



Managing
The Business
Of Content®

4K Remastering, Upconversion & Restoration



Business Context

Film is a delicate medium and prone to scratches, collection of dirt, and deterioration with time. Video tape-based media types are not a reliable solution for long-term data storage either. With today's audiences demanding the highest possible picture quality from digital formats, many legacy content owners find themselves unable to showcase their content, despite there being a demand for it. In such a scenario, Restoration, Upconversion and 4K Remastering have become extremely important, as they help make legacy content presentable across a variety of devices and formats. Even for more recent films shot on 2K resolution, upconversion is the only solution to obtain a UHD version, as native ultra-high resolution originals often do not exist.

PFT Offerings

PFT offers the Academy® Award-winning proprietary Lowry Digital technology – one of the most advanced tools available for Remastering, Upconversion and Restoration. This unique technology helps content owners re-purpose their legacy content for high resolution viewing across all devices – VoD, OTT, and traditional linear television broadcasting up to 4K-UHD. Using complex algorithms based on motion estimation, the 'Lowry Process' effectively reduces visual noise in motion pictures. This makes it possible to carry out other forms of restoration on the content, such as removing dirt and scratches, reducing flickers, replacing lost details, and sharpening the quality of the existing images.

Through Lowry Digital bundled with PFT's flagship technology CLEAR® and our media recognition AI platform, Vision Cloud, we provide customers with quality deliverables within short turn-around times at affordable rates.

Here's what we offer:

Film Scanning

Specialize in scanning 35/16mm film reels and transcoding in any format(s)

Restoration

Digital repair of damaged films through a combination of software algorithms and manual in-painting by skilled restoration artists, while preserving the original aesthetics of the content:

- Reduce /repair as many artifacts as possible
- Ensure correct processing takes place, avoiding over processing
- Use different image processing operations to clean up issues like dirt/dust, grain, scratches, noise, scene splice, bumps, flickers, image stabilization

- Complete retention of source resolution, image information and image quality
- Enhance of overall viewing experience
- Process:
 - Comprehensive range of image processing software, including Academy® Award-Winning 'Lowry Digital'
 - Collaborative IT environment supporting 2K playback across a large number of workstations
 - Frame-by-frame manual repair and painting by highly trained digital image processing artists
 - Manual recovery of original image elements which are processed while applying automated parameters
 - Painting of missing information and reconstruction of images
 - Frame-by-frame QC by highly skilled QC experts
- Team:
 - Professionally trained digital image processing artists
 - Expert QC professionals with trained eyes

HDR Color Grading

- HDR Color Grading enables films to be displayed with more color volume, brightness and contrast, creating a superior viewing experience. It includes:
 - Creating a new presentation master that exceeds the requirements of consumer HDR TVs and future proofs the film for presentation over the next 10-20 years
 - Creating 16 bit ACES archive masters that allow for addition color trim passes
 - Creating tone mapped metadata to target various HDR/SDR peak levels for TV and handheld devices
 - Grade the film in a way that is faithful to the filmmaker's original intent with enhanced color and contrast.
- Team:
 - Professional colorists using Davinci Resolve in Dolby certified workflows, equipment and studios
 - 15+ years of experience in Remastering and color grading

VFX Re-creation

VFX embedded in the re-mastering pipeline in partnership with Prime Focus Group VFX companies, leveraging our extraordinary pool of global award-winning talent

Image Enhancement

- The Lowry Digital Process is the only process in the world that offers complete control of Grain (noise) and Sharpness Enhancement improve the visual experience, even for faded images.
- The process removes subtle and very minute details while increasing the sharpness in the image.
- This toolset can also extract visual data that was not immediately visible by combing through frames and combining the best information from each frame / range to provide the best output.

Deliverables Creation

Create elements for distribution of the original remastered sources, including:

- Content transcoding, re-purposing, logo addition, watermarking etc.
- Frame rate conversion (NTSC to PAL, PAL to NTSC, 24fps to 25fps)
- Generate Digital Cinema Package (DCP)
- Write digital files on to video tapes and film negative/positive (if required)

Up-Conversion

- SD to HD, HD to UHD, 2K to 4K
- De-interlacing – An interlaced video frame consists of two sub-fields taken in sequence, each sequentially scanned at odd, and then even, lines of the image sensor. This was meant for CRT Display, and can't be consumed on flat panel screens (PCs, LCD, tablets etc.). De-interlacing converts an interlaced analog television signals into a non-interlaced form.
- Performed using high-end software & hardware:
 - **Lowry Digital:** Offers custom filters for scaling images, uses spatial frames to fill in detail and re-interpolates to avoid aliasing (jagged lines or ringing)
 - **Digital Vision Phoenix:** Provides motion-compensated frame rate conversion and high-quality upscaling
 - **Alchemist:** Automatically corrects and converts video images to provide high quality output
 - **Tachyon:** Enables unrivalled motion compensated image transformation

AI-led Auto Conform (Television & Motion Picture):

PFT's media recognition AI platform CLEAR® Vision Cloud offers automation of conformance for Re-mastering

DI Validations with LTO Migration:

Complete automation on DI validation powered by CLEAR® Vision Cloud

PFT Advantage

Cutting-edge technology stack and contemporary workflows

- Next-generation Remastering pipeline with VFX embedded
- Academy® Award-winning Lowry Digital technology, one of the most advanced tools in the world for Remastering, Up-conversion, and Restoration
- CLEAR® as the service delivery and service enabler platform
 - Provides complete visibility and control of all re-mastering job requests across business processes - from content transfer and processing to delivery back to the customer – all tracked on ONE single system
- Global delivery model powered by CLEAR® that significantly reduces Restoration and Remastering costs, while enabling scalability and shorter turn-around-times
 - Vast talent bank of experienced colorists and senior Remastering colorists
 - 4K film Restoration workstations with scalable pool of Restoration artists
 - Consistent Sony HDR monitoring at all global locations
 - High bandwidth connectivity for fast file transfers links our multiple restoration centers worldwide, and CLEAR® facilitates remote collaboration
- AI-led automation and cost efficiencies powered by CLEAR® Vision Cloud

Best-in-class technical infrastructure

- Dolby® certified QC rooms
- Davinci Resolve V16 for color grading
- Clipster and Transkoder for packaging and QC
- High performance storage systems to work directly off SAN, and avoid push pull method of processing content from SD to 4K
- Render farm: Clustered Nvidia processing farm used to render image processing and up conversion jobs

Proven domain expertise

- Specialized team of restoration experts with experience delivering a range of top Hollywood projects
- Advanced Restoration capabilities to tackle nagging errors in content
- Strong team of Subject Matter Experts with extensive knowledge all industry standard formats and broadcast guidelines
- Dedicated Research & Development (R&D) wing for image and video signal processing
- End-to-end supporting services for cataloging, bulk digitization, metadata tagging, archiving, mastering and delivery

SLA-driven operations

Unlike other service providers, our operations are SLA-driven, ensuring consistency and timeliness in service delivery

White glove customer support

Best-in-class processes and practices to provide customers across the globe with 24x7x365 support for incidents, problems or service requests.

Top-notch security

Trusted Partner Network (TPN) certified, ISO 27001 certified and SOC 2 compliant

Business Benefits

- Preserve content for posterity at affordable costs
- Easily re-use legacy content for increased ROI
- Deliver high resolution viewing experiences across multiple platforms and devices faster
- Create UHD versions of previously released films in pristine quality

A History of Success

With more than 30 years of experience, Lowry Digital has been credited with restoring, preserving, and, in many cases, saving early Hollywood films, which may have otherwise deteriorated beyond retrieval.

- Restored **1800+** feature films, documentaries, and news reels
- Restored **500+** classic films from Hollywood and across the globe

The Simpsons: 20th Century Fox: For 'The Simpsons', 'Lowry Process' was used for Upconversion from SD to HD in 4:3 and 16:9 with tilt and pan for 342 episodes of this epic animation series.

NASA: The original video footage of the missing Apollo moon landing tapes was restored using 'Lowry Process' in time for the 40th anniversary of the moon landing on 16th July 2009.

Prometheus: Ridley Scott's 'Prometheus': In addition to grain reduction and image processing, all 3D related issues were fixed, and the Z axis was made acceptable for theatrical release.

Star Wars: The legendary first three 'Star Wars' feature films were all scanned at 4K with full restoration including stabilization, grain reduction, and dust and dirt removal.

Avatar and Titanic: James Cameron's 'Avatar' and 'Titanic': In addition to image processing and grain reduction, Z axis issues that had occurred during the original 3D shooting were fixed.

Disney: Short films and feature films like 'Dumbo', 'Snow White', 'Cinderella', 'Sleeping Beauty' and several others were scanned at 4K, color corrected and restored according to fixed specifications. Dirt and dust were removed from each of these films, and scratches and grains were cleaned up.



Several of Hollywood's most renowned films have been restored using Lowry Digital technology

About Prime Focus Technologies

Prime Focus Technologies (PFT) is the creator of Enterprise Resource Planning (ERP) software, CLEAR®, for the Media & Entertainment (M&E) industry. It offers streaming platforms, studios, and broadcasters transformational AI-led technology and media services powered by the Cloud that help them lower their Total Cost of Operations (TCOP) by automating their content supply chain. PFT works with major companies like Walt Disney-owned Star TV, Channel 4, ITV, Sinclair Broadcast Group, A&E Networks, Hearst Television, Warner Media, PBS, CBS Television Studios, 20th Century Fox Television Studios, Lionsgate, Showtime, HBO, NBCU, TERN International, Disney+ Hotstar, BCCI, Indian Premier League, and more.

PFT is the technology subsidiary of Prime Focus, a global leader in M&E industry services.

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