

Unbeatable quality at very high speed.



HARLEQUIN® host renderers SDK™

v13

New in version 13:

- Automatic tiling to maximize throughput, minimize memory requirements
- Extended support for larger DFEs with RIPs on multiple servers
- Direct printing of PNG files, as well as PDF, PostScript®, EPS, DCS, TIFF™, JPEG etc



GLOBAL GRAPHICS®
software



THE QUEEN'S AWARDS
FOR ENTERPRISE
INNOVATION
2005

INCLUDING
PDF 2.0 support

HARLEQUIN® host renderers SDK™



The Harlequin Host Renderer is a Raster Image Processor, or RIP. A RIP is a tool for converting a page description language such as PostScript or PDF into a format that a printing device such as an inkjet printhead, toner marking engine or laser platesetter can understand. The format that it outputs may be a raster file format such as TIFF, or it may be a stream of raster data that is delivered more or less directly to the printing device. The exact format delivered may be tuned for each integration.

Accurate and reliable across a range of applications

Harlequin Host Renderer is perfect for a wide range of print sectors, from complex coding and marking, through transactional, transpromo and direct mail, to general commercial print, publication, and books, to labels and packaging, to industrial and functional print (for example décor, textiles, ceramics, printed electronics and product decoration). It includes native interpretation of PostScript, EPS, DCS, XPS, JPEG, PNG, BMP and TIFF as well as PDF, PDF/X and PDF/VT, so whatever workflows your target

market uses, it gives accurate and predictable image output time after time. Harlequin's faithful implementation of PDF rendering means that it handles files from a wide range of creation workflows effortlessly, including Adobe® Creative Cloud® (Illustrator®, InDesign®, Photoshop®), Adobe Acrobat® DC, Esko and HYBRID Software's PACKZ.

Harlequin Host Renderer is designed to be integrated by prepress and digital print OEMs into their prepress workflows or Digital Front Ends (DFEs).

WHY HARLEQUIN?

Your DFE will cost you less

- The fastest RIP engine available, Harlequin requires less hardware
- It's available on Linux, as well as Windows, so you can reduce licensing costs
- There are no excessive RAM requirements and no need for any special hardware

Quick to market

- The simple API makes it easy to integrate. Your new solution can be up and running within weeks

Consistent, high-quality output

- The Harlequin Host Renderer produces high-quality output time after time. It renders a wide variety of files correctly, including native PDF, PostScript®, EPS, DCS, TIFF™, JPEG, PNG, BMP, PDF/X, PDF/VT, all through one rendering engine for greater control and consistency

Ideal for packaging and label presses

- Special features including exporting technical and structural contours, support for PDF Processing Steps (ISO 19593-1), overriding overprint for white and varnish, brand color matching, and screening options for flexo, offset and digital production

It's scalable

- With lots of configurations possible you can drive any number of digital presses

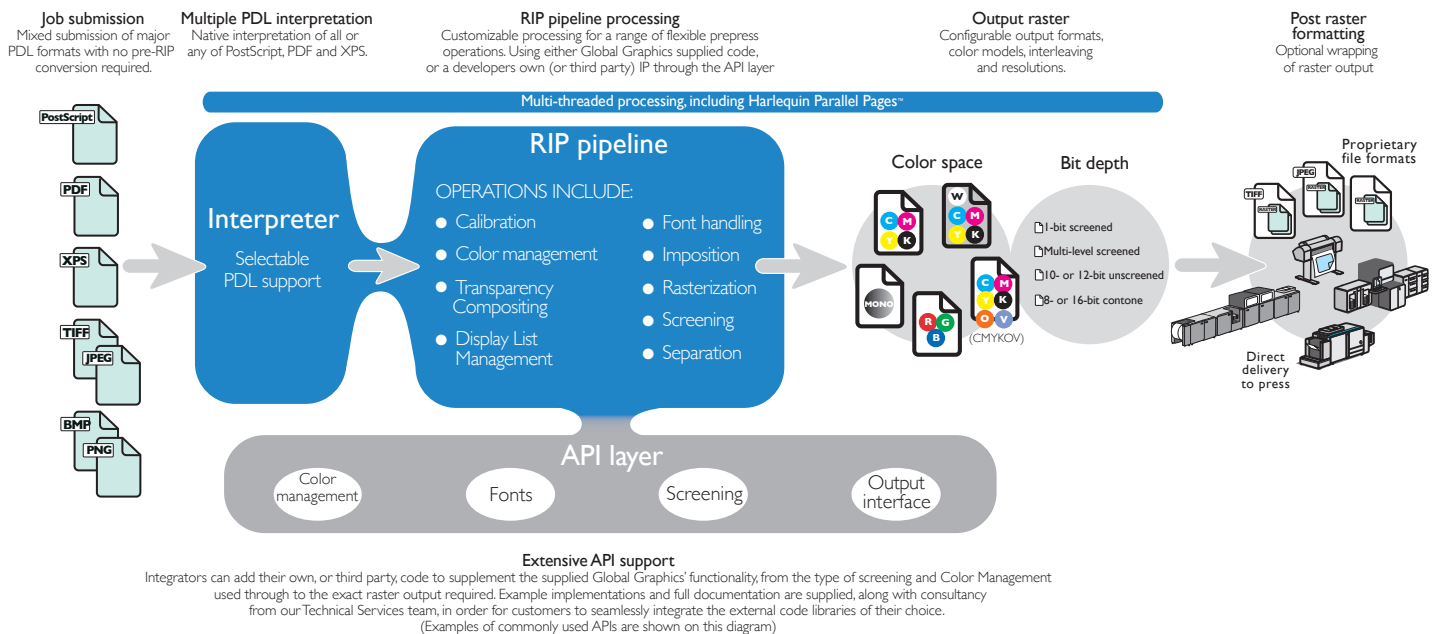
Much more than just a renderer

- Powerful production options are available to enhance your output quality such as Harlequin ColorPro™ color management, contour export screening options and font emulation

Proven

- Harlequin was first used in a production system in 1988. Successive generations later it is now at the heart of digital presses from HP Indigo, HP PageWide, Roland, Durst, Canon and Memjet to name but a few.

A HIGHLY CONFIGURABLE CORE



PDF 2.0 SUPPORT

Harlequin Host Renderer 13 supports all the features of **the new PDF 2.0 standard** (ISO 32000-2:2017) that are relevant for print production, these include: AES-256 encryption, Unicode passwords for encryption, Output intents, Black point compensation controls, Halftone origin.



WHAT'S NEW AT A GLANCE?

- Automatic tiling to maximize throughput by splitting large single pages across multiple RIPs, and to minimize memory requirements because each tile requires less RAM.
- Extended support for larger DFEs, with a complete scale from a single RIP instance, through multiple RIPs on the same server to multiple RIPs on each of multiple servers
- Direct printing of PNG files, an important file type in some sectors of wide format and product decoration in particular. Harlequin also supports direct consumption of PDF, PostScript, EPS, DCS, TIFF, JPEG etc
- Enhanced controls over sizing of output from image file formats such as TIFF, JPEG and PNG.
- Advanced Inkjet Screens has been extended with Opal; especially good at mitigating artifacts when inkjet printing on absorbent substrates at higher resolutions.

For more background on PDF 2.0 for print production, please see www.globalgraphics.com/pdf-2-0-white-paper

FROM CODING AND MARKING, THROUGH TRANSACTIONAL,...

COLOR

Harlequin was one of the first RIPs to include color management, over 20 years ago. Its color capabilities have been continuously developed ever since, responding to the needs of real-world print production.

Harlequin can render to any output color space including combinations of extended gamut colorants (e.g. CMYKOGV), photo-ink (e.g. CcMmYKk), non-standard process sets for industrial print, spot colorants etc.

Brand colors can be rendered as-is, or emulated using the available colorants, using look-up tables or more complex OEM-supplied algorithms, giving correct results even when used with live transparency.

ICC profiles

Harlequin ColorPro™, Harlequin's built-in color management, uses ICC profiles. It supports ICC v4 as well as v2, including DeviceLink profiles. Multiple profiles may be chained for emulation, ink limiting etc, as well as to characterize the output device. This enables separation of responsibility for avoiding over-inking from profiling new substrates.

Alternate color management modules (CMMs) may be added by integrators to address unique requirements.

Color management may be configured separately for different object types (e.g. images, text, etc).

Harlequin can be configured to act on output intents in PDF/X and PDF/VT, and on document and **page-level output intents in PDF 2.0** files to enable upstream control of some aspects of color management.

Black Point Compensation (BPC) may be applied for all input file types. It can be configured either at the job level or using new **object-level control for BPC in PDF 2.0**.

For more detail on Harlequin ColorPro, see:
ColorPro: www.globalgraphics.com/harlequin-colorpro
Color management for digital presses:
www.globalgraphics.com/color-management-white-paper

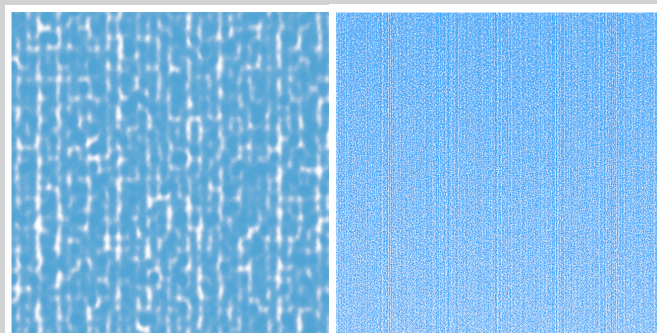
SCREENING

Almost every printing technology requires that the data delivered to the print engine uses a reduced number of tone values per colorant, from two (marked or unmarked) for offset litho or flexo, to a handful for an inkjet press with grayscale heads, multiple print bars or scanning output. The process of reducing the number of tone values is called screening, or halftoning.

Harlequin can halftone screen rasters, delivering any number of colorant levels between 1 and 15, packed into 1, 2 or 4-bit output. Alternatively, rasters can be delivered as 8 or 16-bit contone (un-screened) data.

Advanced Inkjet Screens

Global Graphics' Advanced Inkjet Screens (AIS) are specifically designed to mitigate common artifacts, such as streaking and mottling. The screens increase the perceived quality, and therefore saleability, of inkjet prints, and can enable the use of lower cost substrates. AIS in Harlequin I3 is extended by adding Opal screens to mitigate artifacts in inkjet prints, especially on absorbent substrates at higher resolutions.



Advanced Inkjet Screens are specifically designed to mitigate common challenges in inkjet prints, such as this streaking.

Harlequin also supports stochastic (FM), conventional (AM) and hybrid halftone designs, and there are multiple ways for an integrator to add their own proprietary halftones, including multi-level screens.

...TRANSPROMO AND DIRECT MAIL TO COMMERCIAL PRINT,...

Harlequin can be configured to apply different screening to different object types (e.g. text and images). In workflows where the precise screening for each individual object must be configured upstream Harlequin will also honor screening requests within the incoming job file.

| See more at www.globalgraphics.com/harlequin-screening

QUALITY

Maximizing the quality that a printing workflow can deliver is a very important area for the Harlequin team.

All color values are processed internally in 16-bit precision or floating point, until either halftoned or quantized to 8-bit contone output, yielding smooth color transitions and blends. Contone output can be anti-aliased to visually smooth sharp edges in the page design when rendering at relatively low resolutions.

Harlequin has rendered live PDF transparency in print production since 2002. This includes handling spot colors that are to be emulated in other colorants to match prints from a press using real spot inks, even when they are involved in transparency.

Increased scalability

The Harlequin Scalable RIP framework gives OEM partners access to a complete scale from a single RIP, through multiple RIPs on a single server, up to multiple RIPs across multiple servers. All job management, job splitting, load balancing and collation of output rasters is handled within the Scalable RIP, which means that OEMs can bring high-quality, highly robust solutions to market faster, and without significantly expanding their own development teams for their initial integration.

SUPPORT FOR ISO 1593, PDF PROCESSING STEPS

Harlequin can be configured to ignore technical separations such as die and fold lines, dimensions etc (or to render them

SPEED

Speed is a key focus of Harlequin development, because a faster RIP enables presses with very high data rates to be driven at engine speed and reduces the bill of materials for a digital front end (DFE) or controller.

Amongst other techniques, speed is achieved through:

- multiple threads for parallelizable processes such as transparency compositing and rendering, processing multiple bands at the same time on different cores;
- interpreting one page while the previous page is still being rendered;
- highly optimized code, avoiding large amounts of unnecessary processing;
- flexibility in memory management, e.g. to avoid the need for a data copy post-RIP;
- 64-bit processing, gaining access to a larger addressable memory space and more efficient data transfers;
- highly efficient interfaces for RIP configuration, control and tracking.

| See more at www.globalgraphics.com/scalable-performance-white-paper

on their own). But that requires that the PDF be examined and the RIP configured specifically for the spot names used in that job. Even just in English that might be 'dieline', 'Cut', or 'CutContour' etc.

We've added support for ISO 1593-1, which provides a standard way to identify technical content. From Harlequin 12.1 you can say "just give me the page content with no processing steps", or "just give me structural processing steps and nothing else", without needing to know what name the creator used for each item.

This will be especially useful for labels, packaging, wide format and some industrial print sectors.

...PUBLICATION AND BOOKS, TO LABELS AND PACKAGING,...

VARIABLE DATA PRINTING (VDP)

One situation where processing speed is especially important is when variable data print jobs are processed. If every page is different, then every page must be processed individually, and at engine speed.

The Harlequin VariData™ (HVD) feature intelligently identifies graphics that are used multiple times. It is not limited to only selecting Forms or Images in PDF files, and will amend the order of graphics on the page to maximize efficiency if it can do so without affecting the visual appearance of the page.

Both increase its effectiveness, especially with variable data jobs that have not been constructed by an expert.

HVD may be configured to deliver partial page raster caches for post-RIP re-composition or all processing can be performed completely within Harlequin.

Compliant with the ISO PDF/VT specification

Harlequin was first used in a PDF/VT compliant solution in 2010 and our CTO has been the primary UK expert on the ISO committees that maintain the PDF, PDF/X and PDF/VT standards and is project editor for the forthcoming PDF/VT-3

Harlequin is fully compatible with PDF/VT (ISO 16612-2:2010), making use of the 'hints' in that standard to increase processing speed.

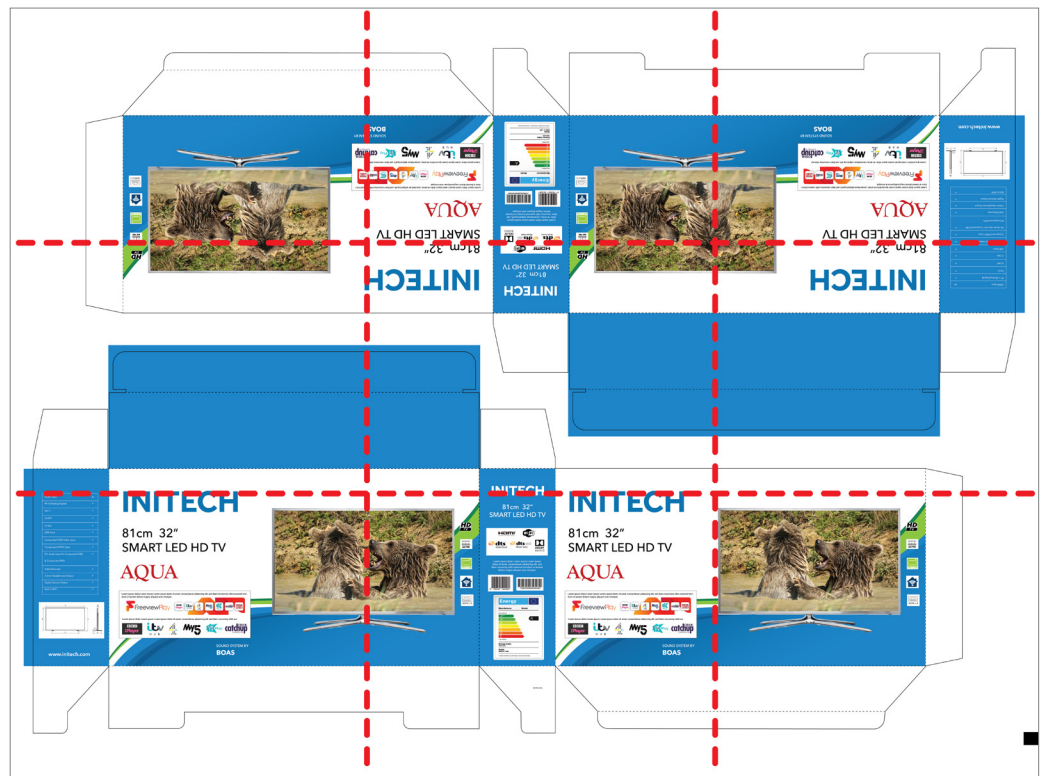
AUTOMATIC TILING

Harlequin v13 adds automatic tiling of large pages, enabling the RIP to handle huge output without requiring huge amounts of RAM, and to maximize throughput for very large output. It is valuable in a variety of ways, most obviously in décor, textiles and corrugated packaging, but also in other sectors where larger PDF pages can increase efficiency, by:

- Splitting very large single pages across multiple RIPs for speed and improved load balancing
- Minimizing RAM requirements (and therefore costs) for a DFE processing very large pages
- Continuous streaming of rasters from huge pages to the printer without waiting for the whole page first
- Processing very large pages where post-RIP components cannot handle rasters above a certain size

The automatic tiling can be used for jobs submitted as PDF and in image formats such as TIFF and JPEG.

Corrugated cartons imposed onto a 72x98" (1.8x2.5m) sheet. Rendered to uncompressed 8-bit contone in CMYK at 1200dpi the raster for this would be over 40GB. Splitting into tiles allows processing to be done in parallel for higher throughput and minimizes peak memory usage for each tile.



...TO INDUSTRIAL AND FUNCTIONAL PRINT.

WORKFLOW

Harlequin has been carefully designed to fit into complete workflows for prepress and digital print.

When a job is supplied without all of the required fonts, Harlequin can be configured to emulate missing fonts, to substitute them with other fonts, or to terminate the job to avoid unacceptable output.

When a spot separation in a job file is used as a brand color it can be emulated with other colorants. Technical spots such as die lines can be completely ignored (avoiding accidental knockout of live graphics), or can be exported in vector format, e.g. to drive a cutter.

Where the output rasters will be further processed post-RIP, Harlequin can be configured to provide additional metadata about the object type from which every pixel was sourced in the incoming job, and about the graphics state at the time.

COMPLEMENTARY PRODUCTS

Global Graphics has developed other technology components that can be used in print production workflows alongside Harlequin. All of these are fully compatible with Harlequin and are used in multiple systems in active production alongside it.

Mako™ is a library for building tools to analyze, edit, convert and visualize page description languages (PDLs) in a DFE or for upstream pre-processing.

| See more at www.globalgraphics.com/mako

ScreenPro™ is a stand-alone screening engine including PrintFlat™ technology for late-stage calibration and correction of uniformity across print bars.

| See more at www.globalgraphics.com/screenpro

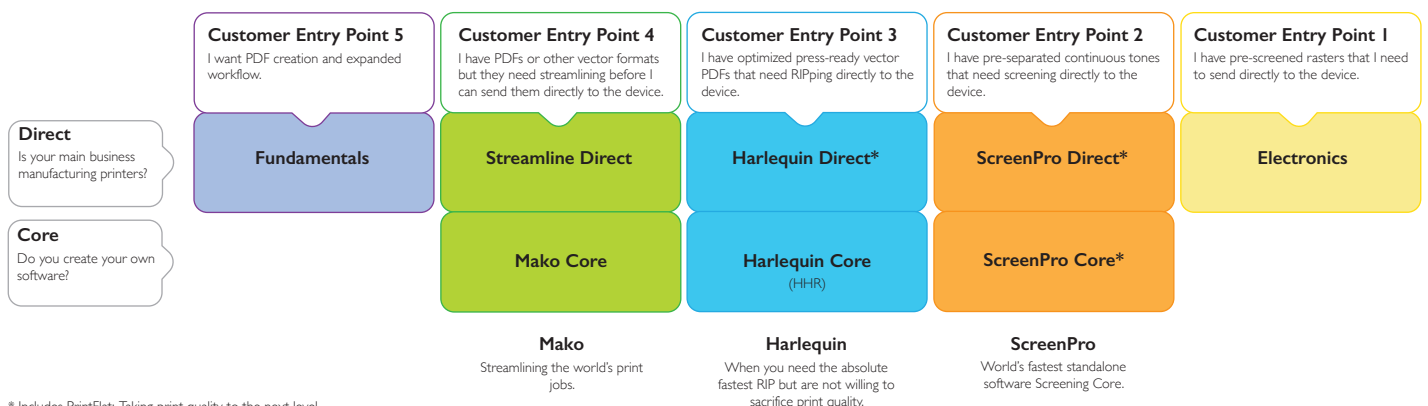
Meteor Inkjet is a leading independent supplier of industrial inkjet print head driving solutions, including interface boards for all of the major printhead brands.

| See more at: www.meteorinkjet.com

Global Graphics can supply these components individually, or pre-packaged with a parallel processing pipeline as ScreenPro Direct™ and Harlequin Direct™ to enable OEMs to achieve the fastest possible time to market and to revenue while building a highly sophisticated and high quality DFE for a high-speed digital press.

| See more at www.globalgraphics.com/direct

Direct unlocks the potential of your digital printer, breaking through all the software barriers for the next generation of faster, wider, higher resolution devices.



FEATURES

Native interpretation of:

- PDF (including ISO 32000-1 and ISO 32000-2 PDF 2.0)
- Processing & validation of PDF/X-1a; PDF/X-3; PDF/X-4 & 4p; PDF/X-5g & 5pg
- Processing & validation of PDF/VT-1 & PDF/VT-2
- PostScript (including EPS & DCS)
- TIFF
- JPEG
- PNG
- BMP

Extensive configuration capabilities, accessible from all PDLs

- Effectively unlimited resolution, including unequal fast and slow scan
- Inkjet-specific, supercell, stochastic (FM) and hybrid screens available, including multi-level and seamless
- In-RIP imposition
- Extensive font substitution and emulation capabilities
- Internal and external modes to Harlequin VariData for optimal VDP performance
- Thread count usage control
- C API for interfacing between layers and core
- Export of technical separations
- Harlequin Scalable RIP to minimize integration work for very high-speed presses

Color

- Mono, CMYK & spot, RGB, RGBK, sRGB, CMY, K & spot output, support for N-color extended gamut (e.g. CMYKOG, CMYKOGV), photoink (e.g. CcMmYKk)
- Raster depths output: 1, 2, 4, 8, 10, 12 or 16 bits
- Planar, separated, frame interleaved, band interleaved, or pixel interleaved output
- Internal color management support, (ICC 4.0) and or OEM defined via CMM API
- Output of object map data to inform downstream color management or screening processes, etc
- Multiple calibration curve options
- Output of mask data, e.g. to enable post-RIP aggregation of rasters for variable data print
- Spots can include white, varnish, etc; separations can be explicitly or automatically omitted.

Cross-platform support through an OS abstraction framework

- Currently supported on 32- and 64-bit Microsoft Windows, 64-bit Linux and Mac OS. Ask if you have requirements for other operating systems.

WORK WITH THE EXPERTS!

Global Graphics Software develops innovative core technology for digital print. Through our various technologies for rendering, screening, and color management, we add value to solutions marketed by the world's leading brands, including HP, Canon, Roland, Durst, Delphax and Kodak. Global Graphics Software is a subsidiary of Global Graphics PLC listed on Euronext (GLOG).

OUR CUSTOMERS CHOOSE US BECAUSE:

- Our software is **technically superior** and **performs faster** than our competitors
- We are **software innovators**
- We have a **flexible and open** commercial model
- We are easy to work with because we have a **partnership approach** to development
- We offer **superb technical support**

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