The Evolution of the Kinoton E-Drive Series

Lutz Schmidt of Kinoton discusses the development of the newest Kinoton E-Drive System.

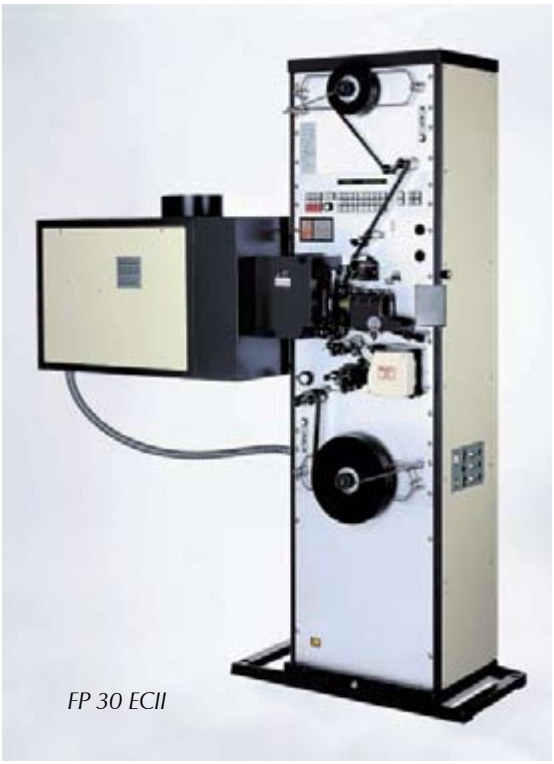
The history of the Kinoton E-Drive began… in 1989 with the presentation of a film projector especially engineered for studio use. Kinoton presented the model FP 30 EC to the market as the world's first true high speed dubbing projector. This film projector met all key requirements and allowed very fast operation with outstanding picture steadiness. Adopting a unique approach, the Kinoton engineering department designed the concept of an electrical direct drive pulldown that for the first time fulfilled all of the high demands made on film projectors:

- Excellent picture steadiness
- Sufficiently fast intermittent pulldown movement
- Long-term stability without the need for frequent re-alignments

The base: Kinoton´s design capabilities

In the eighties the concept of using a direct drive system for the pulldown became a reality and economic. The idea was to design a studio projector which is completely dedicated to sound mixing purposes but also offers perfect picture steadiness. Kinoton's E-Drive electronic intermittent turned out to be the ideal solution:

- The picture quality met the highest standards for theatrical projection on large screens. Maximum error was only 0.12% vertical and 0.15% horizontal. The FP 30 EC allows xenon lamps up to 7000 watts and is also well suited as a screening room projector.



FP 30 ECII

- Kinoton's gate design (photo right) in combination with skate lifting and roller lifting in the sound head treats the film very carefully.

- The two-format projector version FP 38 EC can be converted from 35mm to 16mm and vice- versa in an instant.

- It has features especially serviceable for postproduction work, such as:
  - Extremely high shuttle speed of 300fps forward/reverse for 35mm and 400fps for 16mm
  - Projection speed (with picture) up to 40fps
  - A user interface with large illuminated pushbuttons and a display for relevant information such as SMPTE time code read out
  - The user interface can be operated remotely from other places, e.g. from the mixing desk.
  - Still frame projection with reduced brightness assists the mixing engineer when the machine is stationary.

- The projector was relatively easy to install, with compact dimensions similar to the standard Kinoton column-base cinema projectors and operates at a low noise level what creates a good operating environment without annoying projector sounds penetrating the porthole windows.

Views of Kinoton's new E-Drive mechanism

Individual motors drive the reel shafts

Well accepted by the market

The EC projector series proved to be a market success. The first FP 30 EC was delivered to a studio in Paris. Just one year later, another EC was installed in Hollywood at the Warner studios in Burbank. After this, the number of installations kept increasing constantly.

In late 1999 the follow-up models FP 30 EC II and FP 38 EC II were brought to the market. There were no significant changes in the overall projector concept but a new, even more precise intermittent drive replaced the original system and several new functions were added. The new system offers a doubled positioning resolution and it allows for compensation of small mechanical errors by electronically applying the same error in the opposite direction, thus cancelling the error. The EC II projectors quickly became an industry reference for a projected 35mm (and 16mm) motion picture film. For example, a world-leading manufacturer of raw film stock uses this Kinoton projection technology to project not images but perforation holes for quality checking.

Since the introduction of the EC projector the studios' demands have changed. Formerly the main focus had been on dubbing; now reference projection for colour timing, grading and checking takes centre stage, especially when digital intermediates are transferred back to film. These applications call for split screen projection, which requires better synchronisation than the standard biphase synchronisation, so Kinoton added an option for SONY 9-pin operation. The projector synchronises on a user-selected video clock signal and follows a set of commands appropriate for a film projector (but there is no 'record' command, of course). In cases where no edit controller or the like is used, Kinoton can supply their own PC based user interface.

FP 30 ECII Reference Drive Electronics

In 1998, Kinoton launched the FP 30 E-S (35mm) and FP 38 E-S (35 mm and 16mm) screening room projectors offering various useful studio functions. These projectors are available with a turret and can be fully automated. Another feature of these projectors is the Variodrive shutter. As a separate motor drives the shutter, this offers several interesting features:

- At low projection speeds, the shutter keeps turning at higher speeds, giving a flickerless picture which is ideal for silent film projection. Loss of light, a typical problem of mechanical 3-blade shutters, is eliminated with the Variodrive shutter.
- If three-blade mode is desired at 24fps, as it is common in US postproduction facilities, the 2-wing shutter is switched to a 1.5 times higher speed, having the same effect as a 3-blade shutter.

The E-S projectors became very popular for screenings rooms, for print checking, and in situations with limited budgets, but also for high-class cinema applications requiring special functions. The American Film Institute AFI and the new Museum of Modern Arts in New York City, for example, both acquired FP 38 E-S film projectors, a two-format version of the FP 30 E-S suitable for 35mm and 16mm films. It offers the same studio functions listed above, such as shuttle operation and variable speed. Later additions to the studio line were the FP30 E-Q and FP38 E-Q film projectors designed for postproduction facilities and laboratories, offering still frame projection and optional Sony 9-pin interfacing for e.g. side-by-side projection film/digital.

The E-Drive's way to the cinemas

Since 1997 the E-Drive has been available for 'normal' cinema projection as well. The FP 30 E or FP 50 E film projectors offer an image steadiness outperforming even the premium Kinoton Geneva intermittents.

Suitable for multi-format projection

The E-Drive offers the technical base for 70mm and 16mm projection as well, as it supports different pulldown movements. Whilst the intermittent sprocket rotates 90 degrees for each 35mm image, 16mm film only requires a 45 degree rotation. The E-Drive can perform both angles. For Special Venue or Large Format applications, other different pulldown modes have been developed.

FP 38 EC

E-Drive Evolution

This year Kinoton have launched their advanced E-Drive generation. The new generation E-Drive offers significant improvements to its predecessors:

- A faster film pulldown offers a light output increase of 20% and more.
- The improved positioning accuracy reduces picture jump to a virtually non-measurable value.
- An extremely smooth film transport eliminates any minor vibration effects and ensures very gentle film handling.

With these improvements, a full resolution of 80 line pairs can be reached with a very good lens and film images with a suitable high image quality. If we compare this resolution in D-Cinema terms, it is an equivalent image resolution of about 3.4K, with still higher resolution produced at a lower image modulation. In addition, the high light efficiency will often allow a smaller xenon bulb to be used, reducing heat emission and saving energy costs.

The new drive system was made available as an earlier version for a number of studio installations as the FP 30 EC II REFERENCE. By now, all Kinoton studio film projectors are delivered with the new "REFERENCE" E-Drive. And all E-type cinema film projectors like the FP 30 E or FP 50 E are equipped with the new drive system as "PREMIERE" versions.