

Notion Systems: The Arrival of the 'Jet Age'

Notion Systems is a German-based company and one of the leading suppliers of industrial inkjet systems for functional materials. Antonio Schmidt, senior vice president of sales and marketing, explains that by applying the solder resist fully-digitally, Notion gave Schweitzer Engineering Laboratories (SEL) the opportunity to save time, investment, space, and labor in their new printed circuit board manufacturing facility.

Antonio, let's start with a quick introduction to Notion Systems.

Notion Systems is based in Schwetzingen, Germany, close to Heidelberg. We focus fully on developing and building industrial inkjet systems for functional material. Our parent company is the German-based Lab14 Group; we are part of about nine different companies which are active in the field of electronics and



Antonio Schmidt

semiconductor fabrication equipment. Notion started 12 years ago, and just opened a subsidiary in the Boston area to support our customers in North America. We focus on high-end inkjet printing of functional materials, such as conductives, insulators, resists, and adhesives. We are in many different markets, from display to electronics to semiconductors. Our biggest market is applying solder mask digitally using UV ink instead of a solvent-based ink. With our technology, we are trying to minimize the carbon footprint in PCB production.

With that area of specialty, it makes sense that you were selected for SEL's new facility. Can you share details on the equipment you installed there?

We sold SEL several fully integrated and automated n.jet solder mask systems. They will run the whole backend solder mask process very economically and ecologically compared to other PCB factories. If you look at existing, older factories, there is a lot of manual work, carrying boards around and so on. Our n.jet solder mask system at SEL is fully automated and integrated using fab automation companies selected by SEL.

We print the solder mask and the legend inside one machine. I think our customers choose us because we have the biggest installed base in the world. We have, by far, the fastest machine. We can put up to nine printheads for solder mask printing and several printheads for legend printing; nobody else has this configuration. Our competitors have two or four heads, so they aren't as fast.

Why was the Notion system the right choice for SEL? Was it your automation, high speed, or other criteria?

In your interview with John Hendrickson at SEL, he shared several reasons why they bought our machines. One of the most important reasons is that it saves three to four process steps. You don't need a spray coater or a second dryer. You don't need an LDI or a developer. You are saving space and materials. For example, with the standard solder mask process, you can print maybe 20 boards per kilo. With our process, you can print approximately 75 boards per kilo, so that's three times as many. Likewise, you have energy and labor savings because it's all fully automated. One operator is able to run the entire solder mask backend.

Where have most of the Notion Systems equipment been installed?

It depends on the year. This year, we've sold a lot of equipment to North America, and by December, we should have between 10 and

12 machines installed. We have about eight machines installed in Europe and a couple in Asia. Our focus was to first catch all the interested customers in Europe, and then we saw a strong demand in North America, especially for new companies. There are several PCB makers moving production from Asia back to North America, and that gives us the chance to sell our equipment and our process into these new factories.

Are you seeing an uptick in North America for new factories?

Yes, there definitely will be a couple new factories in North America. We will also see new factories in Europe and Southeast Asia, especially in Thailand and Vietnam.

With this move toward more greenfield facilities, what are those customers asking for? How are those requests driving your innovation?

We save cost and material, so we decrease the carbon footprint. These are the main economic



Notion Systems' n.jet technology saves multiple process steps, large investments in valuable space, energy, and labor. This completely digital process also uses UV-curable inks instead of solvent-based inks.

and ecological advantages. There are also advantages within the application where you can generate new features which cannot be done with a traditional process.

First, we can print the solder mask and legend in just one production step—solder mask followed by the legend. We can also print the 3D structures on a PCB. For example, if you don't want to use the white legend, you could use the solder mask as legend. That means we can print the solder mask with the same ink, just a little bit higher. Using the solder mask as legend saves an additional step. You can also print 2D codes on it. You can print watermarks and print dams right on it.

These are some lesser-known features which not all our customers are using, but they add value to the PCB. Everything adds value and revenue to our customers.

Historically, inkjet has been considered a slow process, especially for production quantities. What effect does your machinery have on the manufacturing floor?

When you look at the total cost of ownership and the total process time, it's a digital, layer-by-layer process that is very fast and precise. We have printing speeds up to 500 mm/sec; I don't call this slow.

Depending on the board design, we can produce up to 50 PCB sides per hour, depending on the copper layer. SEL was smart; they connected two machines with each other, so they are printing the front side on one machine and the rear side on the other machine. That doubles their throughput.

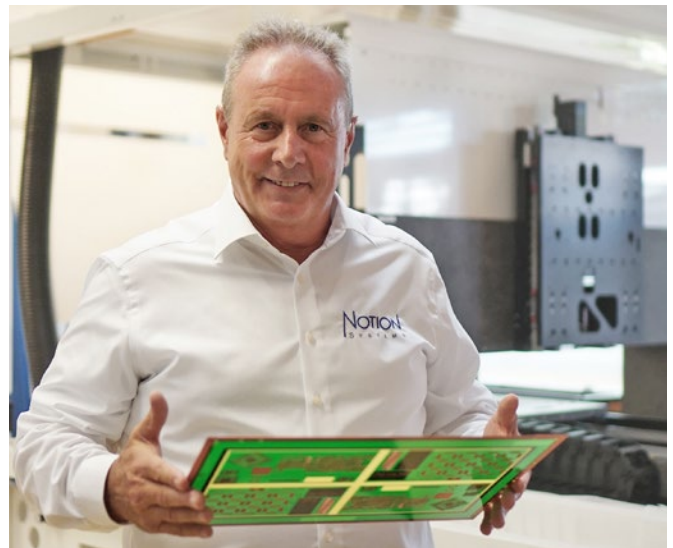
There are some processes which might be faster, but when the installation is fully automated, the entire process is much faster and running at a much higher yield because everything is connected to each other. In a manual process, you have a lot of yield losses; you need at least three or four times more operators to run the whole line—people are carrying the boards around, or you have these boards and trolleys.

Do you think these points are factors in your customers' decision?

We have eight years of experience in inkjet printing, a leading installed base worldwide, and the fastest machine. This is really the key to our customers' decisions. I also want to state that it is very nice working with SEL. They managed to build such a huge greenfield PCB factory in just one year. The whole team is very capable.

Tell me about the new office in Boston.

Yes, we have opened that office with the Lab14 Group. Currently we have two people in the office: Kurt Weber, director of business development North America, and one service engineer. We are looking forward to growing the team next year, as we are expecting more business from the electronics and



Kurt Weber

semiconductor industries. We see great potential, not only in PCBs, but also in semiconductors and renewable energy. That is why we took the next step to open our own subsidiary in the Boston area.

Thank you. It was great talking with you.

It was great meeting you as well. PCB007