Physical Properties of Film & Video

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http://www.tisch.nyu.edu/preservation

We’re always reformatting, and dealing with wide variety of formats

- Nitrate
- Super8
- Cinemascope
- 3-D
- Cartridge
- …

Technical Composition & Deterioration-

- Film
- Video and Audio Tapes

Film Layers

- Topcoat
- Emulsion (content)
- Subbing Layer (adhere)
- Base (cellulose triacetate, cellulose diacetate, cellulose nitrate, or polyester)
- Backing Layer

Surface Physical Damage

- Perforation
- Scratches
- Water droplet damage to emulsion
Mold Damage
ScreenSound Film Preservation Handbook

- Usually in gelatin part of emulsion layer
- Interesting patterns

Shrinkage
ScreenSound Film Preservation Handbook

Vinegar Syndrome Deterioration
Image Permanence Institute

- sour smell
- Shrinkage
- buckling of the emulsion
- the appearance of crystals that obscure the image

Film--Acetate Decomposition
emulsion cracks--Home Film Preservation Guide--filmforever.org

- cupping--Home Film Preservation Guide--filmforever.org
IPI A-D Strips

Acid Detection Strips at NYU Library

NYU University Archives Internship Project
Acid Detection results/autocatalytic point readings

| University Archives/ Collection | Total # of Items | 0% | 1% – 3% | 3% – 6% | > 6% | Total
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IPI Storage Guide

IPI Media Storage Reference Guide

IPI Preservation Index
temperature/humidity, Years until noticeable deterioration

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Improving storage inside the Can

Jean-Louis Bigourdan, AMIA 1998

- zeolites, silica gel, and low relative humidity preconditioning help mostly by reducing moisture content
- acid adsorbents retard further decay
- acid adsorbents do not reduce the acid content of degraded film
- the use of cardboard disks is not recommended

Improving storage outside the Can

Jean-Louis Bigourdan, AMIA 1998

- lowering temperature and/or relative humidity can help reduce the rate of acidification in degrading film
- trying to remove acid within the can does not outweigh the benefits of low temperature and humidity
- the greatest improvements in chemical stability can be achieved with cold temperatures

Cineric Film Restoration

(Cinematography)

Structure of Tape

Van Bogart http://www.clir.org/pubs/reports/pub54

- Binder—Functions as a carrier for the recording material & Bonds it to the substrate
- Substrate—Base material on which the recording material is coated (eg. an aluminum platter or a thin ribbon of polyester film)

Tape Substrate

- Early tape used cellulose acetate
  - Moisture/hydrolysis
  - Vinegar syndrome
- More recent tapes are polyester terephthalate (PET) or polyethylene naphthalate (PEN)
  - Chemically stable
  - Resist hydrolysis and oxidation

Magnetic Particles

- Store recorded information
- Change in magnetic properties can result in loss
  - Magnetic remanence - ability to retain a magnetic field
  - Coercivity - ability to resist demagnetization
  - Magnetic deterioration of the metal particulate and chromium dioxide materials
Binder Layer

- Holds the magnetic particles to the base
- Where the problems are likely to occur
  - binder-base adhesion
  - oxide shedding
  - dropoff
  - hydrolysis
    - sticky shed
    - magnetic head clog
- Tape baking as one solution

Video Cleaning Machine

Longitudinal Recording
Van Bogart  http://www.clir.org/pubs/reports/pub54

Helical Scan Recording
Van Bogart  http://www.clir.org/pubs/reports/pub54

Tape Pack Problems
Van Bogart  http://www.clir.org/pubs/reports/pub54
Packing problems can lead to playback problems

- Tracks for helical scan can be skewed

Storing Tapes

- Tapes should be stored fully wound in one direction or the other
- Store tapes upright (like a book)
- Do not store near potential magnetic fields
- Storage cases should be opaque and kept away from source of light and humidity
- Do not store tapes in plastic bags
- Exercise the tape every few years

Temperature & Humidity for Tape Storage

- Variance of less than 2°C and 5% RH per 24 hours
- Ideally 8°C and 25% RH
- Other options
  - 20°C (68°F) and 20-30% RH
  - 15°C (59°F) and 20-40% RH
  - 10°C (50°F) and 20-50% RH
- Never store below 8°C

What can you do now?

For both Film & Video

- Label elements as well as you can
- Try to keep things at a low humidity and temperature
- Limit the number of formats as much as possible
- Save important production elements

Be concerned about ©

- For preservation you may need to re-format, but with recent changes in copyright laws, you may not have the right to re-format
- Intellectual property rights are very difficult, particularly considering that most films and videos have extensive underlying rights that you could never get prior permission for (stock footage, historical footage, music composition, music performance, …) [“Eyes on the Prize”]
- And even if you have the right to re-format for preservation, you might not have the right to show what you have preserved
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• http://www.amianet.org/
• http://sunsite.berkeley.edu/Longevity/
• http://www.imagepermanenceinstitute.org/