

The state of play of



large format printing



in 2024

don't look back in anger,
see what's ahead!



• • • • • • • • **Table of contents**

We're on a road to ... somewhere	4
Blast from the past!	5
Crisis? What crisis?	5
We are very digital already, right? Right?	6
Please consider the environment	6
Do you think I'm sexy?	7
A very short history of LFP	8
PSPs in the early years	8
Technology in Digital Printing	9
Paper, film, boards	9
Textile printing	9
Back to the future	10
When the work just flows	11
Process Control	11
Robots in the print room	12
AI and print	13
Connected Automation to avoid Creative Disconnect	13
Creativity is a strategic asset	14
How to set up a Connected Automation workflow	14
Good reasons for a new automated workflow	14
Some less-than-ideal reasons to automate	15
How to get the most out of a Connected Automation partner in your company	15

How automation and AI co-creation will change the face of the printing industry, and why we should be excited instead of afraid.



In 2001, the German state lottery advertised right at the Oktoberfest site with a megaposter. While automation requires a bit more effort than just playing the lottery, it can alter a PSP's (Print Service Provider) fate almost just as much.

If you have been contemplating lately how today's fast advance in advanced technology will affect your printing business, and how to use it to secure its future, this read is for you.



Not a lot of time?

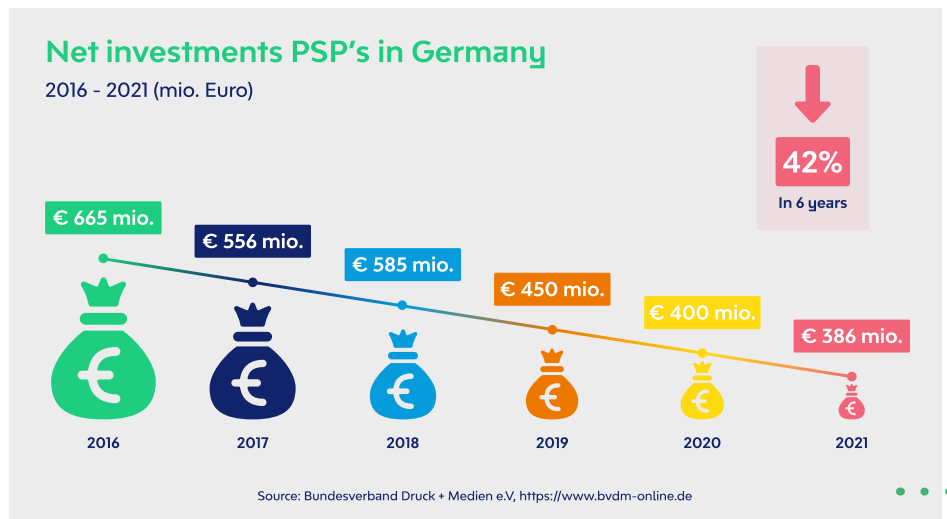
Just consider the TL;DRs as a first step.

Photo: S. Angerer

We're on a road to ... somewhere

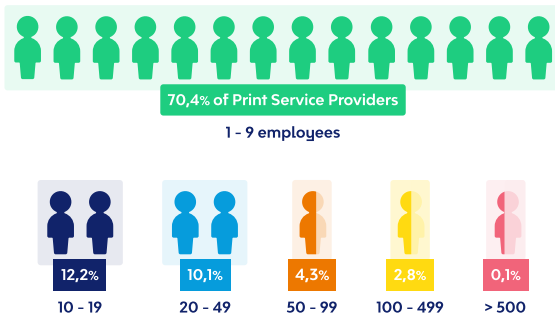
Have you caught yourself recently thinking about the "good old times" in print? Coming round after almost three pandemic years, this seems just natural. We will indeed cover a very short history of LFP in our second chapter of this e-book.

But for now, it just helps to remember, when past was present, it never really was as great as the nostalgic feeling you harbour for it now. That bully kid in your happy-go-lucky elementary school years? It might have shaped you to be the industry leader you are now, but it surely did not feel that way back then.



We are very digital already, right? Right?

Print Service Providers Number of Employees (Germany, 2022)



Source: Bundesverband Druck + Medien e.V, <https://www.bvdm-online.de>

Digitalisation is an ongoing process nobody will deny, and why would the digital printing industry do so, anyways? After all, a substantial part of their own growth story was determined by taking over print run from their analogue predecessors. The printing industry has been embracing the digital world much earlier than most other fields of business.

Having been on the forefront of digitalisation all these years might well have made PSPs feel worse for wear. Some companies therefore today are not yet ready to connect the dots from computer assisted pre-flight, digital printing and cutting to a fully integrated workflow in the print room.

A certain lack of enthusiasm for investments does not exactly make things any better. While there are considerable differences between countries, investments in the print and media industry dropped significantly in Germany between 2016 und 2021. Even considering that in Germany over 90% of all print and media businesses employ less than 50 people, this is startling news.

However, with an ever-growing online business, many industry players are beginning to warm up to the need for structured data and processes. And just when this happens, suddenly, robots and AI loom at us? Johannes*, to the rescue!

*Johannes von Gott is considered a patron saint of PSPs by the catholic church.

TL;DR

Megatrends like changing consumer habits, digitalisation, climate change and a significant shortage of skilled workers are challenging the digital printing industry. Automation and AI will help us to adapt, so it is time to embrace it.

Please consider the environment

The public has become much more environmentally conscious in the recent years. Fine-tuned automated processes can help PSPs to use resources much more efficiently and maximise their bottom-line.



Photo: S. Angerer

The digital printing industry has always taken pride in a small environmental footprint. This still holds considerable truth, because here technology, energy, chemical and substrate consumption are much lower compared to analogue printing technology, and don't even get started on printing copy or inventory!

It may therefore come as an even bigger shock for PSPs that most of the general public perceives print, regardless the technology, as irrelevant at best, and a tree-killing monstrosity at worst. Also, bear in mind that people did not come to this conclusion just in their own mind

but were helped along by orchestrated communication from the internet industry. In the last few years, major retailers and even administrations chimed in, mainly to cut their cost.

However, not every argument against print is mere greenwashing. Many wide format and sign-making applications require vinyl, other film, or textile substrates. All of these are much harder to recycle than plain paper or cardboard, and this is not even taking into account inks, glues, varnishes, and laminates. Considering that lots of signage and advertising is rather short-lived, it

is safe to admit that quite a few LFP applications are indeed less than favourable for the planet.

Regulators all over Europe have acted, clamping down on landfill and thermal disposal, demanding closed loop recycling as a part of the 2050 carbon neutral initiative. Not considering the environment suddenly became not only a moral but also a business decision, leading the way for automation to help streamline material and energy use.

TL;DR

While the digital printing industry considers itself quite environmentally friendly, the general public tends to think that there still is quite some room for improvement. Streamlined, automated workflows can help to significantly reduce energy and raw materials use.

Do you think I'm sexy?

When many of today's industry leaders started venturing in it, the printing industry stood strong, and was considered a rewarding life-long career. Today's general skilled labour shortage hit the LFP industry harder than other segments, and this might come as a bit of a shock to veterans.

There are however some very valid reasons why young talent is generally not over-enthusiastic to consider a career in print:

- the public image of the printing industry has not been too bright recently
- a lot of bad news about PSPs of any size going out of business
- inadequate work-life balance.

Staff shortages have significantly lessened the reservations that some PSPs had against automation, as they struggle to keep their operations running smoothly. On top of that, modern workflows will contribute to making the industry more appealing to talent once again:

- freeing workers from boring, repetitive tasks, unleashing creativity.
- curb the need for late-night shifts and weekend overtime.
- providing tools for state-of-the-art digital industry jobs.

TL;DR

Attracting skilled workers and young talent is very much about the image of an industry. Modern tools and workflows are essential to persuade them to consider a career in the printing industry.



A Very Short History of LFP

In order to tackle today's challenges in automation in the LFP industry, looking back into history helps to understand how we came to the present situation.

Let us therefore briefly dive into:

- how PSPs developed
- which manufacturers took a leading role
- how technology advanced.

The Vutek Ultra Vu 2360 SC solvent printer (2002) already implemented 6 colours.



Photo: S. Angerer

PSPs in the early years

The commercial history of digital printing started sometime in the mid-1990s. There had been a few earlier attempts still, mainly by brave innovators trying to build their own machinery from pre-existing parts. Somewhat reliable wide format digital printing machinery had not yet been widely available before the turn of the millennium.

In those pioneer days, anyone daring enough to venture into LFP needed profound technical skills, some sense of humour and a good dash of recklessness. It was not unheard of for whole companies to go bust, because the printer they ordered and paid for in advance, never turned out to function as promised (sometimes it did not turn up at all...).

Yet, for those lucky or skilled enough to establish a somewhat reliable digital print production, the rewards were indeed substantial. Print still was a main media channel back then, and for many LFP applications there were only a handful of PSPs available worldwide. So, companies were often able to charge whatever gracious amount of money they saw fit for a particular job. And they did!

This situation drew in a wide variety of founders:

- Commercial photo-labs
- Analogue printers (offset, screen, flexo)
- Letter shops
- Sign-makers
- Copy shops
- Trade fair designers and constructors.

While already being a part of the graphic art industry made setting up LFP operations easier, it is important to

remember that no clear standards or formal education for digital print professionals had been established in many European countries until around 2010.

Therefore, founders ventured into the industry from somewhat neighbouring professions like

- painting or owning a car painting shop
- fashion design
- model making
- selling photo, office or computer equipment.

The wide range of backgrounds made it difficult for the industry to come together and agree upon trade associations or industry standards. Therefore, many traditional analogue PSPs considered digital printing inferior and transient, not wanting to make room for the new technology in their clubs, trade shows or even magazines.

Thus, the turn of the millenium saw a wide range of magazines and new trade shows dedicated to digital printing technology. These "wild" pioneer days are to blame for the very wide range of different company workflows, as well as a very diverse approach to digitalisation and automation.



Italian company Neolt introduced a UV curing ink digital printer in 2004, but later gave up on inkjet technology altogether

Photo: S. Angerer

Technology in Digital Printing

Around the turn of the millennium, several very different technologies were used for digital wide format output:

- Photographic (Durst Lambda, Gretag Imaging / Cymbolic Science /Océ Lightjet)
- Ribbons / thermal transfer (Summa Durachrome)
- Solid Ink / hot melt ink (Xerox Phaser)
- ElectroInk (HP Indigo)
- Electrostatic (3M Scotchprint, KIP, OKI)
- Inkjet water-based and solvent-based (Epson, HP, Mimaki, Mutoh...)

Early inkjet printer manufacturers mainly entered the market coming from office printer production, analogue printing industry or photo industry backgrounds. Most of them, eg. Aprion, Calcomp, Colorspan, Cymbolic Sciences, Encad, Gandinnovations, Gerber, Grapo, Gretag, Hollanders, Ilford, Inca Digital, Kodak, Leggett & Platt, Lüscher, Matan, Neolt, NUR, Océ, Rastergraphic, Salsa Digital, Scitex, Seiko, Spühl, Vutek and Zünd have long given up on inkjet, changed their purpose, went out of business or have been bought up by bigger companies.

Each of the vendors not only offered hardware machinery, but also drivers and even early workflow solutions that had to be grandfathered into universal RIP solutions, making software development extremely complex.

Paper, film, boards

While solvent inks ruled the super-wide format industrial inkjet segment until about 2005, smaller formats became a domain of water-based inks. EFI and Durst showcased the first UV-curing inkjet flatbed printers around 2001, with the roll-to-roll UV printer Expedio to follow 2004 by NUR Macroprinters. Durst introduced white inks and spot colour UV ink by 2005. The first UV-LED inkjet-printers were showcased only in 2006, eg. by Lüscher. Several legal battles, mainly between EFI/Vutek and Durst, weighed down UV-curing inkjet development for years.

While water-based inks gradually became more versatile and robust, solvent inks were formulated to be less hazardous with eco, mild and light solvent ink solutions over time. It was, however, HP's prerogative to introduce its first generation of latex ink technology at Drupa trade show Düsseldorf 2008.

Today, UV-LED, water-based, eco-solvent and latex inks are the most common technologies in wide format

printing, with the Canon Crystal Point gel-jetting system (since 2008) quite successful in GIS / CAD as well as graphic arts markets.

Textile printing



Photo: S. Angerer

Digital textile printing for home decor.

Inkjet textile printing history is even more complicated than digital printing onto film, rigid boards and paper-based materials. For many years, no proper distinction was made between

- soft signage
- banner and flag printing
- textile sample printing
- apparel printing
- home décor
- fashion

In the fashion, home décor and flag printing industry, early attempts at digital production started already at the turn of the millennium with companies like D.gen, Konica Minolta, Kornit Digital, Reggiani and Zimmer Austria leading the way. With their backgrounds in the textile industries, ink formulations were quickly optimised to match their analogue predecessors in essential requirements like light fastness and washability.

As textile printing, analogue as well as digital, requires complicated finishing processes and expert skills, these segments soon gravitated away again from wide format digital printing with a focus on communication.

For soft signage printing, essentially printing advertising and signs onto textiles instead of film, two main technologies were established around the millennium:

- digital printing with water-based, eco-solvent, pigment and later latex inks
- direct and transfer sublimation print. ● ● ● ● ● ● ● ● ● ●

TL;DR

Around 2021, DTF (Direct to Film/Foil) emerged on the scene, another textile printing technology with a focus on apparel printing. Mutoh and Mimaki recently introduced turnkey solutions, around FESPA 2023. Regardless the segment, inkjet printing on textiles for fashion and home décor requires very different quality management and workflow solutions from sign-making and soft signage digital print.

The wide format digital printing industry only started in the mid-90s, offering a vast range of different technology and software solutions for printing onto paper, film, boards and textiles. This makes for very different segments only loosely connected by technology, so any automation efforts need to respect legacy.

Prompt /Graphic. Paul Dekeyser



Remember:
The “Back to the Future”
future of 2015 is
already a thing of
the past today.

Back to the Future

In the legendary „Back to the Future“ movies with Michael J. Fox from the 1980s, an awkward 2015’s time stream with robots and flying cars is conjured up in the 2nd instalment of the franchise. The story’s hero, Marty McFly, stumbles rather puzzled through his future small-town, getting scared by holograms and robots, and almost causes a car accident. He only finds some modicum of peace entering an 80s-themed retro place.

In the digital printing industry, as any other SME-heavy segment, many industry leaders seem to adopt a 2015 Marty McFly mindset when it comes to automation. They seem to linger somewhere between incredulity and freezing shock, with a strong urge to go back in time. Only, in the real world, still no time-machine is viable anytime soon.

And maybe this is a good thing, too – given the problems these devices seem to create in a myriad of stories... So let us instead explore the most important aspects of today’s industry (after all, we are way past the 2015’s Back to the Future ‘s future now!)

- workflow automation
- process control
- robotics
- AI.

AI will lead to a new surge
of demand for personalized and
one-off items.



Photo: S. Angerer

When the work just flows

After the desktop publishing revolution in the 1990s, the printing industry had slowly gravitated from processing “open” native Adobe InDesign, Photo, Quark Xpress, CorelDraw and Pagemaker files to first (any) PDF and soon PDF-X as a standard for receiving customer data.

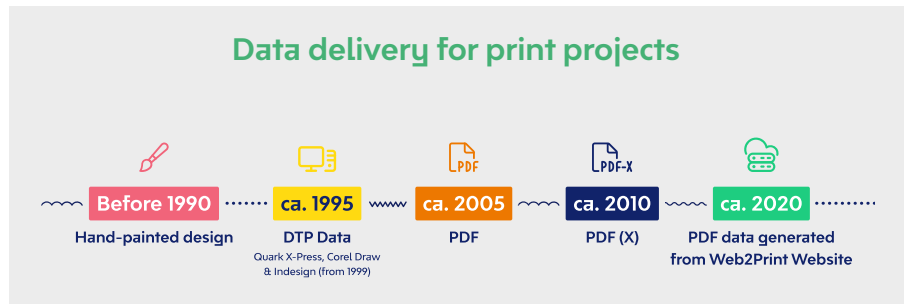
Many PSPs therefore set up “workflow solutions” as more or less elaborate ways to automatically receive and flight-check incoming files and process them on their way to the printing machine in the 2010s. Today, there are web shops available that automatically generate printable data from a design the user clicked together in the browser.

As prepress procedures then took a lion’s share of time and effort in any printing operation, semi-automated prepress had then been a clever way to make things run more efficiently. Most PSPs, big or small, today have some kind of “workflow solution” up and running, mainly linked to a universal RIP.

Only, workflow is much more than that. By Wikipedia definition, workflow means “any orchestrated and repeatable pattern of activity to transform materials or process information”. In the paper, board and film digital printing industry, some major steps are:

- administration / marketing / quotes
- data delivery
- prepress / data preparation
- printing
- lamination / varnish
- cutting
- other finishing
- packaging
- logistics
- invoice / payment
- customer service

Any above step in a typical digital printing workflow can be automated to a certain degree and thus made more efficient. This can happen either as stand-alone processes or, better yet, as a chain of sub-processes linked by data and items passed down from step to step. This complete and fully connected manufacturing process is what we refer to as “Connected Automation”.



Infographic: Paul Dekeyser

Connected Automation is a chain of sub-processes linked by data and items passed down from process to process.

TL;DR

It ultimately comes down to the PSPs to decide which steps they want and need to automate. This is by no means a trivial task. Traditional dealers, typically hardware and consumable suppliers that also sell software on the side, might tend to recommend what limited range of solutions they carry. Bringing in automation professionals with a broad knowledge of available Connected Automation solutions, for example automation partners with a broad experience in the printing industry, will typically yield better, customized results. Also, Connected Automation done right the first time saves a lot of money long-term.

Process Control

Process control means the option to gather consistent and reliable data about any step of the workflow and make it useful for anyone overseeing it.

TL;DR

Any automation needs process overview and control, defined as an option to gather consistent and reliable data on any step of the workflow. But any data not organized and visualized to reveal ongoing trends is just a bunch of gibberish numbers. Therefore, there is software available to help analyse and visualize, sometimes even with the help of Artificial Intelligence (AI).

With employees at any level enabled to interpret relevant process data and act on it, PSPs may soon feel that they are finally on a solid path to taking back control of their company.

How so?

1. Improved Work Life Balance

A print-room supervisor able to anticipate Thursday afternoon's finishing bottleneck based on process data, will be able to act in advance, saving everyone in his department another overtime night. Effectively improving work-life balance and saving money, what more could anyone ask for?

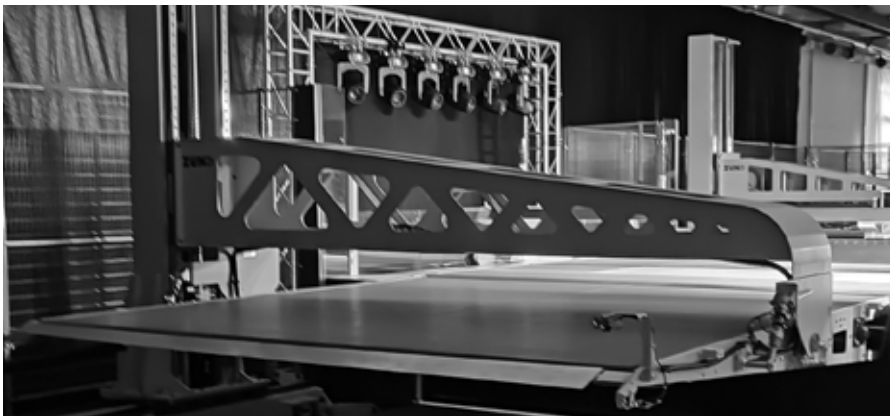
2. Better Investments

Far too many investment decisions in the printing industry today still are rather emotional than rational. With no reliable data to draw from, finding out that expanding peak season print through-put does not in fact require a faster printer, but another PC or a heat press, will be quite a challenge for any PSP without process control.

3. Make Customer Service great again

Customer service profits a great deal from process control. As any step of the workflow is data-based, reliable quality is easier to maintain. Also, problems can be detected early on. Sometimes, relevant data will also just give customers ease of mind. If they are automatically updated on their print job's estimated shipping time, they will probably decide not to call/chat, freeing up time at the service desk for more complicated questions.

Photo: S. Angerer



Stacking Unit with the latest Zuend Q corrugated board digital cutting table.

Robots in the print room

As in any other industry, robots have been recently showcased as a solution to push back against the labour shortage crisis. Collaborative robots, working alongside humans, mainly in elaborate feeding and stacking operations, have been highlights at any print-related trade show in the last couple of years.

No need for fear (or fascination): The print industry in fact never has been a stranger to automation. By concept the printing process was invented to mass-reproduce books! Robots are just another step. Machinery to help cutting, folding, or sorting prints has been available almost from the beginning. For a long time though, they were mainly used for very large production runs. Setting them up took just too long to handle the smaller or personalised print jobs that are a unique digital printing selling proposition (USP).

With today's print finishing and loading/unloading equipment, lines between a robot and "just a machine" are often blurred. Easy set-up and sometimes even the ability to learn and anticipate through AI makes modern



Prompt /Graphic: Paul Dekeyser

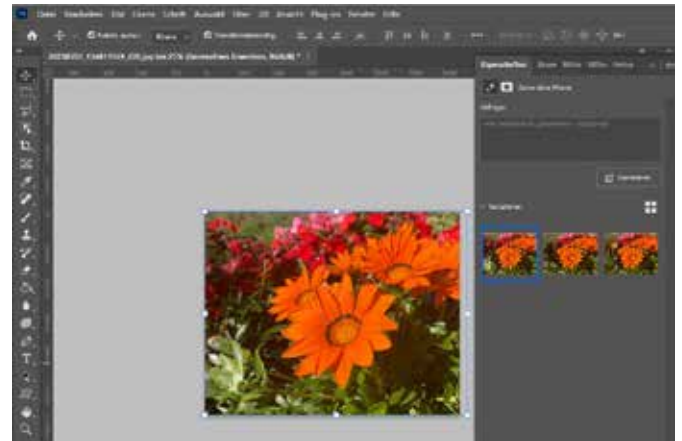
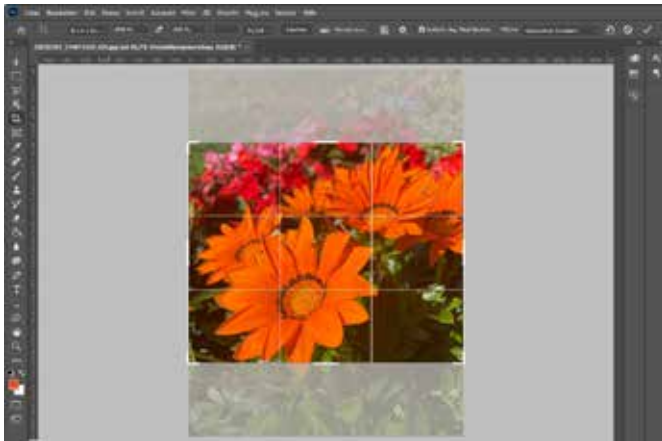
Are robots our friends or a bugbear? It all depends on your point of view.

loading and finishing equipment highly useful even in a small-batch environment.

TL;DR

AI can make process data more accessible and help to streamline workflows. Robots can help with the actual work. More often than not today, the lines between machinery, robots and AI are blurred.

AI and print



Generative Cutting in Adobe Photoshop 2024: The left side of the flower pictures was generated from an AI without even so much as a prompt ("generative fill")

With Adobe Photoshop's last iteration, generative AI is available as a standard option in the industry's most ubiquitous software. It certainly offers some automation in creative work, as clever algorithms can erase, resize, or cut out unwanted items in the blink of an eye. Cleaning up photos has never been so easy!

Making operations that used to require sometimes hours of effort and lots of skill available to virtually everyone on a PC, Mac or smartphone, will have a serious impact on the creative, and, in turn, the printing industry:

- Designing standard applications for print and online will be much more efficient, freeing up capacity in art departments. With software like Adobe Express or Canva, even a layperson can do this at a surprisingly high quality.

- End consumers will be able to design personal items and home décor even easier, bumping up demand for printed or personalized gifts.

It seems quite likely that AI will lead to a new era of print production in very small run-length or one-offs, effectively in need of Connected Automation to handle the granular work-load reliable and efficiently at reasonable costs.

Connected Automation to avoid the Creative Disconnect

If Connected Automation is the way to go to keep printing businesses profitable and future proof, a fully automated PSP is the most obvious answer, right?

Wrong. Because it misses two very important parts of the equation:

- people
- products.

The printing industry has always been quite technology-driven, so much so that it sometimes tends to lose sight of their most precious resource: creative, dedicated people able to find brilliant solutions for any communication needs.

Outside the industry, print products are rarely perceived as products like, for example, a bar of soap. They are

much more: A printed catalogue or magazine gives the recipient a warm feeling of belonging to a like-minded community. Beautiful and clever packaging confirms that buyers made the right choice and help them engage with the item inside and the brand. YouTube is alive with "unboxing videos", all of which, essentially, are a celebration to the creativity and resourcefulness of the printing industry.

TL;DR

Print is not just about technology; it is about communication and creativity. Concentrating too much on technology leads to "Creative Disconnect" and PSPs losing the ability to be problem solvers for their customers.

Creativity is a strategic asset

Ever wondered who they might be, these clever people who design the beautiful and clever Apple or Huawei smartphone boxes buyers today just expect from those brands? They not only reside in posh international design agencies in London, Paris and New York, but essentially also toil away at every print shop. They are often just too busy, to let their real creative light shine. Too tied up in daily business, too overwhelmed by the sheer number of jobs, every spark is bound to die: "Creative Disconnect".

Many industries have come to realise the strategic value of design. During a round-up of industry leaders for a round table organized by Four Pees and FESPA in Belgium in early 2023, the most commonly mentioned challenge was customers' demand for turn-key solutions to meet their printed communication needs. Only the problems in finding skilled workforce to tackle it came close in urgency.

This is where Connected Automation comes into play. A reliable, proven and data-based workflow is foundation professional creatives cannot do without. If boring, repetitive work is processed automatically, people have more working hours to focus on why they entered the printing industry in the first place: creating meaningful, beautiful communication. And getting home to their families in time. Investing in Connected Automation therefore is not only buying new software and machinery, streamlining processes, but also investing in people.



Prompt: S. Angerer

This textile print pattern was created by an AI with just a few prompts.

TL;DR

Connected Automation is investing in people and valuing their time. It's the most viable tool to help today's digital printing industry's most pressing problems: prices and people.

How to set up a Connected Automation workflow

Setting up a Connected Automation workflow is a process that takes the effort, but also the feeling that everyone in the company is on the same page.



Good reasons for a new automated workflow

Most PSPs have set up a standardized, even partly automated workflow at some point. When considering getting in touch with Connected Automation experts, it is essential to be extra-sure about reasons to so:

- Is the existing workflow no longer satisfactory? Has it grown out of hand?
- Has the product range changed so much that the workflow needs to be adjusted?
- Are workers able and willing to follow the existing workflow?
- Is the existing workflow covering all important parts of the production?
- Will there be new machinery soon, with the need for an altered workflow to take full advantage of its capabilities?

Some less-than-ideal reasons to automate

Sometimes, managers see Connected Automation merely as any easy road to save money. They aim to

- reduce headcount
- work with less skilled, more cost-effective personnel
- encourage the existing workforce to work harder and longer hours.

While gaining efficiency is always a good thing, it seems quite unlikely that the process will be successful longer-term if workers feel disadvantaged by it.

TL;DR

Any automation process works best when the workforce in the company is firmly behind it. To make this magic happen, everybody has to gain some advantages from it.

How to get the most out of a Connected Automation Partner in your company

Change management process flow



As it is with any consultation process, it will only be a success if everybody in the company is able to really get behind change management process. This seems self-evident, still it is much easier said than done. Most people are averse to change, and even those who embrace it will need help to adapt.

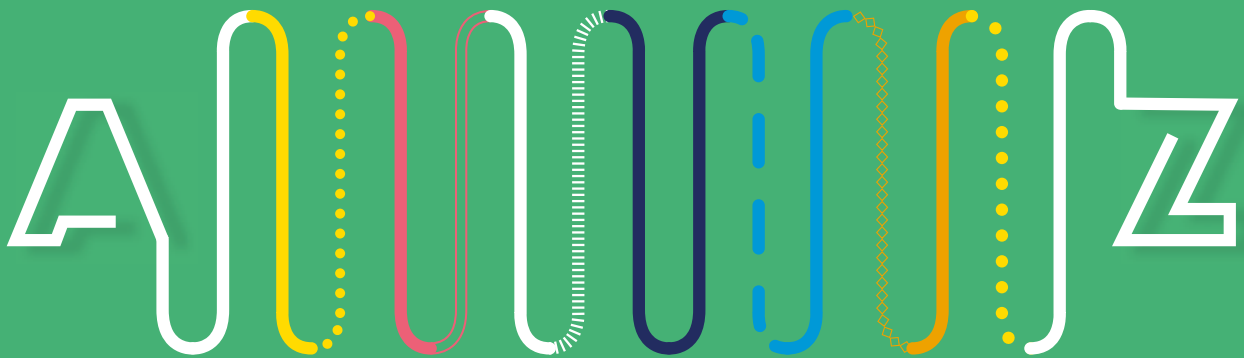
Any process to set up Connected Automation therefore needs to make sure all stakeholders are heard and understood. They need to feel like active participants, having a say in the process, rather than being treated as mere objects to be pushed around as required.

Some of the best ideas for any kind of automation will be highlighted by people within the workforce. This means that Connected Automation partners not only need vast technical, but also social skills to make sure the process is sustainable.

“If you want to build a ship, don’t drum up people to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.” Antoine de Saint Exupéry’s bon-mot from “The little Prince”, unsurprisingly also holds true for any Connected Automation process.

We automate your print production from A to Z

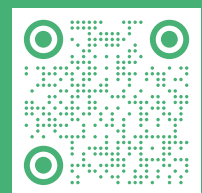
Reimagine your print production. At Four Pees, we help print operations succeed by implementing hassle-free automation. Not only will it make your work easier, but your print organization will thrive. We provide solutions to streamline the entire print and packaging production. Whether it is with advice, a software product or a seamlessly integrated solution from ideation, design and customization all the way up to fully automated production.



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Four Pees NV • Kleemburg 1 • 9050 Gentbrugge • Belgium
www.fourpees.com • tel +32 9 237 10 00 • info@fourpees.com



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