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RP 151-1999
Revision of RP 151-1994

SMPTE RECOMMENDED PRACTICE

Lubrication of 35-mm Motion-Picture Prints for Projection

1 Scope

This practice recognizes that proper lubrication of 35-mm motion-picture prints is needed to promote good projection performance. Proper lubrication will result in improved steadiness, reduction of noise in the projector gate, reduced perforation damage, and increased projection life.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

SMPTE RP 48-1995, Lubrication of 16- and 8-mm Motion-Picture Prints

3 Definitions

3.1 edge waxing: The application of wax or other lubricant to the area of the processed print film that is outside the picture and sound track area. On 35-mm film, lubrication is usually applied to each edge, including the perforation area and margin, using a suitable applicator wheel. The high level of lubrication required by 35-mm prints usually requires edge waxing.

3.2 full-width lubrication: The lubrication of the entire surface of the film, including picture and sound track area. Usually the film is dipped in a solvent solution of the lubricant, buffed, and allowed to dry. Full-width lubrication is recommended for 16- and 8-mm motion-picture prints, as noted in SMPTE RP 48. The amount of lubricant that can be applied to the film as a full-width application is limited because of problems with mottle, visibility, and roll slipperiness, and is usually insufficient for optimum projection life of 35-mm prints.

4 Lubricants

4.1 Recommended lubricant

A solution of a hard wax dissolved in a suitable solvent is the recommended lubricant. No other wax or lubricant was found in the literature to be as safe, effective, or inexpensive as paraffin wax. The most commonly used solvent for dissolving and applying the wax is inhibited methyl chloroform (1,1,1-trichloroethane), a solvent often used for cleaning motion-picture film. Proper care should be exercised in handling this solvent, to minimize exposure of personnel or environment to the solvent or its vapor. An inhibited grade of solvent should be used to minimize the possibility of solvent decomposition and the release of toxic fumes.

4.2 Unsuitable lubricants

The lubricant and solvent used should have no adverse effect on the film, and should be effective in prolonging the projection life of the print. Mineral oils (motor oil, projector oil) may dissolve and leach out the oil-soluble dyes in the film, and should not be used. Nonvolatile oils (mineral or silicone) may cause mottle or undesirable sticking together of the film surfaces, which may cause dirt particles to adhere to the film. Some materials may attack the film base or emulsion, or have an adverse effect on image stability or projection life. Avoid using solvents that are flammable or explosive, or that pose a health or environmental hazard (e.g., benzene or carbon tetrachloride).

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5 Film cleaning

The lubricant should be removable by normal film-cleaning operations, such as solvent cleaning. After cleaning, the film should be relubricated prior to the next projection.

6 Edge-waxer design

The edge wax is usually applied to the film at a point near the end of the processing operation, using an applicator wheel rotating in a reservoir of edge-wax solution. The applicator wheel applies the wax solution only to the perforation and margin area of the film. The wax solution is usually applied only to the emulsion side of the film, with some transfer of the wax to the base side of the film expected when the film is wound up into a roll. The wax solution is allowed to partially dry on the film prior to wind-up, so it will not migrate into the picture or sound track area.

Many laboratories apply edge wax to the film just prior to the film wind-up on the processing machine. Equipment is available from several suppliers, or may be custom built. Care should be taken to monitor and control the application of the edge wax.

Edge wax may also be applied to the processed film as a separate operation, using equipment that is currently available.

7 Edge-wax application

The amount of wax applied to the film is a function of the concentration of the edge-wax solution, the applicator wheel speed, the film transport speed, and the surface properties of the applicator wheel. Concentration of up to 50 grams of wax per liter of solvent may be used with the optimum concentration dependent on applicator design, machine speed, and effectiveness of the final result as described in clauses 8 and 9.

Edge wax should not be applied to prints which will later have magnetic striping or protective overcoats applied, as the wax will prevent proper adhesion of these materials. Edge wax should not be applied to 35-mm film which will be slit for 16- or 8-mm use. These films should be lubricated in accordance with SMPTE RP 48. Edge waxing is not necessary for prints intended only for use on continuous motion telecines.

8 Properties of properly edge-waxed film

The dried wax deposit should be just visible as a haze on both the emulsion and base side of the film. The wax deposit should be only in the perforation and margin area, and should not bleed into the picture or sound track area. When wound with normal tension, large rolls of film should not dish when handled, and there should be no excessive build up of wax during projection.

The effectiveness of the lubrication in prolonging projection life should be evaluated by using the Film Projection Life Test (see clause 9). Properly lubricated prints should have at least twice the projection life of unlubricated prints. Insufficient wax application will give less than optimum performance. Excessive wax application may intrude into the picture or sound track area, or result in wax flaking or buildup in the projector.

9 Test methods

The Film Projection Life Test is the most reliable method for determining the effectiveness of the lubrication in improving projection life. Simple measurements of the coefficient of friction of the emulsion and base side of the film (e.g., paper-clip friction or sled friction) may not accurately measure the effectiveness of the film lubrication in actual use, although they may be of use in monitoring wax application.

The Film Projection Life Test is fully described in the reference given in annex A.

Annex A (informative)
Bibliography

Mino, Edward and Perry, R. S. Lubrication of 35-mm release prints for extended projection print life. SMPTE Journal 92(10):1051-1057; October 1983.