



## BRU™ Backup and Recovery Solutions

### Austrian Film Museum Selects TOLIS Group's BRU Producer's Edition and LTO Tape Technology for Digital.Film.Safe Archival Program

The Austrian Film Museum (OeFM) has two fundamental missions:

1. to preserve, research, enrich and relate to the public the collection of films and objects which the Museum has acquired since its foundation;
2. to exhibit the medium of film in all its dimensions and historical forms, working with the collection as well as with loans from other sources.

The OeFM is a full member of the International Association of Film Archives (FIAP) and the Association of European Cinémathèques (ACE); it therefore participates in the collective efforts of film preservation and presentation in a global framework.

The Austrian Film Museum asserts that film itself – as artefact and as an event, in our archival and exhibition activities – takes priority over film's derivatives and facsimiles. Thus, the preservation of films always also implies the preservation of their specific technical and spatial forms of exhibition; in other words, the preservation of the visibility and comprehensibility of film in its analogue cinematographic exhibition mode. (from the Mission Statement of the Austrian Film Museum)

“As archivists and museum curators, it is our aim and our duty to preserve motion picture film for future generations and to enable them to experience and understand the film medium as a functioning system in which aesthetics, technology and social experience were intertwined in a unique manner, creating one of the most important cultural phenomena of the 20th century. At the same time, it would be a-historical to ignore the unfolding of film into several other moving image media during the latter part of this same century. The ‘mutational era’ we live in is as much part of film's history as the similarly mutational era around 1880/1900 that brought film into existence.” (from the Digital Film Restoration Policy of the Austrian Film Museum)

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The digital era of cinema generates a digital era of archiving – thus the necessity to generate a digital archive as an addendum, not a replacement of the physical archive. The preservation of photo-chemical film as such will continue to be the priority of the Austrian Film Museum. At the same time, the museum accepts the invitation and the challenge posed by the digital era:

1. A growing body of digital native, “born digital” works.
2. The possibilities and challenges of digital film restoration.
3. A unique collection of “ephemeral” films (home movies, advertising or educational films) in “obsolete” formats such as 9.5mm and in danger of decay.
4. Accessibility of highly inflammable nitrate cellulose and fragile small-gauge films for research and educational purposes.

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1. The long term preservation of digital files is a major challenge, not only for archives but also for members of the active film industry. The Film Museum collaborates with Mischief Films in the Digital.Film.Safe project, aiming to save a whole generation of digital native works from getting lost in a "black hole" of cultural history.
2. Whenever archival material is worked on, this process must be widely documented to guarantee the reversibility of each of its steps. Therefore, although the result of a digital film restoration project may be a new 35mm negative and print, all generations of the digital workflow must be preserved.
3. and 4. One of the Film Museum's essential responsibilities is to make all its collections, depending on the preservation status of the objects, accessible to the general public and professionals in the field for their respective needs. The sheer volume of works and the inaccessibility of the mentioned materials call for a digital approach in many of these cases.

Searching for a solution for long term digital preservation the Austrian Film Museum examined a multitude of storage options. The use of standard storage mechanisms such as spinning disk, SSD, optical disk, and the cloud were not acceptable choices when considering the long term storage needs of archival institutions and film makers. Nicolai Gütermann and Raoul Schmidt of the Austrian Film Museum in Vienna and the initiator of Digital.Film.Safe, Georg Misch of Mischief Films, agreed on the Linear Tape Open (LTO) tape technology.

LTO is a magnetic tape data storage technology originally developed in the late 1990s as an open standard alternative to the proprietary magnetic tape formats, and its archival durability is rated at 15 to 30 years; in a controlled environment 50+ years are possible. Open standards are an important factor in long term preservation, to avoid dependency on the continued existence of one manufacturer/vendor and his patents.

"We initially looked at disk-based systems. However, it quickly became clear that the Film Museum, for reasons of long-term archival strategy, prefers 'closed media units' for each asset and something they can put on a shelf, label, and index," said Georg Misch. "Tapes are object-based. A disk-based system is somehow volatile, intangible, prone to overwrites, operator errors, technical failures etc. We are somewhat old-fashioned in our approach, and for a reason. Tape has been tried and tested for a long time, cloud systems are very new in comparison."

"Another factor in the decision to use tape is the 'green' nature of tape," Raoul Schmidt added. "Once the restored and digitized source media is transferred to LTO media, tapes can sit on a shelf with no power or maintenance requirements. A disk-based system or cloud environment needs almost 24/7 power, maintenance, and staffing. In this regard, tape (and LTO in particular) is much like film in cans. Maybe not with a 100 year life expectancy, but 30 to 50 years, and that's pretty good. Servers and storage arrays would need to be migrated many times in that same period."

As the project members examined other tape-based solutions, they decided upon TOLIS Group's BRU archival engine. Although not an open source solution, its ability to track and identify content is essential. BRU's end-to-end verification handling currently is the only solution that could actually verify the data written to a tape or other archive storage devices without the need for the original system or data. Because the TOLIS Group team understands the importance of long term viability and recoverability required for such an archiving effort, they have entered into a source code escrow agreement with the Austrian Film Museum to insure that should something happen to TOLIS Group as an organization over time, the information and application code necessary to continue accessing the archives and creating new tapes will be available into the far future.

TOLIS Group's BRU product family stood out because of its long history in the enterprise, educational, and research environments as well as the consistent tape format and backwards compatibility for old archives. It was able to demonstrate recovery of data written as far back as 1988 on QIC-150 tapes from now out-of-business Unix midrange systems to a modern Linux and OS X system using the latest version of BRU. All of the data on the old tapes were restored to the new systems completely intact. Because of the BRU archive format's device independence, it is also able to provide the ability to

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migrate existing archives from one media technology to another - such as LTO-3 to LTO-5 or even AIT to LTO, providing a technology growth option that means we can continue to maintain older archives as new storage technologies evolve. These are both very important to a long term archival project to insure that you can readily restore a tape that was made today 10, 20, or more years from now.

For Mischief Films and their clients, the same considerations applied: "By using LTO tape as the storage media, we can give a copy to the client and send another copy to the museum for controlled storage. Clients can take huge sets of data and transfer them to another facility (maybe on the other side of the globe), and keeping jobs of different clients separate is also easy with individual media when compared to an option such as the cloud or a large disk array where everything is stored on the same media." TOLIS Group's catalog export feature and their BRUsetta Stone feature make sharing tapes between sites and with clients very easy. The CD or DVD created even contains a restore-capable copy of the BRU software so that the recipient only needs appropriate tape hardware to restore data on the LTO tapes.

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Misch continued, "Additionally, for our own projects and post production work for others, we often need to temporarily store huge amounts of data for shorter amounts of time. With LTO, I will feel much more confident than with disk that the data will still be there after some time. With the drag-and-drop ease of use of the BRU Producer's Edition software and the low cost per GB of storage provided by LTO media, a production team can easily store ALL of the data created during a shoot, rather than just the finished product. You never know when that shot that you just edited out might come back in a different version of your work, or even as part of another project."

In summary, the combination of LTO tape's long term life, high performance and excellent price per GB of data stored with TOLIS Group's understanding of the importance of an archival project and their BRU products' handling of all sorts of data in a manner to provide the highest level of performance and platform compatibility, made our decision an easy one.