

DP Patterning

The Solution to Flex-PCB Sourcing Disruption



Index

Introduction	1
—○ A solution closer to the home market	2
In house Flex-PCB production with Dry Phase Patterning	3
—○ How Dry Phase Patterning works	4
Comparing Chemical wet etching to Dry Phase Patterning	5
—○ The benefits of Dry Phase Patterning compared to Chemical wet etching	6
Conclusion	9
About DP Patterning	10



The Flex-PCB market is growing year over year, with a projected CAGR of over 10%. But as demand for Flex-PCBs increases, so do sourcing issues.

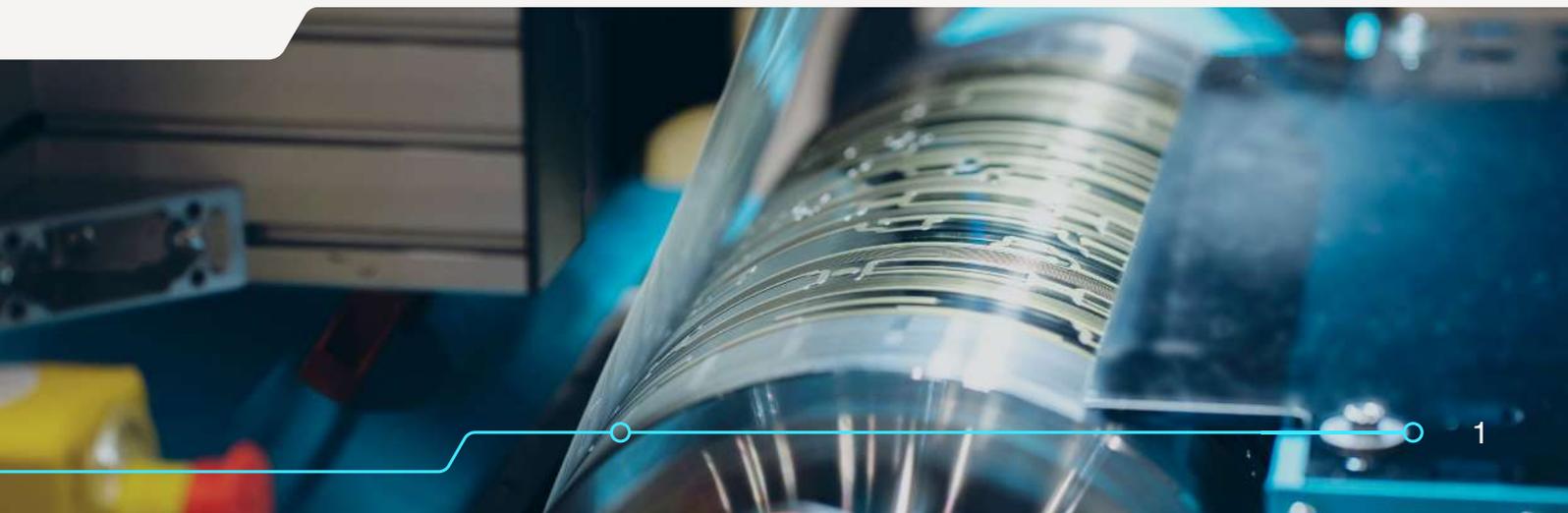
Sourcing materials and components is proving harder every year, especially when you're ordering products from overseas. In fact, a recent [Accenture report](#) found that “components for a semiconductor chip could travel more than 25,000 miles” and “cross international borders approximately 70 or more times” before finally making it to the end customer.

As a recent [Deloitte report](#) states,

“ A decades-long focus on supply chain optimization to minimize costs, reduce inventories, and drive up asset utilization has removed buffers and flexibility to absorb disruptions — and COVID-19 illustrates that many companies are not fully aware of the vulnerability of their supply chain relationships to global shocks. ”

When your supplier is on the other side of the world, and a component may have to cross international borders 70 or more times before reaching its destination, any number of disruptions — from trade conflicts to pandemics and natural disasters — can put a large dent in the supply chain. **And these disruptions aren't going away any time soon.**

What can you do to ensure that your company has all the materials and components needed to make your products — and make sure you have them when you need them?



A solution closer to the home market

There has been a lot of discussion recently about reshoring and nearshoring PCB production. But which option is the best for Flex-PCB production? Let's look at each in more detail.

Reshoring is the practice of transferring a business operation that was moved overseas back to the country from which it was originally relocated. Reshoring is usually driven by factors including tax breaks/benefits in the home country, increased labor costs in the offshoring country, or a general disappointment in the product quality from the offshoring country.

Nearshoring is the practice of transferring a business operation to a nearby country, especially in preference to a more distant one. Nearshoring is generally driven by the same desires as reshoring, with the added variables of finding lower-wage workers, bigger tax breaks, or less legal restrictions in another country.

Both options allow for faster turnaround times than offshoring, while providing greater control over materials sourcing and production processes. Moving production closer to the company's home country also greatly improves the security of intellectual property — a major concern — and allows for faster innovation thanks to short lead times for prototyping.

In most discussions of reshoring and nearshoring, the option of **in-house production** isn't even mentioned. Perhaps this is because the term "PCB production" is associated with the process of Chemical wet etching, which conjures up images of corrosive chemicals and expensive machines — neither of which sound very appealing to a company looking to improve efficiency, boost productivity, and cut costs.

But that's because most companies haven't yet heard of Dry Phase Patterning.



In house Flex-PCB production with Dry Phase Patterning

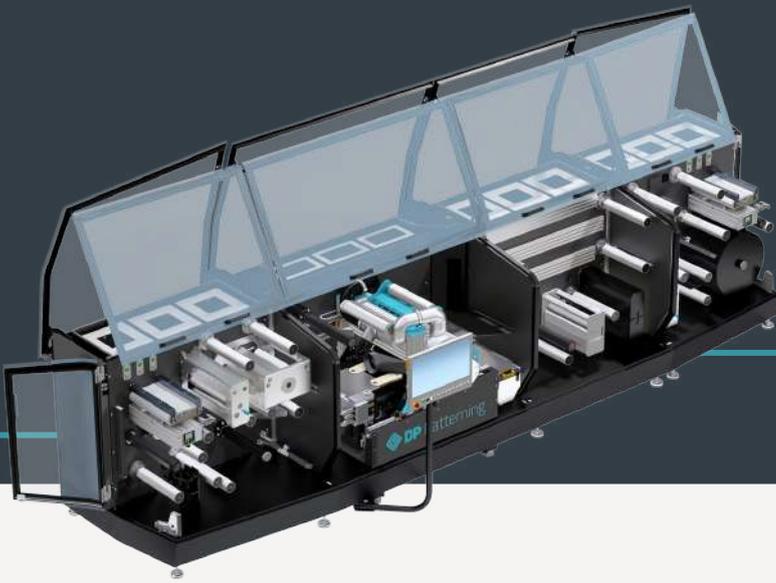
Dry Phase Patterning is a process based on mechanical machining of the material, rather than the traditional use of chemical etching. This brings you instant advantages such as cost-efficiency and significantly faster production times. But it is also the choice for everyone who is looking for an environmentally friendly, sustainable solution that meets tomorrow's demands.

Using Dry Phase Patterning, you can effectively remove one link from the supply chain by manufacturing your own Flex-PCBs in-house. This also means it's much easier to prototype new products, test out new materials, and speed up innovation. You can use a variety of materials as both connect carrier/substrate and conductor, meaning you are not limited by the price and/or availability of materials — which stops sourcing issues in their tracks.

In short, Dry Phase Patterning isn't another Flex-PCB supplier — it's a way to take control of your manufacturing from start to finish, shortening the supply chain, encouraging innovation, and cutting production costs in the process.



How Dry Phase Patterning works



With Dry Phase Patterning, you can produce conducting structures on nearly any flexible materials including metals, paper, or plastic, using a process akin to punching a hole in a piece of paper — but with much more speed and precision.

- 1 A cliché presses out your desired pattern on a laminate material stack, or laminate, consisting of a top layer and an underlying carrier/substrate.
- 2 A milling wheel then mechanically removes the protruding pattern from the top layer while the bottom layer of the laminate remains untouched.
- 3 This leaves a conductive pattern on the laminate surface.

Uses for Flex-PCBs

Dry Phase Patterning can be used to produce Flex-PCBs for all types of uses, including RFID, automotive, LED lighting, electric vehicles, and consumer electronics. It can also be used for non-electronic and non-conductive applications such as plastic or paper decor, or functional 3D structures like micro-fluid channels or cavities for leveling electronic components.



Dry Phase Patterning

With the Dry Phase Patterning technology you can use various types of organic material as the carrier, such as PET (Polyethylene terephthalate), PC (Polycarbonate), PI (Polyimide) or PEN (Polyethylene naphthalate). Depending on desired thickness and result, you can use Al (aluminum), Cu (Copper) or (CCA) Copper Cladded Aluminum as a top layer.

[Click here](#) to watch a video of the Dry Phase Patterning process in action.

Comparing Chemical wet etching to Dry Phase Patterning

Both Chemical wet etching and Dry Phase Patterning can produce high-quality Flex-PCBs. But while the quality is similar, the process to reach the final product is faster, cheaper, and more controlled with Dry Phase Patterning.

Chemical wet etching

Time elapsed: days to weeks

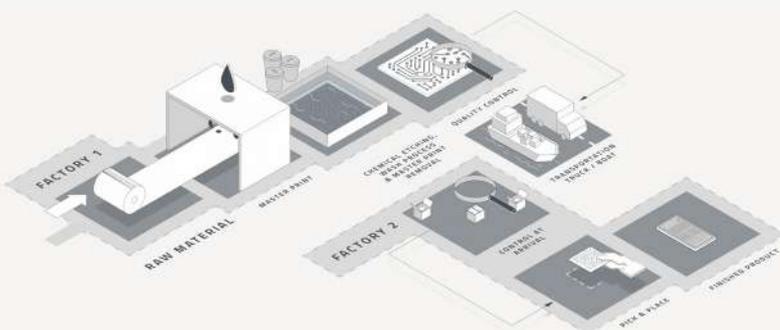
- Multiple raw materials
- Master print
- Chemical etching
- Wash process
- Master print removal
- Quality control
- Harmful waste handling
- Shipping
- Inventory
- Assembly
- Finished product

Dry Phase Patterning

Time elapsed: minutes to hours

- Single raw material
- Patterning and metal removal
- Quality control
- Material recycling
- Assembly
- Finished product

Traditional Process



Dry Phase Patterning Process

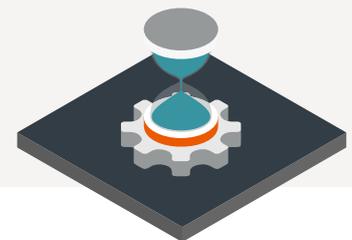


The benefits of Dry Phase Patterning compared to Chemical wet etching



Flexibility

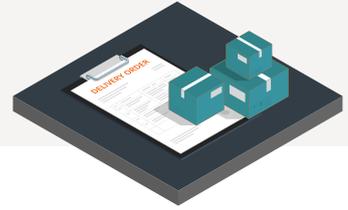
The wet etching process limits your ability to use certain materials. While in theory you can etch on nearly any surface, you need to change chemistry depending on the material you decide to use. With Dry Phase Patterning, you can make PCBs from a variety of conductor/carrier materials without changing chemistry between metals. Conductive materials can include any type or combination of soft metals, while carrier materials can be pretty much anything you like: flexible polymer, or even chemical-sensitive material like paper. To avoid operator dependency, every single operator input is recorded and stored in the database so we can find root causes of deviations in production. This helps the operator and maintenance personnel solve production issues quicker and with more accuracy.



Speed

Wet etching is a multi-step process that involves chemical reactions, water baths, and long wait times. In contrast, the DPP 360 can produce up to 30m of PCBs per minute, which is approximately 10 times faster than traditional wet etching. Because it is extremely fast and easy to change tools in one single machine, you can use the same machine for both prototyping and mass production. And because everything is produced in-house, lead times are virtually nonexistent.

Logistical simplicity



Simply put, with Dry Phase Patterning, there is one material in and one product out. Shorter product cycle times put pressure on manufacturers to meet changing market demands. Compared to wet etching, which requires multiple materials to create the product of a Flex-PCB, Dry Phase Patterning requires only one material. This makes it easier to produce Flex-PCBs on demand as you need them; it also makes it easier to keep materials in stock, thereby side-stepping supply chain issues.

Sustainability



Wet etching involves the use of some hazardous chemicals: chemicals that are costly and hard to dispose of safely. Dry Phase Patterning technology doesn't use any chemicals, which means no hazardous materials and not costly chemical cleanup/disposal. Dry Phase Patterning also uses significantly less energy and water than traditional PCB production. Even better, the clean metal residue created through the Dry Phase Patterning process is recyclable, meaning less waste and a better environment.

Safety



Manufacturers need special hazardous material training as well as special protective gear when handling the chemicals used in the etching process. There's also the matter of waste removal. With Dry Phase Patterning, there are no chemicals or fumes — and no special equipment required outside of the DPP 360. The materials are enclosed within the machine, and everything stops automatically when the door opens. It's safe enough to use in nearly any environment. In fact, we have a working DPP 360 set up in our offices in Norrköping, Sweden, where we produce samples and prototypes.



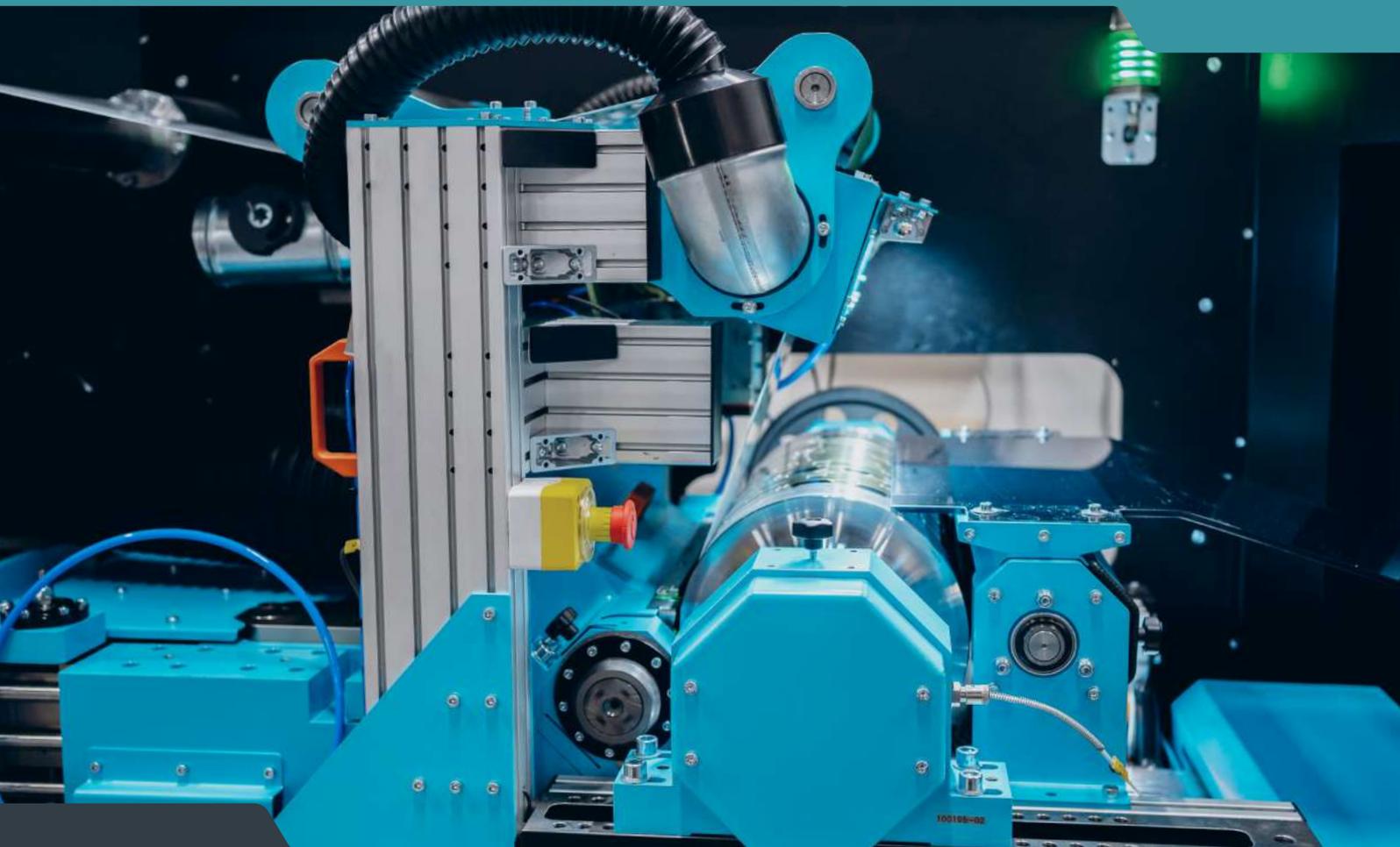
Intellectual property

Chemical wet etching requires several specialty facilities, from the production facility to printers, tool manufacturing companies, and printing workshops. This means that you must send your designs — your intellectual property — to multiple companies to build your product. Every time your IP is sent to another place, it increases the chance of that IP being stolen, altered, or tampered with. But when you produce your own PCBs in-house, you don't have to share your designs with any third parties. This protects your IP and gives you an edge over the competition.



Conclusion

If you produce any kind of electronics today, from automotive to RFID, you need PCBs to build your products. But PCBs are proving harder than ever to source from overseas. Moving production to a facility closer to home can cut lead times, but it doesn't solve the underlying problems with the wet etching process: namely that the process is slow, expensive, antiquated, unsafe, and leaves a large environmental footprint. By switching to Dry Phase Patterning and bringing PCB production in-house, you can speed up development time, encourage innovation, protect the environment, and keep your intellectual property safe.



If you would like more information about Dry Phase Patterning, please contact:



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About DP Patterning

DP Patterning offers an innovative solution to revolutionize printed circuit board manufacturing by introducing a mechanical process for in-house production. Our globally unique Dry Phase Patterning technology enables environmentally friendly, cost-efficient production of flexible electronic circuit boards. Replacing hazardous traditional chemical etching processes by sub-suppliers in distant countries with an in-house, mechanical reel-to-reel process, this is both a game-changing solution for sustainability and allows for local high-quality production. It is customizable and simplifies the production process by cutting lead times as well as significantly reducing transport, waste management and costs.

Our passion is working closely with you.

The successful organic growth of DP Patterning is a result of working closely together with our customers. Many of our employees are experienced in advanced research and development that originates in The Swedish Research Institute (RISE), and the cooperation with the institute is an important on-going partnership for DP Patterning. Innovation and advanced research are always close at hand when developing certain specifications or applications.

Make use of our skills and experience.

DP Patterning is recognized for technical expertise and deep knowledge; assets that our engineering team pays forward through our products and further to our customers. Designed and manufactured in Sweden, according to the latest international industry standards and regulations, our machines are built in a scalable production environment and assembled by our own technicians to ensure that the quality meets – and often exceeds – our customers' expectations. Our engineers also have international experience in business development and sales, a fact that confirms and ensures that both existing and new customers will always benefit from the most suitable solutions.



Our history

Our innovation journey began in 2001 when CEO Staffan Nordlinder worked as a researcher at The Swedish Research Institute (RISE). We started developing the machine in 2006. DP Patterning was established in 2009, development was then finalized, and the first machine launched to the market in 2014. DP Patterning is a mainly privately held company. We are a growing entrepreneurial company with a caring and innovative organizational culture.

We are proud to launch and establish a production process of great value that presents the lowest possible environmental impact for our customers and for society. We believe that combining global potential with local manufacturing, labor and sourcing add to sustainable qualities for modern businesses. Remote operation management also presents valuable possibilities for future production facilities, as will maintaining full control of business-critical intellectual property.

Today we support manufacturers and front-runners in the automotive, LED lighting and RFID sectors, while continuously researching and developing green-tech system solutions to individual customer requirements.

Our offer

We adapt dependent on what your needs are, or we guide you to the right direction of this development that your company wants to take. We offer you help with: a total Customer Development Project, Service & Maintenance, Machine Manufacturing, Pilot & Small Volume Production, R&D and Cliché Production.

DP Patterning AB

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