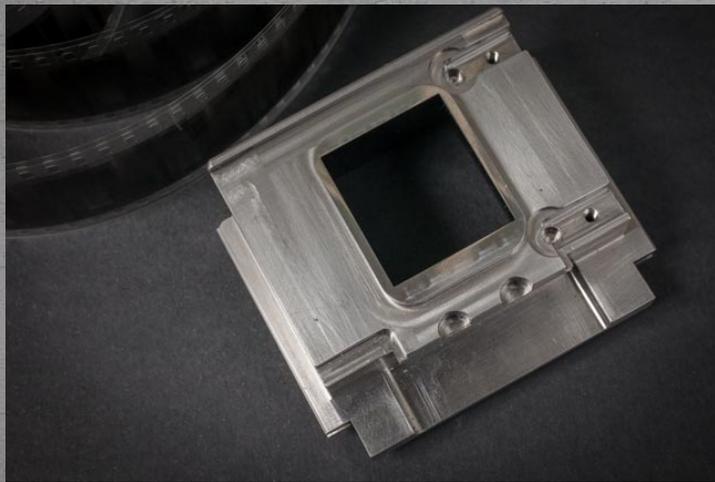


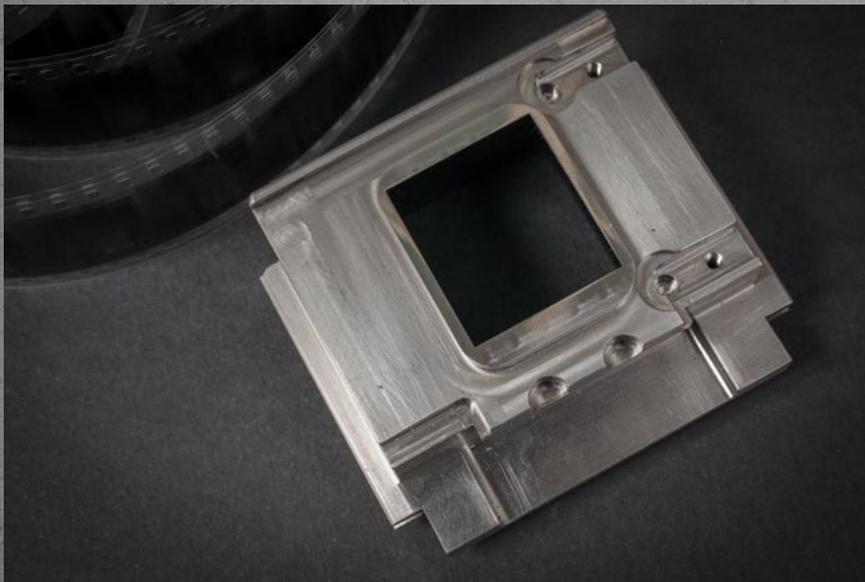
Image stability

- Archive gate for scanning perforation
5 perfs height, wider than standard gate
- Scan-time stabilization



Non-standard image position

- Archive gate
- Pins may be used



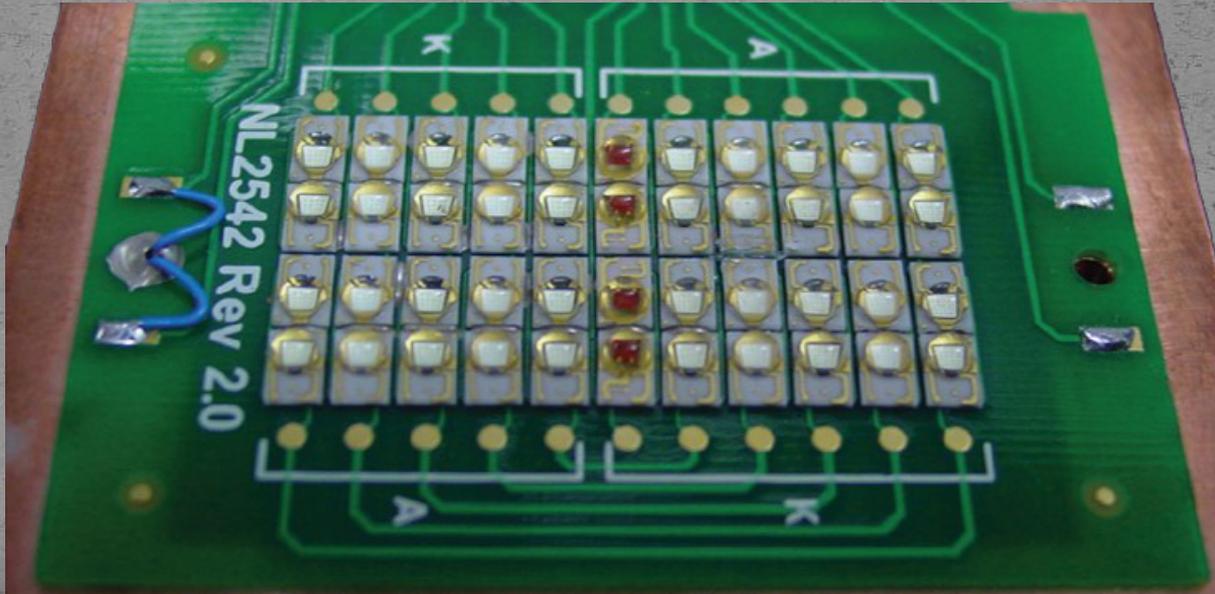
Non-standard film types

- Capstan
- Adjustable transport parameters



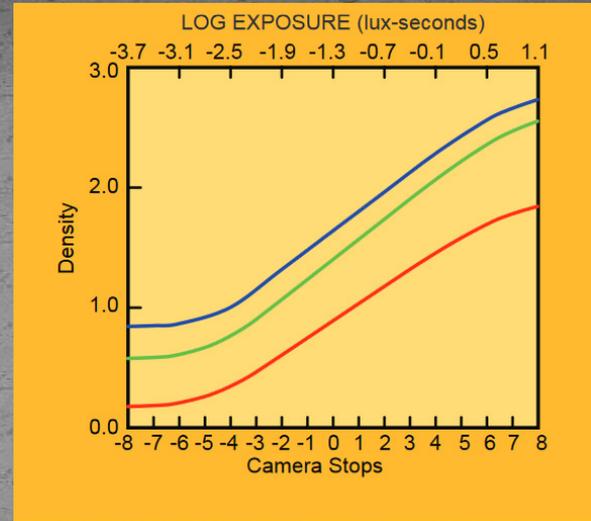
Nitrate film

- Nitrate-safe light source
- Minimal heat load - LED



Black and white film

- Log colour space for scanning
- Cineon standard for colour films
Density above D_{min} is stored
2.0 density \rightarrow 1023 code value
- Challenge: b&w film may include > 2.0 density
lin-to-log conversion rule has to be adjusted



Challenges of 4k workflow No1

- Amount of data

4k frame (4096 x 3112) -> 50 MB

90 min long film: 50x24x60x90 -> 6.2 TB

4-5 generations + deliveries -> 50 TB/film

File server

6 TB HDD– 330 USD/pc

Challenges of 4k workflow No2

- Data rate

24x50 MB -> 1200 MB/s

HDD (7200 rpm): max. 216 MB/s -> 6 pcs.

HDD in raid 0 (relatively cheap: 6 TB HDD– 330 USD)

Data safety!!!

SSD (PCIe): 3000/1600 MB/s – expensive – 3.2 TB 10,000 USD

Hybrid solution

- SSD in workstations, HDD in servers
- Problem: how to move data ?
- 10 GbE network



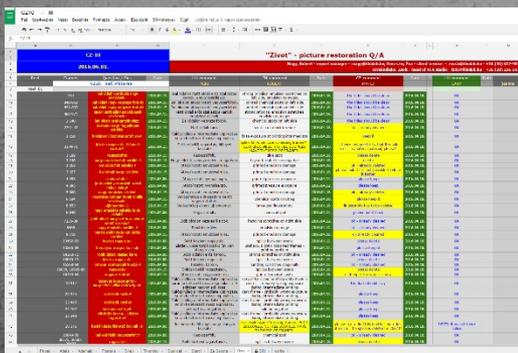
Restoration workstation

- Fast processor, 32 cores
- Ram: 1 GB/core
- SSD for media
- 10 GbE NIC Network Interface Cards
- Restoration software
- 4k monitor

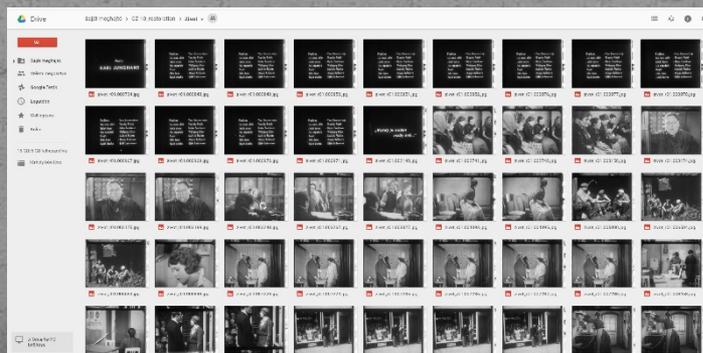
Restoration workflow tailored to film

There are two main factors involved in a restoration workflow

- the customer's demands towards film restoration
(starting with basic digital archiving up to almost today's motion picture quality outcome)
- the condition and quality of source materials
(the condition of the source constrict restoration potential)



File	Created	Modified	Size	Status
001	2018.01.01	2018.01.01	100 MB	Completed
002	2018.01.02	2018.01.02	100 MB	In Progress
003	2018.01.03	2018.01.03	100 MB	Completed
004	2018.01.04	2018.01.04	100 MB	In Progress
005	2018.01.05	2018.01.05	100 MB	Completed
006	2018.01.06	2018.01.06	100 MB	In Progress
007	2018.01.07	2018.01.07	100 MB	Completed
008	2018.01.08	2018.01.08	100 MB	In Progress
009	2018.01.09	2018.01.09	100 MB	Completed
010	2018.01.10	2018.01.10	100 MB	In Progress
011	2018.01.11	2018.01.11	100 MB	Completed
012	2018.01.12	2018.01.12	100 MB	In Progress
013	2018.01.13	2018.01.13	100 MB	Completed
014	2018.01.14	2018.01.14	100 MB	In Progress
015	2018.01.15	2018.01.15	100 MB	Completed
016	2018.01.16	2018.01.16	100 MB	In Progress
017	2018.01.17	2018.01.17	100 MB	Completed
018	2018.01.18	2018.01.18	100 MB	In Progress
019	2018.01.19	2018.01.19	100 MB	Completed
020	2018.01.20	2018.01.20	100 MB	In Progress



Our method involves many steps

- several generations
- mix full manual and partly automatic procedures
- different softwares
- final check



Restoration in practice

- demands
- possibilities
- solutions





Carl Junghans : “Such Is Life”

1930's silent picture for the Czech National Film Archive
The client decides what procedure to follow...



Such Is Life
reel02
12 fps

Michael Curtiz : "The Undesirable"

- it was the only remaining copy
- faulty printing
- restoration was determined by the condition of the source
- drastic intervention





Undesirable
reel05
12 fps

Restoration

- fixing the geometry of picture (stabilizing and dewarp)
- deflickering
- grain removal
- precleaning
- manual restoration
- regraining

Network Interface Cards



Scanner criteria –research!

- Requirements - purpose of scanning – quantity, quality, speed
- Budget – price and maintenance costs
- Ease of operation – calibration time
- Options: archive gate, wet gate, resolution, pinless, film handling
- Difficult to compare truly – attempts
- Real value of scanner – concept
- Future-proof?
- Operator – machine 30-60%



Thank you for your attention !

Looking forward to hearing
your ethical dilemmas!

Gabor Pinter

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