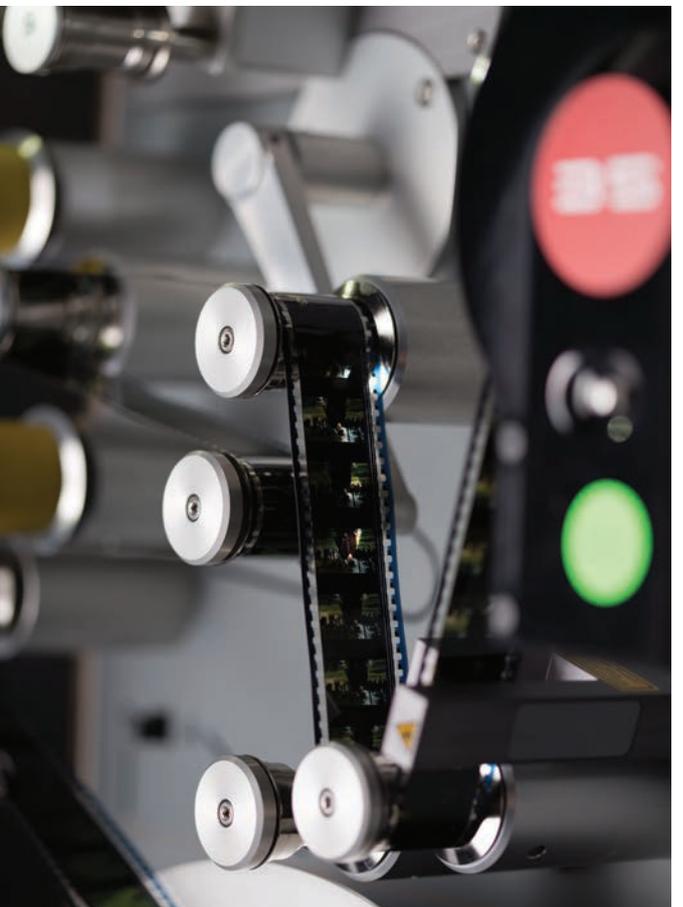


# Scanity HDR

high dynamic range film scanner



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# Scanity HDR >>>

A multitude of exceptional and first-to-market features provide Scanity HDR users with cutting-edge technology that addresses the challenges many archives and facilities are facing today. Scanity HDR significantly improves ROI, enhances productivity, works effectively in datacentric workflows

and provides a fast and effective solution that reproduces the pristine quality that film warrants. Scanity HDR serves a variety of film scanning applications including, film archive scanning for mass digitisation, EDL conform scanning, short-form commercials, digital intermediate and new formats like 4K UHD.

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# Scanity HDR >>>

DFT's state-of-the-art film scanner Scanity HDR excels in the uncompromising ability to handle a range of difficult and historically-aged film issues.

Scanity HDR uses highly efficient LED (RGB, IR) light sources and hence low temperature, dedicated hardware processors and fewer, less expensive third-party components. This lowers initial costs as well as on-going operational expenses.

Scanity HDR is able to solve a number of key issues that are prevalent when scanning damaged and aged film stock.

## KEY FEATURES

- Real-time 2K scanning from 35mm, 16mm & 8mm films
- High-speed 4K scanning from 35mm, 16mm & 8mm films
- 4K ultra HD ready
- Exceptional, versatile and safe film handling
- Enhances productivity and workflow efficiency
- Optional WetGate technology
- High Dynamic Range up to 4.8 D
- Shrinkage compensation up to 5%
- Handling of irregular warped or twisted film using contactless scan processing
- Simultaneous audio ingest via COM-OPTICAL or COM-MAG option





## Real-time 2K and high-speed 4K scanning

Scanity HDR provides industry leading data ingest speeds, providing up to 2K real-time or 4K up to 15 fps in DPX or TIFF data files.

This high speed data ingest or capture is unrivalled in the industry, but even more so when contextualised with the uncompromising high dynamic range in color and particularly for black and white films.

Scanity HDR offers a range of user adjustable speeds, from 96 fps in 0.25K through to 15 fps in 4K. Facilitating both parallel 2K or 4K data capture as well as simultaneously providing a selection of user definable deliverables via its batch processing facility.

## High dynamic range

Scanning normal color

negative images for post-production and visual effects using modern high-end technology allows users to capture the dynamic range of the color negative. Film archives however, typically manage large volumes of historic images, and require specialist equipment, which enables the capture of an even greater dynamic range rather than image resolution. This is particularly important when managing black and white (B&W) recorded images on either print or negative stocks which have a high dynamic range (HDR).

Traditionally, HDR scanning is done using a multiple exposure method during which a scanner 'stops the film' to capture images at different exposure levels. Images are subsequently recombined into

a single HDR image, a process that significantly slows the rate of scanning.

## Exceptional and versatile film handling

Scanity HDR is a highly versatile and flexible scanner that serves a multitude of scanning applications. Its speed makes it ideal for bulk archive film scanning, mass digitisation and EDL/conform scanning of feature films, short-form commercials, dailies, low-resolution browsing and applications that require the immediacy of live moving images.

Scanity HDR is an excellent fit for applications where film is scanned only once. The contactless roller gate makes it perfect for sensitive and fragile film in restoration and archiving applications.



### **Safe film handling**

Scanity HDR uses a uniquely designed film gate mechanism instead of the usual costly and potentially film damaging skid plates. Film travels on the roller for approximately 170 mm (7") during which the image and optical perforation scanning takes place. The film lies stable on the gate roller and the high resolution tacho wheel (which is attached to the roller) provides control pulses to precisely manage the movement of the film supported by the optical perforation detection. This method is the most gentle way to transport and scan the film. Aside from the rollers there are no mechanical parts in contact with the precious film. The rubber coated and newly designed continuous capstan

drives the film smoothly and securely.

### **High performance image stability**

Scanity HDR provides touch-free pin registration rather than mechanical pins to ensure excellent image steadiness. Several newly designed modules include: an optical perforation detection device with dedicated camera; a precision roller gate for mechanically stabilising the film controlled by a high resolution tacho and servo system; a continuous motion capstan film transport; and dedicated hardware for 4K image stabilisation processing without delay. With these key elements Scanity HDR combines steadiness with high-speed and gentle film handling.

### **Optional WetGate technology**

Scanity HDR comes pre-prepared with an optional state-of-the-art wet-gate technology solution. Filling the surface deficiencies with environmentally safe fluid at the point of scan provides near perfect quality transfer results, saving time and downstream processing, and improving the outcome significantly.

### **Workflow efficiency**

Scanity HDR includes two control interfaces: a state-of-the-art touch screen tablet for local operational management of the scanner, facilitating live, on-screen remote control and status updates; and a dedicated high-end workstation with dual displays.

## Key technical features

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- High speed scanning - 4K scanning up to 30 fps (2-perf) and 4K up to 15 fps (4-perf), 2K up to 30 fps (2-perf) and 2K up to 25 fps (4-perf), 1K up to 44 fps, 0.5K up to 69 fps, 0.25K up to 96 fps (speed depending on IT, network and storage infrastructure).
- High dynamic range Black and White film scanning up to a density range of 4.8 D in real-time 2K data (2048 x 1556 RGB) and 4K data (4096 x 3112) at 15 fps, 4-perf. Suitable for both print and OCN materials Super 16/16 mm and Super 35/35 mm.
- Versatile multi-application scanner, archive film scanning, mass digitization, EDL/conform scanning, low resolution browsing and highly suited for restoration and archiving, commercials and 'video-like' applications.
- Customized high resolution optics – capable of resolving 8K equivalent image details.
- Sprocketless transport for ultimate protection of archival film.
- Time Delay Integration (TDI) sensor technology for extremely fast and sensitive film scans - 4300 horizontal active pixels, 96 TDI lines, 6 µm pixel size relative to the film.
- Independent from frame height - film frame aspect ratio is matched by the number of lines.
- Over scanning in horizontal and vertical direction beyond image boundaries.
- LED light source with optimized spectral wavelengths specifically designed for a variety of film stocks including aged archive materials such as nitrate stock.
- Precision roller gate avoids mechanical stress and risk and provides unparalleled smooth and safe film handling.
- Continuous motion capstan film transport.
- Optical perforation detection and touch-free image stabilization to provide pin registered steadiness. Providing for a stability of less than ± half a pixel at 4K in real-time.
- Highly integrated and fast spatial image processing manages content scaling and formatting.
- Dirt and scratch handling capabilities with diffuse illumination and IR channel. Capable of dirt map generation for internal/ external processing up to 16 bit dirt matte selectable. Working with a range of third-party products to provide seamless dirt and scratch processing, optimizing the workflow.
- Audio scanning of optical sound tracks on 16 mm and 35 mm film and magnetic track on 16 mm film.
- Parallel scanning of both audio and 2K/4K film ingest to provide single, real-time pass material.
- Long LED life provides stable and cost-effective illumination solution at very low temperatures for extra film protection.
- Integrates seamlessly with third-party software tools such as PF Clean and Diamant Film Restoration Software.
- Capable of handling shrinkage up to 5 percent tolerance.
- WetGate ready deck plate to support both 16 mm and 35 mm wet scanning.



Resultant HDR Image

A typical HDR picture will use a combination of two, three or more bracketed images to produce the final look.

Using this patented processing technique, increases the effective dynamic range of Scanity up to 4.5 ND and at real-time speeds.



Over Exposure



Medium Exposure



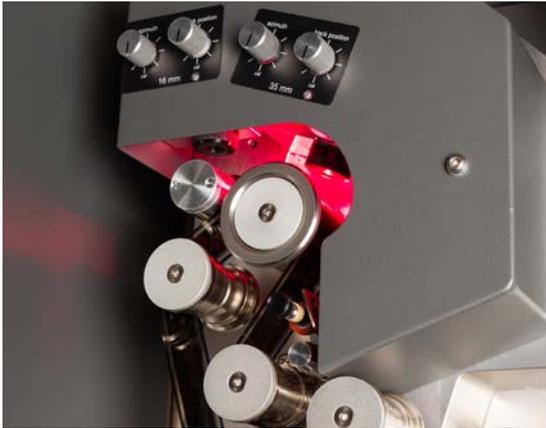
Normal Exposure

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# Scanity HDR Audio scanning >>>

Scanity HDR provides an audio scanning option facilitating the ingest of analogue optical mono or stereo sound tracks from 16mm or 35mm print and magnetic tracks on 16mm film. This feature eliminates additional and separate image and audio scanning passes. The audio option uses components from Sondor and is mounted into Scanity HDR before the lens gate assembly.

The capstan-driven continuous film transport offers real-time audio scanning in conjunction with real-time 2K film scanning. The soundtrack is picked up by audio heads, converted into WAV files on the Scanity HDR workstation and stored with the images. This means that both the audio and image files are available for further processing or playout via third-party software systems.



Internal processing within the audio scanner compensates for any audio delays that are introduced, as well as any pitch changes due to film shrinkage or other factors. Many archive films contain optical (COM-OPT) or magnetic (COM-MAG) sound tracks that need to be ingested along with the film materials, Scanity HDR can facilitate simultaneous audio and 2K data scanning of these typical soundtracks. With combined features such as extremely gentle film handling and optical or magnetic audio scanning, Scanity HDR is an ideal solution for the film archive market. Scanity HDR - audio scanning seamlessly integrates with both DFT proprietary software applications and a range of third-party solutions. The optical

audio scanner can be ordered as an option with the Scanity HDR or added to existing Scanity or Scanity HDR Film Scanners in the field.

#### Key technical features include

- High-performance audio for mounting into the Scanity HDR Film Scanner
- Audio components from Sondor are seamlessly integrated and pre-qualified
- Reads optical audio tracks from both 16mm and 35mm positive film (Prints)
- Adjustable tracking and azimuth of optical sound heads
- Compatible for reading cyan-dye high magenta and silver optical tracks
- Variable area: unilateral, bilateral, dual lateral
- Variable density
- Scans analogue audio tracks and converts them into digital audio WAV files
- Reads magnetic tracks on 16mm film
- Eliminates additional and separate image and audio scanning passes
- Real-time audio scanning in conjunction with 2K data ingest
- Generates broadcast WAV files for automatic syncing of images and sound
- Audio base option includes a platform for audio heads, wire harness and 19" 3RU electronics unit
- Compensates audio delays
- Infield upgradable

## Scanity HDR FAQs

*“What is the main Scanity HDR USP and the benefit to customer?”*

Scanity HDR facilitates the ingest of difficult dense black and white materials at real-time speeds using its new proprietary, patented simultaneous triple-exposure technology. This has the advantage over traditional scanners because the triple exposure is executed once, in real-time 2K or up to 15 fps in 4K, which means that instead of having to slow down the scan speed it stays consistently fast. This creates significant time and cost benefits and allows access to previously unseen details from the highlights and lowlights of the film at extraordinary speeds. To further enhance this feature set for all film transfers, B&W and color and to mitigate unwanted surface imperfections including: scrubs, cinch marks, horizontal and vertical scratches, Scanity HDR comes pre-prepared with a new optional state-of-the-art proprietary WetGate technology solution. Filling the surface deficiencies with environmentally safe fluid at the point of scan provides near perfect quality transfer results saving time and downstream processing, and thereby improving the outcome significantly.



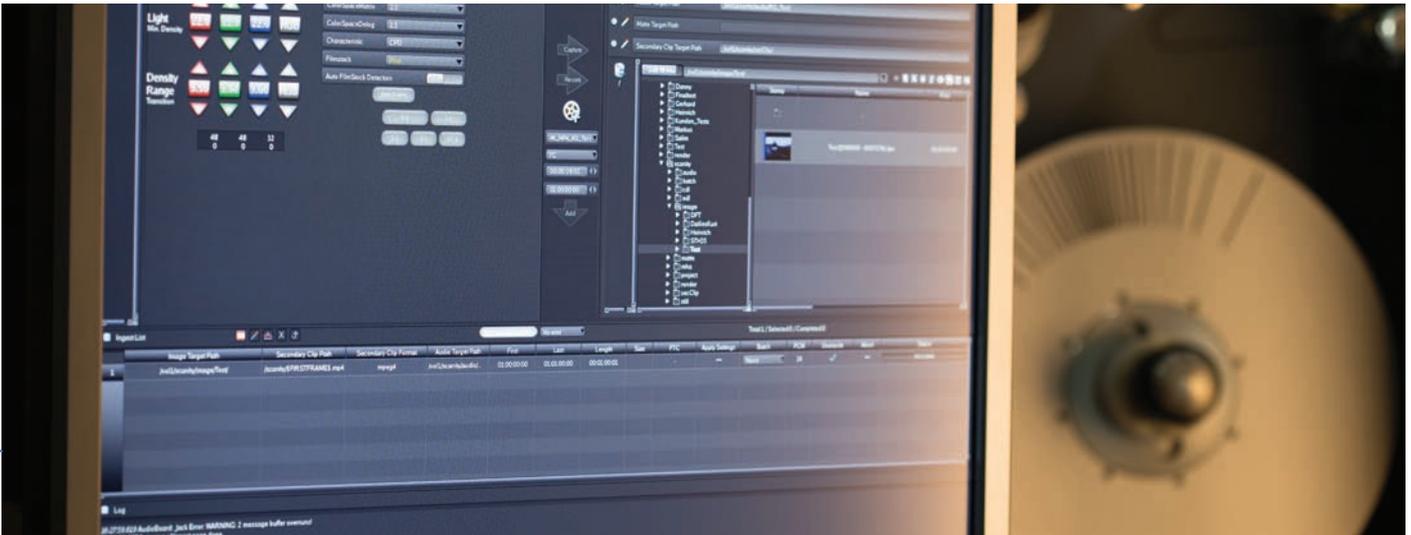
*“How can the scanning speed be so fast and yet Scanity HDR does not need a high power light source?”*

High speed scanning is down to the use of new sensor technology. Time Delay Integration (TDI) enables scanner sensitivity that has never before been achieved. TDI sensors accumulate charges of up to 96 lines in the sensor and increase the sensitivity by a factor of more than 50 compared to a single line CCD sensor.

The result is that an LED-based light source can be used and the diffused light from an integration sphere can be utilised. There is also enough light headroom for individual light adjustments in red, green and blue images. Furthermore, TDI technology enables the use of a lens design that has a small aperture and consequently a large focal depth, which makes focusing an easy task.

*“How stable is the LED light source and how long does it last?”*

LED light sources are known for their long life and are cost-effective compared to other illumination solutions. However, LEDs require clever controls to ensure that they continuously reproduce a precise spectral response and compensation for the slight decrease in efficiency over years of use. Scanity HDR has been designed to hold sufficient light headroom in all three color channels to always correctly calibrate the scanner and ensure reproducible levels. It is important to ensure a constant spectral response, therefore the light output is controlled via Pulse-Width-Modulation and the various spectral curves of the dyes of different films are taken into account by the LED light source, which can be adapted in its spectrum. This adaptation is automatically triggered by the film stock selection.



*“What is the advantage of using optical methods for image steadiness?”*

Stabilising the image with mechanical pins is a worthy and proven method yet it has limitations in speed and versatility. Mechanical pin scanning leaves marks on the film and wears the film if scanned repeatedly. Optical film scanning has many advantages. This method does not physically touch the edges of the perforations and is therefore a wear free and safe method of scanning. With optical scanning and continuous film transport, speed is not an issue as long as image processing capacities are sufficient. Dedicated processing is capable of performing high-speed scanning beyond real-time while fast shuttling to browse the content of the film is also possible. A further advantage

includes the ability to scan shrunken films without any concern about the integrity of vintage film.

*“What features does the Scanity HDR workstation and software offer?”*

The Scanity HDR workstation and software provides a platform for image ingest and monitoring, data management and direct access to standard file systems through Linux. It supports all major SAN systems (CVFS, Store Next and CXFS) and can be backed up to standard IT devices. The workstation uses off-the-shelf IT hardware, which can easily be adapted when technology progresses. The software executes batch processing where scanned images can be further processed, such as look-up tables, color manipulation, format and size transformation, grain and

noise reduction. Scanity HDR seamlessly integrates with the third-party software tools, which allow for multi-platform workflows and the use of one common database.

*“What operational costs should I consider?”*

Due to the LED illumination system, frequent replacement of the light source is eliminated, unlike tubes or bulbs. Also the TDI sensor technology provided by DFT is proven and long-lasting with insignificant running costs. Since components can break, Scanity HDR has been built around a modular and simple mechanical design, which allows easy exchange of parts onsite.

The only moving parts in the gate are the rollers providing very low maintenance.

# Technical Specifications

## Film Transport

Play / Record Speeds - depending on resolution	4K - 15 fps (4-perf) 2K - 25 fps (4-perf) 1K - 44 fps (4-perf) 0.5K - 69 fps (4-perf) 0.25K - 96 fps (4-perf) Variable speed control: speeds can be slowed down according to requirements. Speed depends on the limitations of clients file system, workstation and storage solution.
Optional Lens Gate Assemblies S35/35mm S16/16mm S8/8mm WetGate for 35mm and 16mm	Roller gate with reference edge on which the film travels Optical perforation recognition and evaluation Pressured air supported film gate No parts where the film might slide or wear
Film Format 35mm	Maximum scan width: 25.8 mm; Pixel pitch 6.0 µm; 2-perf; 3-perf, 4-perf, 8-perf (VistaVision); Cinemascope Fixed settings for Full Aperture (Super 35) and ACA (Academy Camera Aperture)
Film Format 16mm	Maximum scan width 12.9 mm; Pixel pitch 3.0 µm; S16 or 16mm Fixed settings for S16, N16
Keykode Reader	For 16mm and 35mm films Film stock recognition and film stock memory recall, metadata generation
Local Control	Touch screen display For calibration, major film deck functions, and low resolution image representation film ingest task monitoring and status indication
Focus	Automatically, manually, in stop and in play
Framing	Coarse and fine
Film Length	On cores 2000 feet, 609 m; A/B wind
Visible Navigation	Supported by proxy images from cache; Cache keeps all images of a 2,000 foot film in 0.5K resolution
Step with Image	Instantly from cache (if filled)
Shuttle with Image	Visible forward live and supported by cache (if filled); Backwards supported by cache (if filled)
Spooling w/out Image	2.2 m/s = 120 fps on a 4-perf 35mm film
Mechanical Dimensions	
Cabinet	984 mm (width) x 1943 mm (height) x 811 mm (depth) - including door handles Weight: ±320 kg / 705 lb
Transport Crate	2100 mm (width) x 1080 mm (height) x 1210 mm (depth); Weight: ±150 kg / 330 lb

## AC Power Connections

AC Supply	1-phase current 240 V, 50 Hz 2-phase current 208 V, 60 Hz 2-phase current 200 V, 60 Hz
Power Consumption	1.5 kVA, typically

## Scanning Front End

Illumination	LED illumination system with dedicated spectral response, Automatically adjusted according to film stock and manually adjustable (overwrite) Integration sphere for diffuse light film illumination for dirt and scratch compression
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Beam Splitter	Splits into Red, Green, Blue and IR
Image Sensors	3 TDI sensors (Time Delay and Integration) for Red, Green, Blue image, 1 TDI sensor detection IR light to generate a dirt and scratch representing image, Resolution 4300 pixels x 96 lines, 7 µm square pixel size resulting in a 6 µm raster on the film level in 35mm, and 3 µm raster on the film level in 16mm
Camera	3 or 4 cameras comprising preamps, ADC, and binning circuitry Camera link interface to image processor
Image Processing	Signal processing: look-up table, matrix, look-up table, factory and custom settings, Spatial processing: for image formatting in scanning speed, including anamorphic unsqueeze 2:1; Processing quantization: 16 bit
HDR	High Dynamic Range - Simultaneous Triple Exposure for Black and White Film material, up to 4.8 D
Scanner Calibration	Automatic

## Workstation

Workstation Hardware	Current high-end workstation Dual port graphic card Ubuntu Linux operating system Postgre SQL Database File format DPX according to SMPTE 268M-1994 High Definition dual monitor setup
Remote Interface	Script based via LAN
File Format	10 bit LOG / LINEAR DPX according to SMPTE 268M-1994 16 bit LINEAR TIFF A wide range of streaming deliverable formats and compressed formats through batch processing, please refer sales for latest details. Presets for various image resolution
Components and Packing	3 x 10 bit, RGB, filled to 32 bit with padding at bits 0 and 1 4 x 8 bit, RGBA packed to 32 bit Alpha (A) = space("0") 4 x 16 bit, RGB 3 x 16 bit, RGB 2nd workflow step rendering on multiple Scanity workstations Supports data backup drives

## Software, GUI

Ingest Page	Scanner front end control Transfer window Time bar Monitor and Monitoring Metadata window EDL or keykode list based data capture Frame counter, feet and frame, time code, keykode, log list
Monitor, Monitoring	Image monitoring display characteristics selectable via display look-up tables Monitoring: parade or super-imposed waveform, vector, histogram, detail tool
Batch Processing Page	3D look-up tables Primary color correction Transform
Production Set-up	Structure: The workstation is part of Scanity and requires a connection to at least one disk array or a SAN storage via fibre channel (dual 16Gb FC). Note: The achievable data transfer speed depends on the overall system performance and might be subject to variations. Parameters like the connected storage, connections between storage and host and the file system make an impact



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