

# Phoenix

Film and Video Restoration

Specifications  
2018.3

# Phoenix Overview

The Phoenix suite of products offers world class restoration tools for the most demanding jobs. Featuring our multiple award winning DVO technology.

Phoenix is designed to produce great results fast with less manual intervention. With a familiar timeline based interface, the artist and archivist can easily review and touch things up in context if required.

Each product has been designed around a feature set for specific jobs and budgets

**Phoenix Finish** The most comprehensive set of tools and the restoration product to beat. It brings all the power of both Phoenix Refine and Phoenix Video in a unique combination, allowing users to fully correct and deliver projects of mixed film and video media with related artefacts, within a single timeline.

- A complete set of powerful colour tools accesible from dedicated colour layers
- Powerful format conversion tools, including DVO Upscale and DVO Zoom for optimised upscaling to larger formats and DVO Twister for sophisticated motion-compensated frame rate conversion.
- Optional camera RAW support.
- Compatibility with Precision, Tangent Element and Tangent Arc panels

**Phoenix Refine** The best high-end restoration tool-set for repairing damage to film material. Combining the best in automatic, semi-automatic and manual restoration tools, Refine adds editorial and effects processing capability. The result is a single system that delivers for both mastering or archival and preservation.

**Phoenix Video** End-to-end solution that includes Digital Vision's leading image manipulation DVO software tool set for highly automated restoration and enhancement of video content stored on various tape formats, such as 1", U-Matic and Betacam SP or later transferred to digital tape formats. The system handles common image defects such as drop-outs, severe noise, cross colour artifacting, line sync problems and more. Additional features include motion compensated frame rate conversion and high-quality upscaling as well as full support for common broadcast codecs.

**Phoenix Touch** Cost effective image restoration software aimed at film based material and ideal for cleaning up VFX plates and DI scans. Phoenix Touch contains powerful automatic dust busting capability alongside a high quality manual repair tool-set that can quickly turn around intensive repair tasks. Phoenix Touch can also act as assist station to Phoenix Refine and Phoenix Finish.

Phoenix Touch can be expanded by purchasing the Touch+ option, adding DVO Dry Clean and DVO RegrainRGB for next generation dust and fix.

Any other DVO tools can also be licensed separately for Phoenix Touch

# Phoenix - Core Features

*\*check the product matrix for version specific features*

**Easy Project creation** - Create multiple output formats for a single project. Easily create multiple deliverable versions in different resolutions.

**ACES 1.1 Managed Colour**

**Import and Conform\*** - Easy conform using AAF, EDL and XML (Premiere) Support for animated resizes, opacity, dissolves, retimes from AAF and XML. Support for high performance Apple ProRes, Avid DNX, MXF, Camera RAW files.

**Flexible multi-layer timeline** - Work with material in a familiar and flexible way, using multiple video and audio tracks. Easily move and trim shots, lock and solo tracks, track based compositing. Timeline and shot bookmarks allow for better organisation and retrieval of information. Automatic track naming for VFX intensive workflows

**Source Editing** - Three point editor

**Dolby Vision Mastering** - Mastering and trimming of Dolby Vision content with Integrated Software Content Mapping and support for hardware Content Mapping Unit

**Library** - Automatic folder creation on import. Material sorting. FInd in timeline and FInd in Library Standard project setup on per user basis.

**Interoperability** - Interoperability with third-party systems supporting industry standard formats like Avid DNxHR, MXF and Apple ProRes - including metadata. Read and write Avid DNxHR, MXF and Apple Prores. Avid Interplay

**Multiple, Layer based colour tools\*** - Each colour layer contains multiple tools to manipulate the colour of your image. LGG, Balance, Brightness Regions, RGB Curves, Printer Lights, Hue Curves, Luma-Sat, Sat-Sat, Blur, Brightness Contrast, Colour Curves, Printer Lights, Channel Mixer

**Layer Router** - Advanced layer routing functionality combined with isolation tools for every layer. RGB, alpha and luma mattes, shapes, keys, difference mattes. Transfer functions and transparency between every layer. Route any layer.

**Paint & Difference Matte on every layer** - Easily restore the source material or retouch, generate difference mattes for advanced regrain.

**Advanced report generation** - Generate customised HTML restoration reports to help with billing and planning.

**Restoration Report-** Generate custom restoration reports as HTML. Includes Source Information, Tools used, amount of manual fixes.

**Comprehensive comparison tools** - Compare images and grades by Track, Playhead, Source or Event.

Modes include: Dual, Split, Checkerboard, Red Diff, Butterfly, Cut Mono, Mono\*10, Diff Multiply

**Event view** - Use the event view to navigate, compare and recall easily from any other timeline event. Open different compositions for recall or comparisons from other compositions. Recall entire grades or single tools

**Configurable Master Reset** - Configurable Master reset means users can choose what effect to ignore during resets.

**Easy save and recall of notes and tools** - Save and recall effects using notes, from single tools and layers to complicated multi-layered effects. Create a library of notes and apply to any segment on any timeline in any project.

**User Default for all tools** - Save personal preference for effects and use as default.

**DVO Image enhancement\*** - Access to Digital Vision DVO tools for advanced image processing. Tools can be purchased individually or in predefined collections.

**Access to OFX plugin effects** - OFX support including Sapphire and Re:Vision effects.

**GPU Accelerated colour tools\*** - All colour tools and Pan & Scan tools on are GPU accelerated for increased interactivity and performance

**Fully automated background caching-** Unobtrusive background rendering ensures you always have the best results available without interruption. User selectable GPU and layer cache to streamline operations and greatly enhance user interactivity. Compressed caches supported.

**Monitoring using AJA Kona 4 or Decklink** Resolutions up to 4K/UHD and high frame rates

**Integrated Scopes and Measument** - User configurable scopes and measurement tools. ROI Display. Waveform and PQ Nit displays. Custom labels

**Multiple monitor support** - Multi monitor support with different resolution configurations makes working on complex timelines a breeze.

# Work descriptions and scenarios

Below is a number of restoration scenarios and how the Phoenix tools can be utilized. These are not recipes, merely examples on approaching the issues faced with.

## General film issues

The normal approach for film restoration is to address global issues (i.e. issues affecting the whole image such as unsteadiness or flicker), the local ones and finally and sometimes optionally enhancing the image.

Unsteadiness is first removed using the automated DVO Steady, in combination with addressing splice bumps, then flicker (including chroma breathing) is reduced with DVO Flicker, also automated. Once the global issues has been addressed, tram lines can be removed using DVO Scratch. The normally time consuming dust-busting process is done swiftly with the motion compensated DVO Dust optionally complemented with manual, but motion compensated

DVO Fix touch up, either using include or exclude modes. Although most of the listed processes are automated, the operator can override and fine tune for an even better result.

Finally a bit of gentle grain reduction using DVO Clarity and some sharpening using DVO Sharpen can be added for that extra crispness. Both Phoenix Refine and Phoenix Finish are suitable for this type of work.

## Old and damaged film

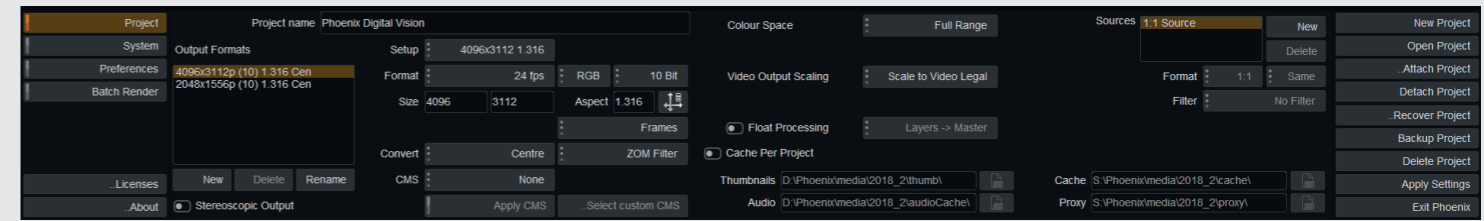
In addition to the above general film cleaning, old and severely damaged film needs additional treatment. The complete range of tools may need to be used and Phoenix Finish is the best choice here. E.g. frame reconstruction can be done in a number of ways, with motion compensated fill in using DVO Fix, time stretching with DVO Twister, using multiple layers/tracks and compositing tools.

The negative, parts of a print or even material previously put on tape may be used and matched to the negative by image enhancement such as sharpening (DVO Sharpen) and grain reduction (DVO Clarity or DVO Grain) as well as image resize/positioning (Pan & Scan or DVO Upscale).



Colour correction

Before and after comparison of an image that has been corrected using the colour tools available in Phoenix Refine and Phoenix Finish



Project interface

The latter will make SD material look sharp when upscaled by preserving edges (especially diagonals). Also colour/density matching using the advanced grading tools of Phoenix Finish can be performed.

## Digital Camera issues

Digital noise is the most common issue, but other sensor issues, if present, providing different types of patterns needs to be address first.

This can usually be resolved by sharp cut-off low pass filtering using the generic DVO Brickwall or DVO Alias tools. Digital dropouts can be removed using DVO Dust, a very versatile tool that can remove almost any type of random artefacts, whether they are field or frame based.

Digital noise is finally reduced by DVO Clarity. It is not unusual that different camera types are used in the same production, whereby different types of noise are induced. DVO Clarity will easily match these different shots.

## Analogue Video tape

Start by addressing with line start issues DVO Line Sync and possible composite artefacts with DVO Cross Colour. One of the biggest issues with material on analogue tapes are dropouts.

Use DVO Dropout to take care of this. Bigger artefacts can also be removed manually with DVO Fix using motion compensated fill-in.

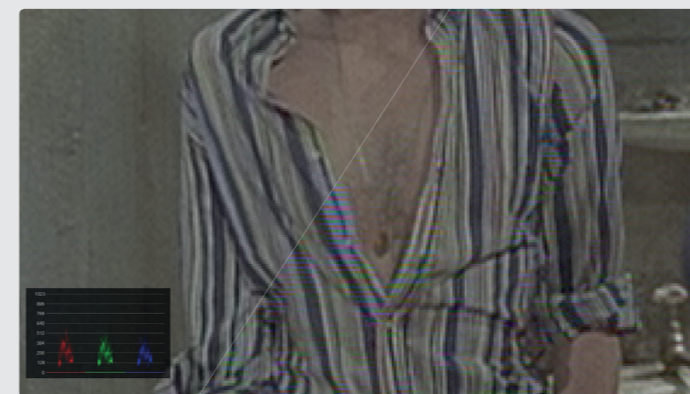
Noise is typically also a big problem, but can dramatically be reduced with DVO Noise, which also has separate luma/chroma controls, typically to attack the chroma channel much harder. To make the final product look pristine, sharpening (DVO Aperture) can be added.

Having mixed film/video related artefacts? No problem, film and video restoration tools can be mixed to restore the content, matching the original capture. General film issues

The normal approach for film restoration is to address global issues (i.e. issues affecting the whole image such as unsteadiness or flicker), the local ones and finally and sometimes optionally enhancing the image.

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DVO Fix touch up, either using include or exclude modes. Although most of the listed processes are automated, the operator can override and fine tune for an even better result. Finally a bit of gentle grain reduction using DVO Clarity and some sharpening using DVO Sharpen can be added for that extra crispness. Both Phoenix Refine and Phoenix Finish are suitable for this type of work.



DVO Cross Colour

# Control Options - Precision



CONTROL | EFFICIENCY | CREATIVITY

The Precision panel maximizes creativity through efficient and innovative navigation, while retaining the stylish look and feel required in modern grading suites. Combining touch-screen operation alongside traditional control elements, Precision offers features and functionality unavailable from any other generic or integrated grading panel.

Precision is comprised of three separate panel units - Colour, Touch and Transport – allowing operators to create an optimised setup to suit their own environment and preferred ways of working.

Precision offers a sleek low-profile combined with a hard wearing, non-glare surface that ensures a superior look and feel. All rotary controls, buttons and joysticks are of the highest manufacturing quality and were selected to provide a long life and precise control.

The brightness and colour of all illuminated controls can be adjusted to better suit the ambient conditions of a DI suite, as well as providing colour-coded State and Mode indications that are fully configurable by the operator.

Precision also provides dimmable script lights along each side of the panels, as well as built-in audio feedback that offers an additional level of configurable response and user control.



# Control options - Tangent

The Element and Arc control surfaces from Tangent Devices are also supported on Phoenix. All controls can be mapped using the Tangent Mapping software.  
[www.tangentwave.co.uk](http://www.tangentwave.co.uk)



Tangent Arc

- Three sections: Grading, Navigation, Function
- Each section precision machined from a solid aluminium block
- Left and right sections can be swapped to suit handedness
- Controls are labelled with high contrast, dimmable, OLED displays
- Individual control displays also provide value / feedback where appropriate
- Each panel has a large dimmable, OLED display to provide mode / bank information



Tangent Elements

- Ultra-slim all metal construction
- Every programmable control is labelled on a high contrast, high resolution, OLED display
- The display also provides value / feedback where appropriate
- A set containing one of each panel model has an overall footprint of 77cm x 20cm (30.3" x 7.9")
- Modular design
- Configurable to suit handedness, desk space and to place around other equipment
- Multiple panels of each model may be added to your layout; especially useful for some applications

# Some nice words from our customers...

## Lee Kline, Technical Director The Criterion Collection

'Kes' was a particularly challenging project with really tough vertical scratches in the original camera negative. We didn't have any other tools tackle this as well as Phoenix, so we were excited to see the results. It was almost magical.

## Davide Pozzi, Director L'immagine Ritrovata says:

We were looking for new software that could implement the existing restoration workflow. The Phoenix systems' strong motion estimation pedigree, based on years of experience, was a strong deciding factor for this new workflow as was its extensive toolset, automatic capabilities and full technical support.

Digital Vision provided excellent training and the fact that we knew that we would have full support in future implementations often based on our feedback, gave us a lot of confidence in the system and made us look at the Phoenix systems as an investment.

## Mats Forsberg Mars Motel

We used Phoenix Finish to clean up dirt and dust and to remove scratches from Bergman's classic Autumn Sonata, which stars Ingrid Bergman.

Considering the film is more than 30 years old it wasn't too badly damaged. Phoenix Finish's Scratch and Clone painting tools allowed me to easily fix a number of scenes with vertical scratches that would have otherwise have been more difficult to remove.

I used DVO Dust, Fix and Steady for the majority of the project to achieve a pristine finish. Phoenix Finish brought speed and flexibility to the project and because many of the processes are automatic I didn't need to spend time setting up parameters. The client was delighted with the result. The film looks like new.

## Matthew O'Hara Lead DVD author for FUNimation

'Dragon Ball Z' originates on 16mm film, and over time had begun to show signs of aging – dust, scratches, some shaking and focus. In this restoration process in HD, the Phoenix has greatly enhanced our ability to recover the quality of the original material in a realistic time frame without the artefacts some algorithms leave behind.

Grain can be challenging. DVO Clarity enables us to clean and restore, without removing what we consider the right amount of grain to give the images depth.

# Phoenix product options overview

Software	Phoenix Touch	Phoenix Video	Phoenix Refine	Phoenix Finish
Multi Track Timeline	●	●	●	●
Conform	●	●	●	●
Background Scene Detection	●	●	●	●
EDL, AAF and XML handling	●	●	●	●
Video I/O with optional Kona 4	●	●	●	●
SDI Monitoring with BMD Decklink	●	●	●	●
2K / 4K / UHD / Custom	●	-	●	●
SD / HD	●	●	●	●
Dolby Vision HDR Mastering				
Apple ProRes for Windows import and Export				
RAW Camera Support	-	-	-	○
Advanced Codec Support	○	●	○	●
DVO Dust + Fix / Dropout & Fix for Video	●	●	●	●
DVO Video Tools	-	●	-	●
DVO Restore	-	-	●	●
DVO Enhance Tools	-	-	●	●
DVO Convert Tools	-	●	-	●
Option to buy individual DVO Tools	●	●	●	●
Colour Correction as FX	-	●	●	●
Lin to Log / Log to Lin and LUT support	●	●	●	●
Input FX Layer	●	●	●	●
Base Layer - Colour correction layer with all tools	-	-	-	●
FX Layers	●	●	●	●
Master Layer colour tools	-	●	●	●
Pan & Scan	●	●	●	●
Notes & Composition Notes	●	●	●	●
Event View	●	●	●	●
Full Precision Panel	●	●	●	●
Tangent Panel Support (Arc & Element)	●	●	●	●
ACES Colour 1.0.3	●	●	●	●

Key: ● Included as standard in product ○ Optional extra - Not Available

# The DVO Tools

## DVO Restore

An extensive tool set used to repair film and digital media and prepare for enhancement.

## DVO Chroma

Used to counter the effects of chromatic aberration in film and digital material.

## DVO Dirt Map

Combining Infra Red dirt map scans with the incredible DVO Dry Clean allows cleaning of film based of scanner generated dirt maps.

## DVO Dry Clean

DVO Dry Clean is the result of years of experience and research into improved techniques in dust and defect detection and concealment, it allows for significantly better detection of defects and also allows much larger defects to be automatically repaired. The name reflects the fact that this tool does much more than dust removal.

Defects that previously would require manual intervention can now be detected and repaired using an automated tool. Meaning that more time can be spent on other aspects of the restoration.

## DVO Dust

Fully automatic and highly accurate film dirt, dust and random scratch concealment and video drop-out removal system. It can remove around 90% of visible imperfections without introducing unwelcome

artifacts. Experienced operators are provided with full access to advanced processing filters and settings.

In addition to Auto Fix and manual Clone, there's also an Auto Clone mode where automatic repositioning and best match of surrounding frames is done as an alternative to complete regeneration of content. Visual aids (overlay) provides helpful information on operating mode plus numerous keyboard shortcuts allows the operator to concentrate on fixes rather than navigating the GUI.

## DVO Dust+Fix

A combination of above DVO Dust and DVO Fix that allows manipulation of the DVO Dust automatic dust busting using the brush and shapes in DVO Fix.

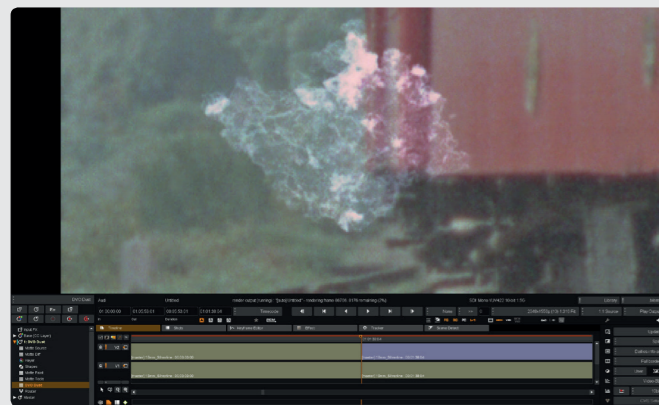
## DVO Fix

Facilitates the repair of specific areas and imperfections in a single frame, such as scratches, hairs and blotches or even larger damages such as punch holes, film tears and full frame reconstruction.

Using a brush or shape tool to select the damage, DVO Fix automatically repairs the selected area using motion compensated fill-in to recreate missing detail plus grain compensation to blend-in the recreated information.

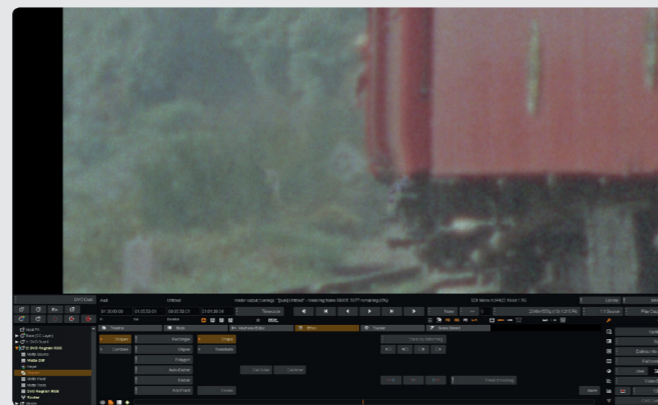
## DVO Frame

DVO Frame allows fixes of large tears or entire missing frames using a single click.



DVO Dry Clean

This image shows a large defect on a film frame. This would normally require manual intervention and repair.



DVO Dry Clean

Using DVO Dry Clean the detection and repair was completed automatically.

## DVO Pixel

Automated dead pixel detection and removal. User defined region to force processing. Set areas where no processing will be done

## DVO Print Align and Print Align Seq

A fully automatic process to align RGB separation prints, even if the offset varies over time. With Align Seq, are able to align sequential separations.

## DVO Scratch Target

The process is fully automatic and has an advanced detection algorithm with a fill-in result far superior to the normal process of hiding the defect using information from both sides of the scratch.

Scratch Target allows the user to take control of processing over and above the automated fixes.

## DVO Steady

Used to reduce unsteadiness due to film weave during scanning or camera shakes during capture of footage. A two pass solution, including advanced motion estimation, provides better separation of random instability and pan/tilt movements.

## DVO Steady II

Steady II builds on the original Steady algorithm and can be used to fix splice bumps automatically. There are also new scaling options and it a single pass automated tool.

## DVO Flicker

Analyses the image sequence to remove brightness and chrominance (a.k.a. chroma breathing) fluctuations. These may be caused by varying exposure time, unsynchronised light sources, telecine transfer, aging film stock and/or film chemical related issues. Includes Local flicker and ability to set manual reference point.

## DVO Warp

It is well known that line scan technology is affected by film splices, resulting in possible image warping after the splice. DVO Warp is a fully automated tool for detecting and repairing possible warping with very high precision and no user intervention.

## DVO Enhance

consists of creative tools that significantly improve detail, adding that extra touch and clarity.

## DVO Alias

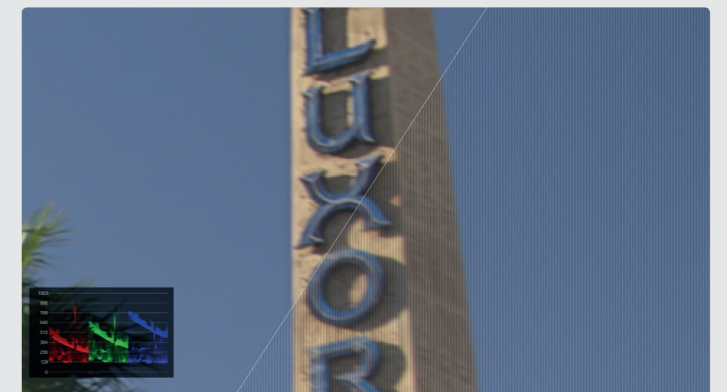
Takes care of the negative side effects of out-of-band vertical frequencies that show up on-screen as line flicker or "twitter" as well as moire.

## DVO Aperture

A high quality frame-based spatial filter that increases the apparent sharpness of the picture. This is a critical function when dealing with film scans and compensates for the loss of high frequency information generated in the film scanner.

## DVO Brickwall

Helps reduce signal entropy making compression easier. It provides an extremely sharp cut-off beyond a user defined frequency, enabling the creation of an accurately defined spectral content of material for various types of compression pre-processing. This means that compression artefacts can be reduced and the quality of the compressed image can usually be greatly improved. DVO Brickwall is a universal tool that can also cure problems such as high frequency patterns.



DVO Brickwall - fix for camera sensor fault

## DVO Clarity

Automated and texture preserving grain and noise management. DVO Clarity is designed to work in any resolution, from SD to 4K and above.

With completely new algorithms including grain/noise characteristics analysis for automated grain and noise reduction, new motion estimation engine and a new innovative spatio-temporal filter, the DVO Clarity provides stunning images, virtually artefact free, still retaining the original image sharpness and texture. Having become a much used tool and approved by major players in broadcast, restoration and post production, DVO Clarity is now considered as the new industry standard in grain and noise management.

## DVO Grain and Grain GT

The algorithm is specifically designed to manage the look of film grain and to reduce unwanted electronic noise in film or video originated material. Uses include restoration, compression pre-processing, and image processing of new feature film, television and commercial material. The updated version of DVO Grain includes a video mode with separate Y/C control for improved handling of video tape noise.

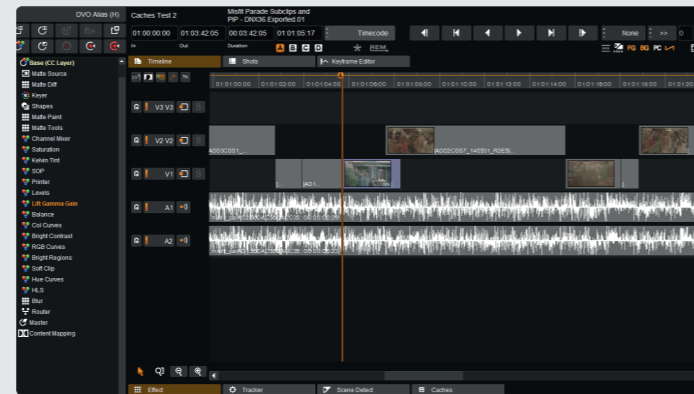
## DVO Re-grain and DVO Regrain RGB

Allows the user to quickly set up and generate natural looking film grain. The intuitive controls enable you to match almost any type of film stock by setting the grain size and sharpness as well as matching the characteristics of highlight and lowlight intensity behavior.

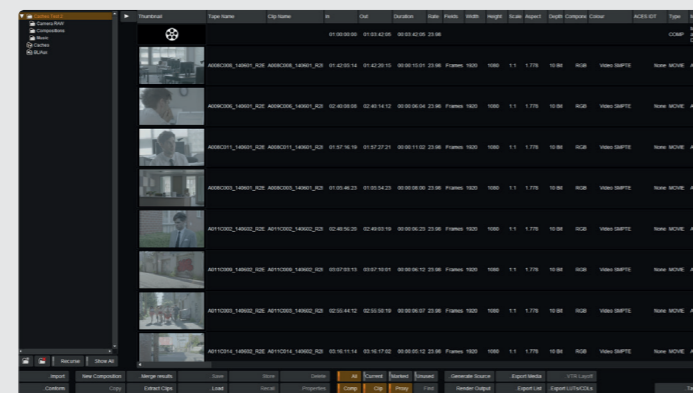
DVO Regrain RGB gives full creative control to the restorer, separate controls for R G and B channels, size, sharpness and uniformity control on a per channel basis.

## DVO Sharpen

An advanced sharpening tool that greatly enhances out-of-focus shots. It uses adaptive picture analysis and processing to yield excellent results without the common side effects associated with standard algorithms (such as amplified grain, noise, or halos around areas that were already sharp).



Phoenix Timeline



Phoenix Library

## DVO Convert

Used to create content in any format for any delivery platform, whilst retaining the original quality.

## DVO ThreeTwo

Pull-down conversion that handles discontinuous sequences and orphan fields and matching source edits.

## DVO De-interlace

Creating film look from interlaced video using high quality de-interlacing with advanced motion algorithms. The de-interlacer can maintain the fluid motion present in video.

## DVO Twister

Standards conversion relies on the process of interpolating picture content, creating images that did not exist in the original material, either because you need extra or less pictures. DVO Twister provides motion compensated standards conversion from any format, frame rate and resolution to any other, even creating 24P out of interlaced material

## DVO Upscale and DVO Zoom

Optimised upscaling of material, of specific value when converting from SD to HD. The algorithm maintains the high quality of edges (particularly diagonals) using clever adaptation and filtering technique, providing optimum result for both natural images as well as graphics and text. better separation of random instability and pan/tilt movements.

## DVO Video

Highly automated tool set that brings new life to valuable content stored on video tapes.

## DVO Alias

Takes care of the negative side effects of out-of-band vertical frequencies that show up on-screen as line flicker or "twitter" as well as moire.

## DVO Aperture

A high quality frame-based spatial filter that increases the apparent sharpness of the picture. Compensates for the loss of high frequency information.

## DVO Brickwall

Helps reduce signal entropy making compression easier. It provides an extremely sharp cut-off beyond a user defined frequency, enabling the creation of an accurately defined spectral content of material for various types of compression pre-processing. This means that compression artefacts can be reduced and the quality of the compressed image can usually be greatly improved. DVO Brickwall is a universal tool that can also cure problems such as high frequency patterns.

## DVO Chroma

Used to counter the effects of chromatic aberration in film and digital material.

## DVO Cross Colour

Significantly reduces Cross Colour a.k.a Chroma Crawling, an infamous defect that results from crosstalk due to the inter modulation of the chrominance and luminance components of a composite signal like PAL or NTSC. Once a video signal has been in the composite domain this effect is not easily removed

## DVO Dropout+Fix

A clever combination of above DVO Dropout and DVO Fix that allows manipulation of the automated processing using the brush and shapes in DVO Fix.

## DVO Dropout

A fully automatic and highly accurate video drop-out removal system. It can remove around 90% of visible imperfections without introducing unwelcome artifacts utilizing a pioneering set of processing algorithms and filters.

## DVO Fix

Manual repair of specific areas and imperfections in a single field, such as larger dropouts. Using a brush or shape tool to select the errors, DVO Fix automatically repairs the selected area using motion compensated fill-in to recreate missing detail.

In addition to Auto Fix and manual Clone, there's also an Auto Clone mode where automatic repositioning and best match of surrounding fields is done as an alternative to complete regeneration of content.

## DVO Grain and Grain GT

The algorithm is specifically designed to manage the look of film grain and to reduce unwanted electronic noise in film or video originated material. Uses include restoration, compression pre-processing, and image processing of new feature film, television and commercial material. The updated version of DVO Grain includes a video mode with separate Y/C control for improved handling of video tape noise.

## DVO Line Sync

Line sync or line jitter is a very common problem with archived analogue video tape. It is typically caused by the lack of or disturbances of line synchronization pulses, preventing the the video tape recorder from locating the actual start and end of each line. The most visible effect is that edges, which should be vertical in the image, appear to be jagged. DVO Line Sync automatically detects and corrects these line displacements as well as any stretching thereof.

## DVO Noise

Digital Vision's DVO Noise algorithm is specifically designed to reduce unwanted electronic noise especially on video originated material. Uses include restoration, compression pre-processing, and image processing of new feature film, television and commercial material.

## DVO Pixel

Automated dead pixel detection and removal. User defined region to force processing. Set areas where no processing will be done



DVO Clarity - (Image enhanced to show original grain)

# DVO image processing tools

Presenting the best image manipulation tools for restoration, enhancement and format conversion. DVO Tools can be purchased in collections or as separate effects.

DVO Tools	Effect	Conv	Enh	Restore	Video
DVO Alias	Removes line-flicker and unwanted patterning		●		●
DVO Aperture	High quality spatial sharpener		●		●
DVO Brickwall	Sharp frequency cut-off to eliminate artefacts		●		●
DVO Chroma	Fixes chromatic aberration or chroma artefacts			●	●
DVO Clarity	The best grain & noise reducer available today		●		
DVO Cross-colour	Removes chroma or dot crawl from video				●
DVO De-Interlace	Accurate creation of progressive frames	●			
DVO Dry Clean	Superb automated large artefact removal			●	
DVO Dirt Map	Use scanner dirt maps for automated repairs			●	
DVO Dropout +Fix	Highly accurate removal of video dropout				●
DVO Dust and Fix	Automated Dust removal with manual Fix			●	
DVO Dust	Automated motion compensated dust removal			●	
DVO Flicker	Automatic flicker removal			●	
DVO Frame	Automatic frame replacement for large repairs			●	
DVO Grain	Motion estimated grain & noise management		●		
DVO Line-Sync	Removes line jitter from edges of video material				●
DVO Noise	Removes unwanted noise on video materials				●
DVO Pixel	Automated dead pixel detection and repair			●	●
DVO Print Align	Automatically aligns RGB separation prints			●	
DVO Print Align Seq	Automatically aligns RGB sequential sep prints			●	
DVO RegrainRGB	Add realistic, highly customised grain to images		●		
DVO Regrain	Adds grain to video to match with film sequences		●		
DVO Scratch Target	Vertical scratches removal - new manual mode			●	
DVO Sharpen	Sharpens picture detail and not the noise or grain		●		
DVO Steady	Removes camera shake or other unsteadiness			●	
DVO Steady II	Removes Film weave and Splice jumps			●	
DVO Stereo Fix	Corrects colour variations and image alignment				
DVO ThreeTwo	Pulldown removal	●			●
DVO Twister	High quality standards conversion	●			
DVO Zoom	Optimized up and down scaling of film or video	●			
DVO Warp	Removes warping associated with line scanners			●	
DVO Upscale	Upscale SD to HD - Sharpen and I to P convert	●			
DVO Warp	Remove Telecine splice warps automatically			●	

All DVO tools can be bought separately and can be used with Phoenix Touch.



# Technical specifications and Features

## Projects

- Auto Backup project with full history restore
- Cache and Proxy drives assignable per project
- Multiple output formats per project
- Restoration Report generator

## Timeline

- Fast and accurate background scene detection
- Trim, add and remove edit, ripple.
- Source Mode editor
- Multiple tracks for easy versioning and comparisons
- Apply and work with dissolves during grading process
- Conforming, editing & finishing, with unlimited video and audio tracks
- High speed foreground and background rendering
- Automated cache generation and ability to specify multiple cache nodes on a per layer basis.
- Audio support. Import of WAV and MXF audio with automatic audio caching.
- Easy to do conform check against original material in virtually any format.
- Timeline thumbnails
- Specialist clip scrubbing functionality
- Specialist restoration clip and frame review options
- Adjustment segments allow for any tools to be applied locally or globally
- Apply effects and tools to entire image, or use mattes, shapes, keys to apply processing to isolated areas of the material.
- Manual & automatic tracking (Shape and deformation)
- Manual and automatic keyframing
- Track naming - Including Auto Track naming
- Sophisticated conform ability with EDL processing  
Import AVID. Locators from EDL and AAF
- Coloured, annotated markers on clip and timeline - can be exported to spreadsheet or EDL.
- Save complex Notes for re-use in other compositions and projects
- Recall or Append notes on a per layer basis including keyframes]
- Conform XML and AAF

## External Colour Panels

- Precision Panel - Designed for Nucoda
- Tangent Element Panel - Full user mapping
- Tangent Arc panel - Full user mapping

## Video Monitoring

- Support for Kona 3G, Kona 4 and BMD Decklink
- VTR capture/ layback (Kona 3G and Kona 4 only)
- RS-422 Control
- Support for embedded audio ingest and layoff
- Source order layoff
- SMPTE and Full Range
- Preview BVB, BBB.
- 4:4:4: Ingest & Layback
- Remote control of Nucoda timeline

## Format support

- PAL and NTSC
- 1080p, 720p - Interlaced and PSf
- UHDTV 3840x2160p
- 4K 4096x2160p 23.98, 24
- DCI 2K and 4K
- 23.98 ,24, 25, 29.97, 30, 50p, 59.94p and 60p
- 10 Bit RGB444 and 10 bit YUV422
- 12 Bit 444 Support for HDR and Dolby Vision
- HDMI

## File support

- 8 / 10 /12 /16 bit DPX file
- B & W Single channel DPX support
- OpenEXR
- OpenEXR Compressed formats (OpenEXR 2.2)
- ACES EXR
- Audio Retime on export
- BWA V File export 16/24 Bit / Poly, Stereo and Mono
- YUV colour space export
- CIN
- TIF
- SGI
- TGA
- JPG
- PIC
- EXR
- J2K
- H.264
- PNG (import only)
- Canon EOS MXF
- Canon 5D/ 7D /C300
- AVC Intra 100
- DVCPRO
- Panasonic P2
- Sony SR Master (SSTP MPEG-4) F65 MXF
- OP-Atom - DNxHD, DNxHR

- OP1A - AVCi-100 and XDCam 50
- Import AAF - Including audio tracks.
- EDL and XML
- Avid Interplay Support
- Uncompressed MXF
- RGB 4:4:4:Uncompressed MXF
- DNxHR all formats
- XDCAM HD
- DVCAM
- Arri RAW - Alexa Mini, Large Format
- RED RAW - Monstro and IPP2 support
- Panasonic RAW (DNG) VLog
- Sony RAW F55 and F65
- Phantom Camera
- Sony F5, F55, F65 RAW
- Sony Venice RAW

## Colour Tools

### Base Layer and Master

- Channel Mixer
- Saturation
- SOP (Slope Offset Power - CDL Data Export)
- Printer Lights
- RGBM Levels (including Auto level)
- Lift Gamma Gain
- Balance
- Colour Curves
- Brightness Contrast
- RGBM Curves
- Brightness Regions
- Soft Clip
- Kelvin Tint
- HueCurves
- HLS Correction - Hue - Sat and SatSat
- Blur

## Master Layer

- Pan & Scan

## Image effects Including Isolation Tools

- 3:2 Pulldown
- Auto 3:2 with broken cadence detect/remove
- Blur
- Channel Extract (RGB)
- Channel Align
- Convert
- Fade Colour
- Field Dominance Correction
- Field remove and Field swap
- Invert
- Keyer (HLS / Luma / RGB / IKeyer)
- Paint

- Re-Flicker
- Reinterlace
- Retime
- Composite tools
  - *Blend - Incl. Blending Modes*
  - *Channel Combiner*
  - *Over*
- Transition
  - *Dissolve and OFX*
- Generators
  - *Source generator*
- *Test Pattern*

## Colour and effects Layers Isolation tools

- External Matte Support
- Matte Paint
- Matte Difference
- Shapes (Circle, Square, Bezier, Auto Bezier)
- Softness in/out and variable shape softness)
- Auto tracking with shape deformation
- Point tracking
- HLS / HSV / RGB and IKeyer

## Transform Tools

- Pan & Scan
- Blanking
- Rotation
- Warp 9 - Nine point warper
- Warp 4 - Four point warper
- User Definable Mesh Warper
- Lens Distort / undistort

## Stereo Tools - DVO Stereo Fix

- Anaglyph & Checkerboard comparison modes  
User
- Dedicated L&R tracks
- Mono tracks
- Advance grade merging functionality
- Track grouped grading
- Floating window support
- P & S - Interocular adjustment incl Rotation
- DVO Stereo Fix Auto Colour & align Tool with localised colour matching and auto deformation

## Specialist Comparison Modes

- Diff Red
- Diff
- Diff multiply
- Mono Checkerboard
- Split screen

- Dual screen
- Blend
- Anaglyph
- Checkerboard
- Butterfly

### Comparison Sources

- Playheads (ABC or D)
- Notes
- Tracks
- Events View
- Source
- Revert

### List support

- AAF and XML
- Flame EDL and AAF support
- CMX 3600 EDL import
- Enhanced EDL (CDL, File path support)
- AVID ALE Export - incl Audio
- Support for standard CMX and enhanced characters for tape name export
- Export Locators as comments

### Viewer Tools

- Live Waveform and Vectorscopes with ROI
- RGB, Luma. RGB Parade
- Used definable labels and custom setup
- Histogram with ROI and pixel measurement
- User definable Grids
- User definable Frames
- User definable Metadata overlay
- User definable Masks
- R /G /B Channel isolation and view
- Matte and Alpha view
- Source/Output/Selected
- User definable HUD for frame burn-in.

### Plug-ins

- OFX Compatible
- Sapphire OFX
- Beauty Box OFX
- ReVision FX

### Colour Management

- ACES (SMPTE 2065) - V1.1
- ACES Standard Input and Output Transforms
- ACES LMT
- Colour Convert Tool - Colour Space, Illuminant, Curve Includes Chromatic

Adaptation setting

- CMS Layer FX
- LUT I/O Support for .cube and .cms
- 1D & 3D LUT Support
- Creation of Inverted LUT's

### DVO Collections - Option

- DVO Classic
- DVO Restore
- DVO Enhance
- DVO Convert
- DVO Video
- DVO Camera
- All DVO Tools can also be bought as standalone options

### Installation and Training

At Digital Vision we aim to provide the best in training materials from dedicated product training classes to the latest 'tips and tricks' videos. If you have any specific training requirements please contact us directly at [training@digitalvision.se](mailto:training@digitalvision.se)

### Support

We understand the need for comprehensive product support and the importance of adding value to its products by offering first-class technical support services service team from Digital Vision World or our certified resellers provide the necessary worldwide support services to minimize downtime and increase productivity.

We are committed to resolve any product problem as quickly, efficiently and effectively as possible. Through these services, we share our expertise to help you better manage your enterprise.

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If you are a Phoenix user we recommend that you sign up to the Digital Vision Google Group

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