



HP Indigo compliance with Industry 4.0

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Industry 4.0 is the current trend of automation and data exchange in **manufacturing** technologies. It includes cyber-physical systems, the Internet of things and cloud computing. **Industry 4.0** creates what has been called a “**smart factory**”.

Industry 4.0 compliance means that the production floor is utilizing the following characteristics:

- Connectivity
- Automation
- IoT (Internet of Things)
- Big Data
- System Integration
- Cloud computing

This document highlights how the HP Indigo offering enables customers to create a smart factory which is Industry 4.0 compliant.



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1. Connectivity

On-premise Bi-directional JDF/JMF Interface

One of the initial requirements of Industry 4.0 is to have bi-directional communication between the manufacturing device and the management systems. The HP Indigo Production Pro DFE comes with a built in JDF/JMF interface accompanied with an SDK so you can develop an integration between the management system and the HP Indigo Press.

JDF is an international standard maintained by the CIP4 organization and covers most print shop activities in pre-press, press and post-press. HP Indigo's JDF SDK focuses on the integrated digital printing portion of the print shop environment, specifically around the HP Indigo presses and the HP Production Pro digital front end (DFE).

The JDF SDK for the HP Production Pro contains documentation, samples and useful tools for helping with development of a JDF workflow within the print shop environment. Since JDF is an international standard maintained by the CIP4 organization, HP Inc. does not provide libraries for generating JDF/JMF, nor information on the overall JDF specification. Please visit the CIP4 Confluence website for development code samples, additional useful tools and the JDF specifications.

You can download the SDK from the HP developer's portal [here](#). Note that you will need to login to the site or register if you do not have credentials to the portal.

The JDF SDK is specific to HP's JDF implementation and contains the following information:

Documentation

- JDF SDK Overview - A brief overview of JDF and the contents of the SDK
- Developer's Guide - Descriptions of JDF, common Use Cases and Troubleshooting
- Implementation Specification - In-depth specification of HP's JDF capabilities.
- Detailed Documentation - Documents detailing common use cases.

Samples

- JDF Tickets for setting individual features
- MIME packages for setting individual features
- JMF queries and sample responses

Tools

- MIME Util - a simple JAVA application for creating MIME packages
- Send JMF - A simple script for sending JMF messages and capturing the response

The list below defines some of the capabilities of the JDF interface:

- **JDF (Job Definition Format)** - Submit electronic job tickets to automate job settings including:
 - Print Quantity
 - Ticket Template selection (through an Internet Input Method)
 - Color Management (select an Esko Color Strategy and define input colorants)
 - Select Step and Repeat Templates
 - Select a media for printing

- Create basic batches by defining multiple "documents" and individual quantities for those documents
- **JMF** (Job Messaging Format) - Query the DFE and attached Press(es) for current information including:
 - A list of active Jobs and their current statuses
 - Current state of the press(es)
 - Automatically submit, cancel and delete jobs
 - Query resources on the DFE (Step and Repeat templates, Color Strategies, Ticket Templates etc.) and Press (Media, Inks etc.)
- **JDF AuditPool** (historical job information) - Capture production information about the job including:
 - Start and Stop times for the various phases of a job (Download, RIP, Routing, Printing)
 - Printed length of media
 - Number of frames printed
 - Number of impressions per ink
 - Number of spreads per number of impressions

PrintOS Cloud Interfaces

In addition to its many applications that are accessible online, PrintOS also provides a number of interfaces (APIs) that enable accessing Job and Press data programmatically.

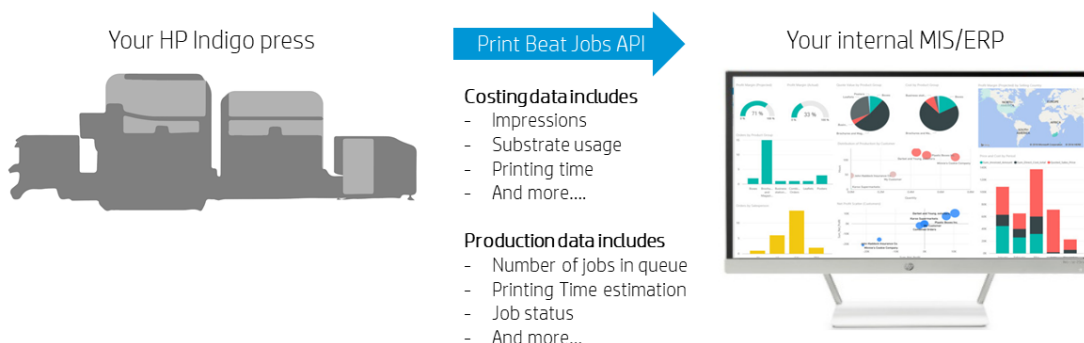
Jobs API

The PrintOS Jobs application has a RESTful API which provides an authenticated method for securely querying information about jobs from any of your PrintOS Connected devices.



What data is available with Print Beat Jobs API?

Dozens of per-job properties are available for you.



The list below shows some of the most common API calls used to collect data over the Jobs API:

- Update an MIS application with Production Information
- Retrieve Property Specs for Certain Context
- Get all jobs on a specific Press
- List of Jobs in the Queue of a specific Press



- Find the current Work Time Estimate for a specific Press
- Tracking jobs submitted from an upstream application (MIS, Web-to-Print, etc.)
- Query the devices in your organization

For more information on Jobs API visit the HP developer's portal [here](#).

Print Beat API

The PrintOS Print Beat application has a RESTful API which provides an authenticated method for securely querying historic and near real-time information from Print Beat and it's embedded features like Color Beat, OEE etc.

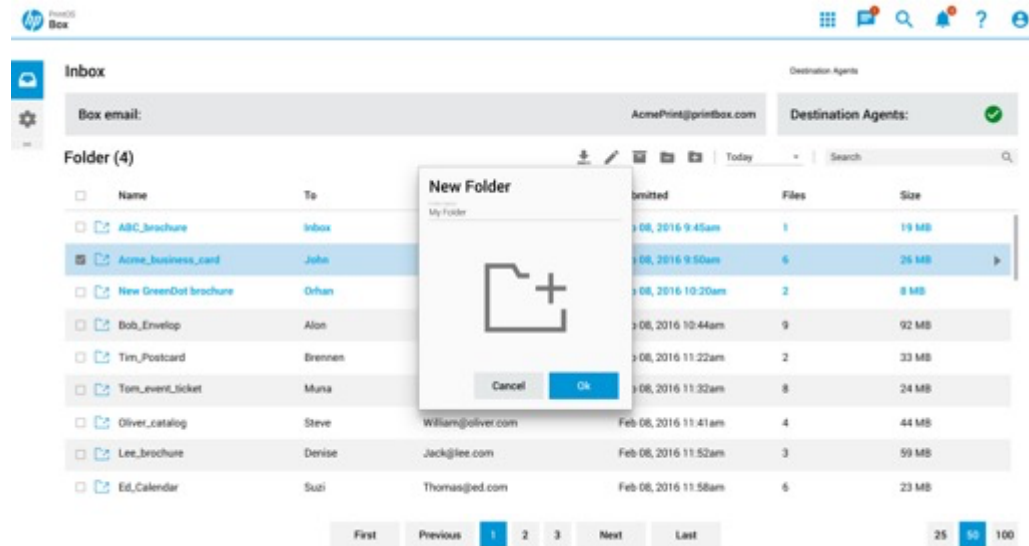
For more information on Print Beat API visit the HP Developer's portal [here](#).

2. Automation

PrintOS Box

PrintOS Box is a file exchange app optimized for print. It simplifies file receipt from clients, content validation and preparations and file routing directly to production.

It is included Free of Charge as part of the PrintOS suite of applications available to all HP Indigo customers.

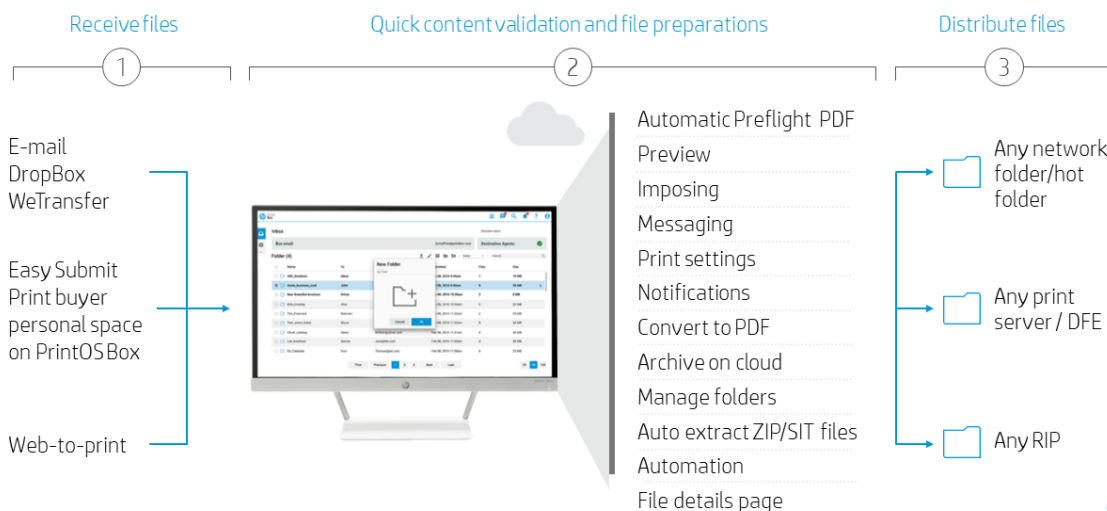


PrintOS Box helps automate production processes by:

1. Receiving files automatically (including zipped archives)
2. Validating the content (Preflight, imposition)
3. Submitting the files to the directly to the HP Indigo Press (optional)

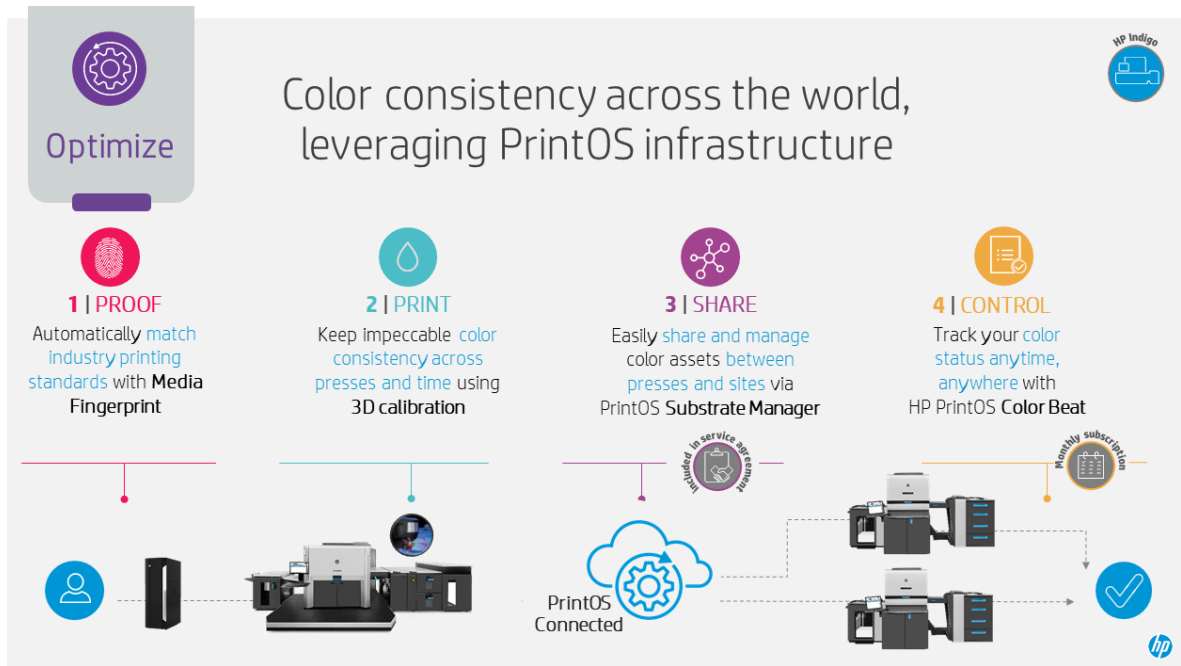


PrintOS Box – What does it do?



Automate Color

The PrintOS Infrastructure enables HP Indigo customers to automate production processes related to Color, Color Management, and Color tracking. Most of the features are included as part of PrintOS, but some premium features, like Color Beat, requires an additional subscription.



About Color Beat

Color Beat is an automated color tracking and analysis solution that replaces a 20-30 minute manual process with a 1-2 minute automatic solution.

Color Beat provides real-time color status for the press operator, with reporting capabilities for the production/site manager. Color Beat can even pause your printing if the color does not meet your standards.

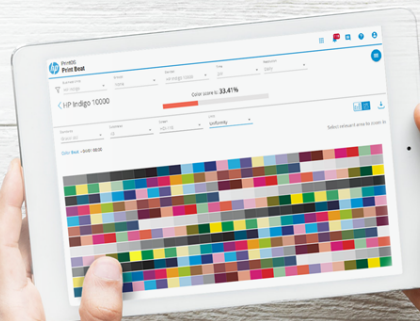
PrintOS Color Beat real-time color status and historical reports, across presses and sites

- Achieve and maintain superior color
- Eliminate manual labor and reduce reprints
- Improve productivity by up to 2.5%
- Share color performance reports with customers and Brands



"We provide color consistency to our big customers. We can say we have the highest quality and with Color Beat there is no argument about it"

DIEGO DIAZ Production Manager SmartPress





Color Beat uses the same spectrophotometer in order to monitor the Press color performance against a chosen color standard like G7, Fogra, Gracol and more. Color Beat also enables automated certification of G7, which shortened the time and reduces the cost of getting official approval that you meet this popular standard.

Color Beat data can also be accessed via API so the results can be shared with any external system, including your customers'. The Color Beat APIs are part of Print Beat APIs. You can read more about it [here](#)

Use Color Beat to:

- **Continuously drive color performance excellence:** Use real-time and tracking color status reports to take immediate action
- **Regain valuable production time:** Cut color control time to one minute!
- **Free up operator's time:** Color Beat is a fully automated solution that frees up your operator for other tasks
- **Avoid Human Errors:** No need to use manual external measurement devices
- **Increase press reliability:** Make data-driven color decisions for perfect results

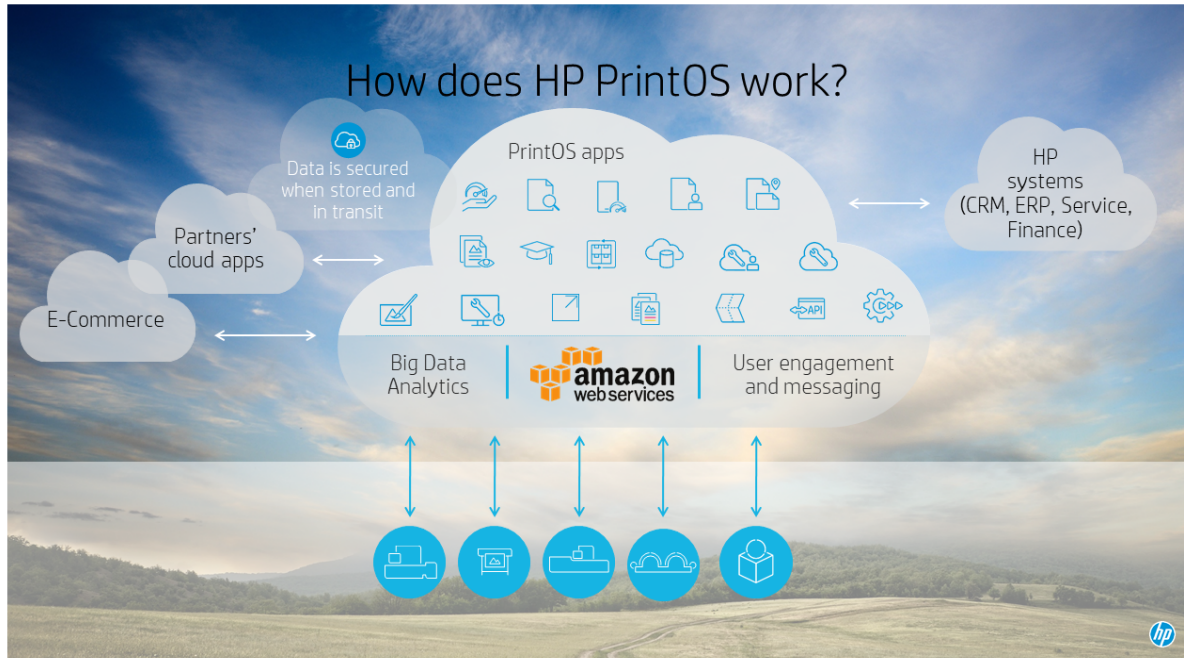
Color Beat Data is accessible either via PrintOS over the web, or on the PrintOS Mobile application available for both iPhone and Android.

Read more about Color Beat [here](#). (PrintOS credentials required)

3. IoT

PrintOS

Once installed, The HP Indigo Presses (Series 3 and above) automatically connect to PrintOS, HP's cloud-based infrastructure.



PrintOS is a **Cloud based Secure infrastructure** leveraging **big-data** and **real time analysis** to optimize press performance, increase uptime and reduce cost of service. It is a network connecting thousands of HP customers and solution providers, enabling resources and information sharing, and an effective deployment of complex e2e solutions.

PrintOS makes it easy to manage any number of jobs from submission to shipment, collaborate with partners and colleagues, and discover new opportunities for growth. Access the open, secure cloud-based platform anytime, anywhere.

PrintOS contains a variety of cloud applications to help customers:

- Simplify and Automate Production
 - *HP Site Flow* - Manage high volumes of short-run and personalized jobs end-to-end, from submission to shipment.
 - *PrintOS Box* - Manage files captured from various sources, facilitate communication with print buyers and easily submit jobs to production.
 - *Imposer* - Sophisticated yet easy-to-use imposition tool.
 - *Composer* - High-performance composition tool for HP SmartStream Designer and HP SmartStream Mosaic variable data jobs.
- Get more out of the HP Indigo Press
 - *Print Beat* - Use historical and near real-time press data for better-informed decisions and operational excellence.
 - *Media Locator* - A searchable database of certified media.
 - *Substrate Manager* - Share custom media profiles across an entire fleet of HP Indigo digital presses.

- *Resource Manager* - Central resources management of in-shop devices such as HP SmartStream Production Pro.
- *Knowledge Zone* - A searchable repository of technical, training, application, and marketing resources.
- *Service Center* - Get a single point of access to all HP service tools and processes.
- *Innovate, Collaborate, and Grow*
 - *Open API* - Simple integration with third-party products and applications.
 - *Partner Ecosystem* - Leverage pre-integrated web-to-print and content providers to innovate and grow.

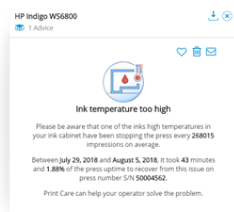
Read more about PrintOS [here](#).

PrintOS Mobile Application

The PrintOS Mobile App enables you to Track your production with real-time visibility into your essential KPI's, at your fingertips anytime anywhere.



Improve uptime through data with PrintOS mobile app



Personal Advice

Relevant, timely advice using big data



Dynamic, Data-driven Reports

with corrective actions



Knowledge Zone

On demand information, different level based on certifications

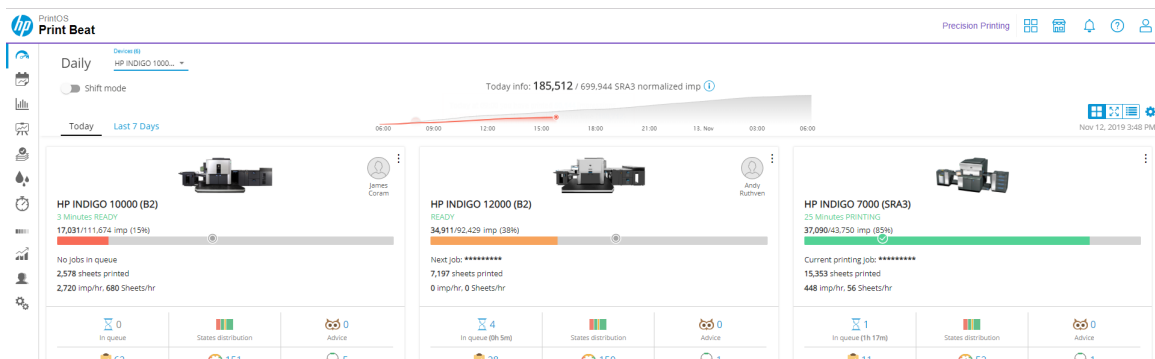
4. Big Data

Thanks to the PrintOS Cloud infrastructure described in section 3 above, data streams can be analyzed and used to provide real-time views of the Production floor, but also provide insights that can result in significant improvements of the Press utilization and the Production floor efficiency overall.

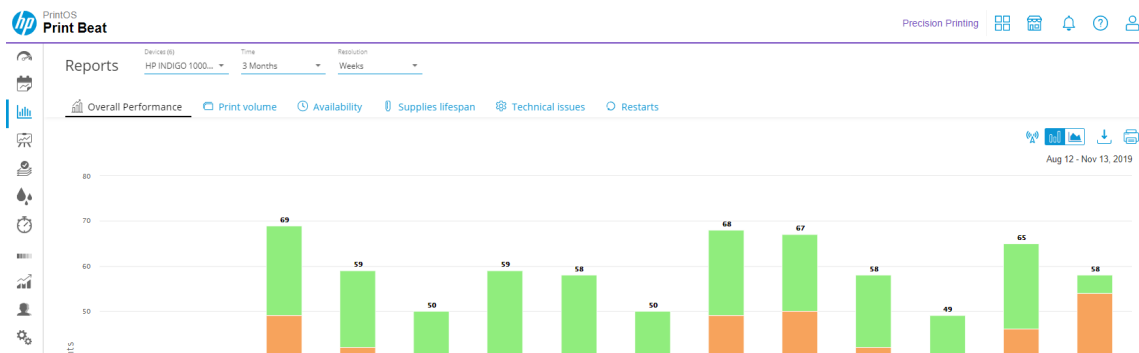
Print Beat

The Print Beat applications enabled a dashboard view via web or mobile of the HP Indigo Presses on the production floor. It:

- **Analyzes** your press' performance
- **Reveals** your main bottlenecks
- **Guides** you where to focus to improve your press utilization today and moving forward
- **Empowers** your employees

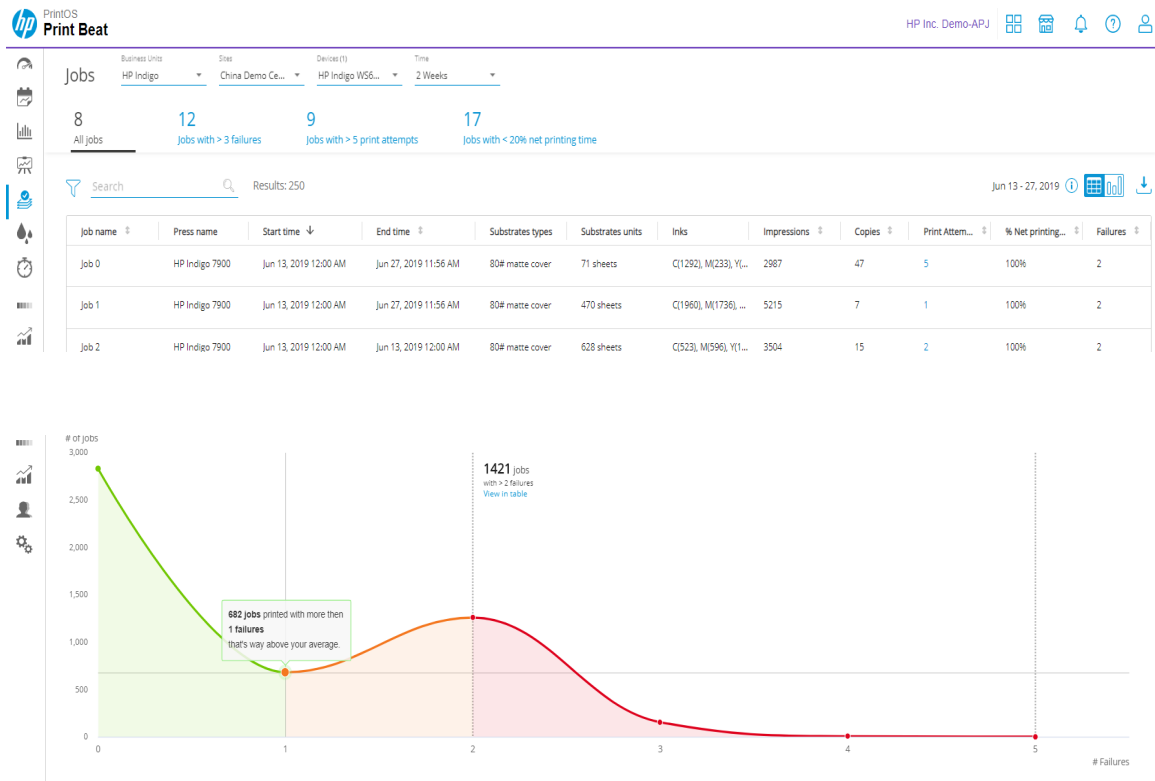


It also provides an easy and effective way to identify potential issues and drill down to their root cause.



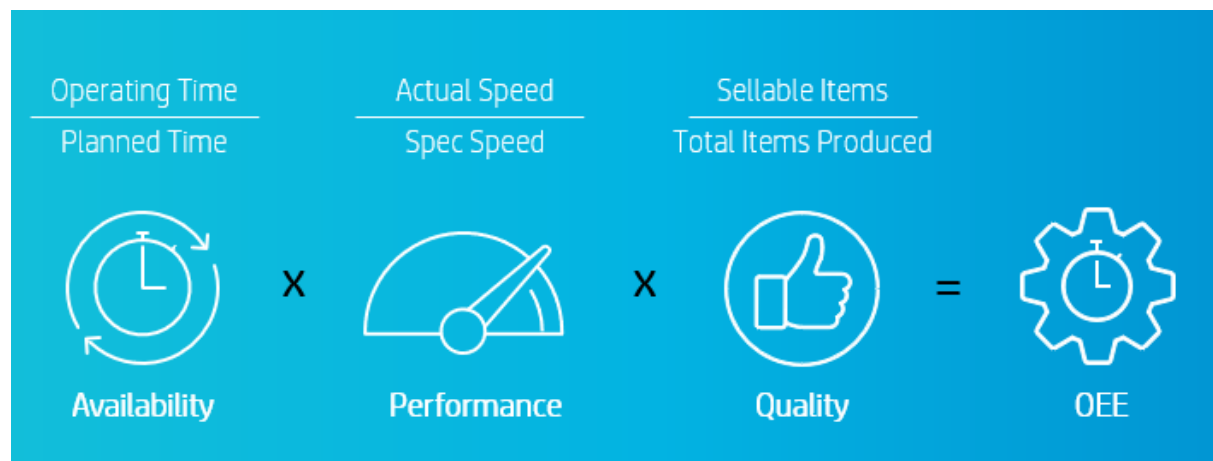
In addition to the above, Print Beat's **Jobs Report** feature reveals actual print costing and focuses on your operational opportunities based on jobs key performance indicators such as:

- Number of failures
- Number of print attempts
- Percentage of the net printing time
- Customized KPIs to improve efficiency

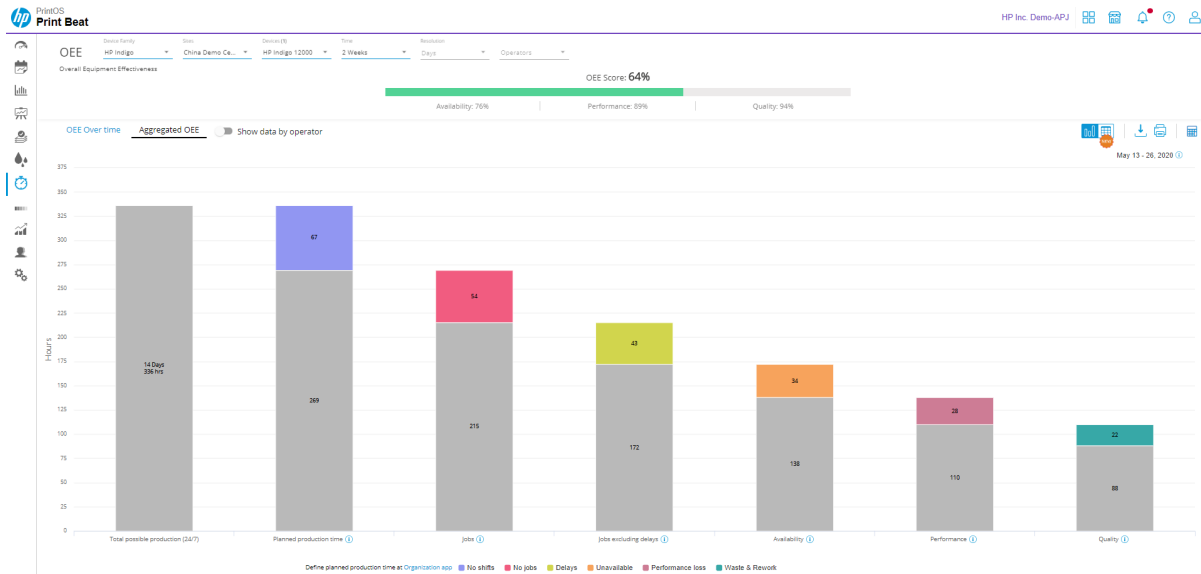


Print Beat OEE

OEE (Overall Equipment Effectiveness) is the industry gold standard method to measure manufacturing productivity.



The Print Beat OEE tool is a premium feature of Print Beat and requires a monthly subscription. It identifies which processes affect equipment effectiveness the most and which areas will have the greatest impact on improving operations.



The tool has two modes of operation:

- *Standard*, out-of-the-box mode: Offers immediate value based on press data only, no setup required
- *Advanced mode*: Provides press measurements as a combination of user input and press input

It is proven that customer that are using Print Beat OEE reduce dramatically wasted time on their Presses. Read more about the tool [here](#) (PrintOS credentials required).

OEE Data can be accessed via API so you can integrate it with your management software. The OEE API are part of the Print Beat API. You can read more about it [here](#).

5. System Integration

The PrintOS infrastructure supports open architecture that enables 3rd party vendors to integrate their products with the HP Indigo Press. There are dozens of partners already integrated with the PrintOS eco system, both upstream (web to print, MIS, etc.) and downstream (Finishing partners).



Partner integrations

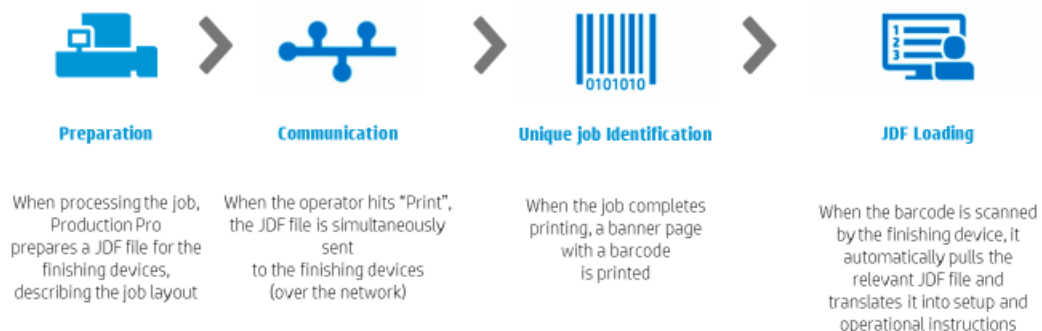
In the case you own a partner application that has an integration into PrintOS or to the HP Indigo DFE, all that is required is to configure the connection between the partner application and PrintOS, or the DFE. Note that some partners may charge a fee for enabling the integration of their application and the HP Indigo ecosystem.

Finishing Automation

Another premium feature that is available as part of PrintOS is **HP Direct-to-Finish**. It is the ultimate solution for automating your printing production flow with the bindery by enabling the Production Pro DFE to send a JDF file with finishing parameters for an automatic set up of a finishing device.





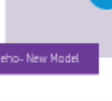

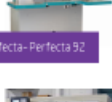
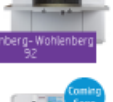
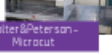
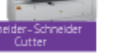
















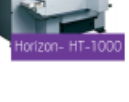

How does it work?

Minimize manual steps for an automated production



HP Direct-to-Finish enables you to replace the manual steps that takes place on the finishing station, taking advantage of the imposed data created on the Indigo DFE or upstream software. It fills the gap between prepress and finishing, leverages your current operation, reduces your extra resources and improves your e2e automated flow.

HP SmartStream Direct-to-Finish Compatible Devices

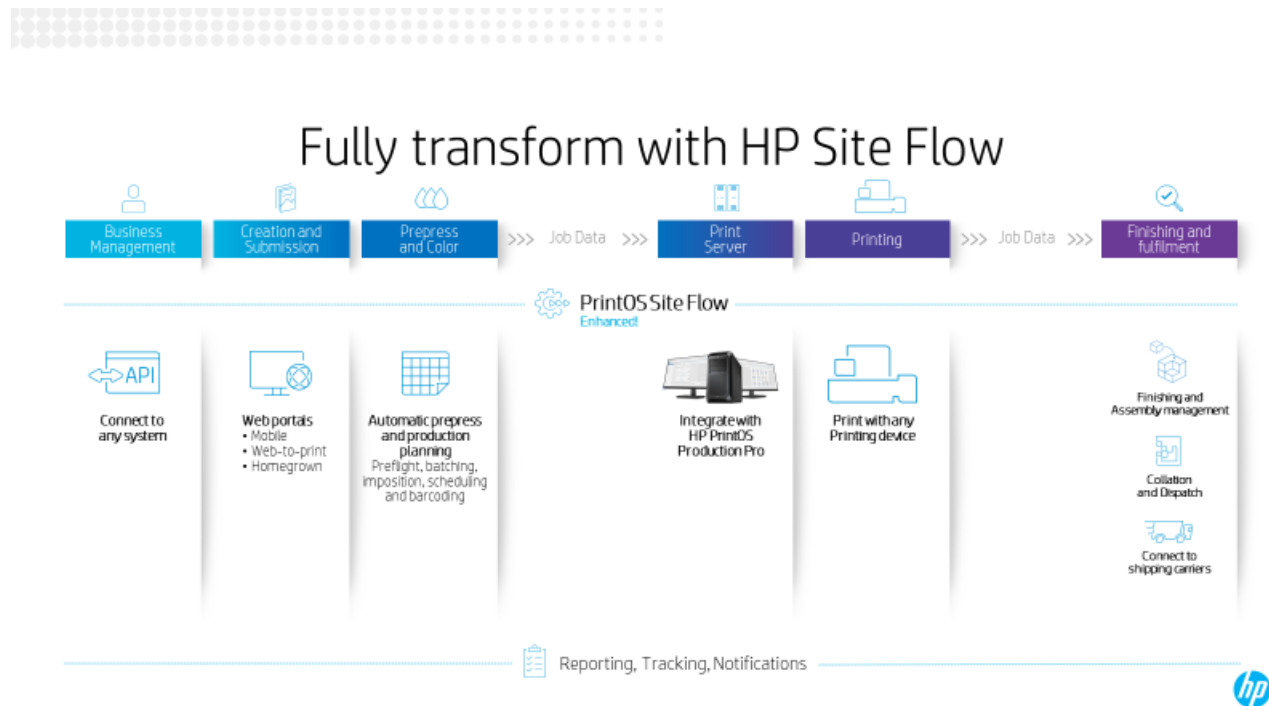
Guillotine Cutter	Cut/Slit/ Crease/Stack	Booklet Maker/ Saddle Sticher	Perfect Binder	3-Knife Trimmer
 Polar-Consult CBulvender  Polar-Polar 56  Mohr-NET models  Dahco-Cutter series  Dahco-New Model  Horizon-APC 6111  Perfecta-Perfecta 92  Wohlenberg-Wohlenberg 32  Colter&Peterson-Microcut  Schneider-Schneider Cutter 	 Horizon-SmartStacker  Horizon-SmartStacker  Duplo-DC-648  Duplo-DC-648  Tetrau-PageReady  Horizon-CP 352 crease folder 	 Horizon-Stitchliner 5500  C.P.Boung-ExPress / BM-e 	 Horizon-BQ-270  Horizon-BQ-280  Horizon-BQ-470	 Horizon-HT-30  Horizon-HT-80  Horizon-HT-1000 

HP Direct-to-Finish is an optional feature for HP Indigo commercial sheet-fed presses enabling an automatic set up for the finishing devices.

- Saves up to 25% of cutting-related handling time enabling a faster turnaround
- The validation process prevents and stops the loss of paper and costly errors
- Labor costs are decreased as there are no longer need for skilled operators
- Effectively handling high volume of multiple short run jobs
- Increase production capacity by more than 35%

E2E Production Management

For customers looking to invest in a comprehensive solution to manage their production floor, HP offers the Site Flow solution, an End-to-End Workflow and Production Automation cloud-based system



Increase profits by **growing**, **optimizing**, and **controlling** your print shop from pre-press to post press. Gain the reliability and redundancy of cloud computing.

- **Enable Double Digit Growth:** Handle hundreds to thousands of orders a day. End-to-end capabilities ideal for managing high quantities of low item counts.
- **Maximize Factory Throughput with Automated Workflows:** Optimize your production workflows to utilize more of your current investments. Help cut implementation time and reduce waste.
- **Accelerate Customer Onboarding:** Set-up accounts in hours not weeks, using APIs and SDKs. Or create a custom ordering webpage with HP Site Flow Printstore.
- **Never Miss an SLA:** Conquer any volume with fully automated, dynamic scheduling to handle variable SLAs or seasonality. Trigger reprints automatically.
- **Minimize IT Effort:** Integrate ordering, billing, shipping, and custom systems with ease. Scale without adding infrastructure or additional headcount.
- **End-to-End Visibility:** Create reports and custom dashboards. Identify bottlenecks and know how your business is delivering on customer demand.

Read more about HP Site Flow [here](#)

6. Cloud computing

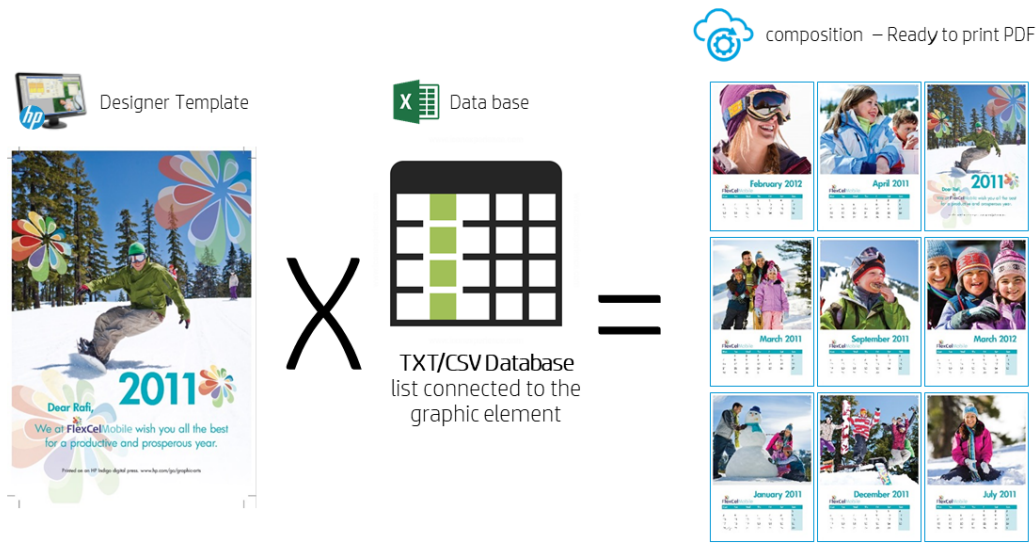
As described in section 3 above, The HP Indigo Press is connected to PrintOS, a cloud infrastructure. This enables harnessing the cloud to run computational tasks hence achieve the same results faster while freeing up on premise computer power.

PrintOS Composer

A common example that requires significant computation power is variable data composition.



Variable Data Printing (VDP) preparation – basics



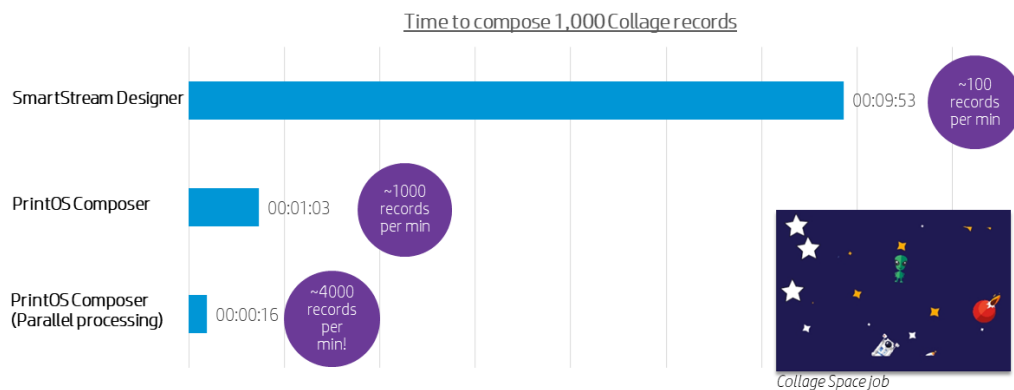
PrintOS Composer is a cloud-based application which enables you to compose (create) variable ready-to-print PDF's from SmartStream Designer templates

- Fast creation of variable ready-to-print imposed PDF
- Up to 50x faster PDF creation compared to using Mac/PC
- Compatible with any HP SmartStream created template
- Enables storing and archiving of templates and files in a single location
- Flexible packages - from hundreds to millions of records



Save time on variable jobs preparation

PrintOS Composer is up to 50x faster compared to SmartStream Designer





Like other PrintOS applications, PrintOS Composer also has APIs enabling 3rd party applications a smooth integration with its composition engine. Read more about PrintOS Composer [here](#).

If you are using Enfocus switch as your Prepress automation workflow, you can activate the Enfocus PrintOS Composer App and use this powerful composition engine flawlessly in your existing workflow. Read more about the Enfocus PrintOS Composer App [here](#).