WELL EQUIPPED WITH PATCH PLACEMENT

by Stefan Richter

A new additive production process is becoming established alongside 3D-printing: with *patch placement*, high-tech machine manufacturer Manz is opening up new design possibilities and providing a key building block for the self-organizing production of the future.

Marc Schmidt will probably have to wear the orthotic for a few weeks after his sports accident. His medical walking aid is supposed to be delivered tomorrow by courier. The orthopedist just scanned Schmidt's leg today and sent the data to the manufacturer via e-mail: dimensions, weight, requested color, and the maximum mobility permitted to allow for the healing process. Just a short time later, the "Marc Schmidt edition" orthotic rolls off the line at a southwest German medical technology manufacturer's facility. It's built layer by layer, in the truest sense of the word. A one-of-a-kind, fully automatic.

Patch placement is the process recently developed by Manz for this kind of production: flexible materials off the roll are laser-cut into the contours – so-called patches – that customers need. These patches are then combined in an additive layering principle, for instance using laser welding. Patch placement is used not only in medical technology, but also in customized mass production in the shoe industry, or in producing custom-tailored sports equipment. Automotive industry and aircraft construction applications are currently in development. For example, in order to locally reinforce the material structure around drill holes for attachments or rivets.

Patch placement by Manz: technical data

- Maximum roll material width: 500 mm
- Maximum size of individual patches: 240 x 80 mm
- Patch geometry freely programmable
- Patching cycle duration: 5 seconds including cutting, engraving, placing, and attaching
- One machine cell can work with three different rolls of material
- Patch placement plants can be linked to create one production cluster

Significantly faster than 3D printing

Any “processable,” flexible material such as textile fibers, plastic and metallized foils, or fiber composite materials like carbon composites can be handled. Patch placement can be used to shape these into geometrically complex structures – with the best possible stability and the lowest possible material use and weight: patch placement only applies a thicker layer in areas exposed to increased mechanical strain, fulfilling the highest demands for lightweight construction.

There's almost no material waste, and different materials and colors can be combined “from the roll,” or to put it more precisely, from multiple rolls without having to go through complex plant conversion processes. While tactile and visual properties are important on the surface of a product, for example, stiffer materials with a specific texture can be used inside.

The advantage that patch placement has over 3D printing is that it allows for much higher material throughput and shorter production cycles.

More than just prototyping

“Patch placement offers new kinds of design freedoms and goes beyond rapid prototyping,” says Dr. Martin Steyer, who heads the area of Integrated Solutions at Manz. “I see three main advantages for designers: first, with its freely programmable axes, patch placement facilitates an extremely broad diversity of complex and highly integrated product geometries. Undercuts, cavities, or fluid flows in any layer – anything is possible. Without re-clamping, without having to assemble components.

Dr. Martin Steyer, Head of the area of Integrated Solutions at Manz AG in Reutlingen:

With its freely programmable axes, patch placements allows designers to create an enormous variety of complex and highly integrated product geometries.

In addition, it allows them to combine materials with very different properties. Concepts can be ready for mass production right away if designers are working with the same equipment as production does.

The second big advantage is that they can combine materials with very different properties. For example, porous materials can be integrated into a component if coolant needs to be directed close to a very specific spot. And finally, designers will have to do less worrying about whether their concepts will be ready for mass production if they're working with the same equipment as production does.

Software-controlled conversion

Patch placement plants are built to be autonomous, so they can be easily integrated into existing production lines. Of course, the production line has to be fully digitized. That's the only way to produce customer-specific products like mass-production products (also known as mass customization) and significantly accelerate their delivery cycles. Another feature of patch placement becomes relevant in achieving this goal: the process is not tied to tool shapes, and can be converted through purely software-controlled processes.

For Martin Steyer from Manz, that means the highly flexible process is a key building block in self-organizing production lines. These allow even small quantities to be manufactured reliably and inexpensively, and facilitate model changes in real time: “The patch placement process is useful for any manufacturer that is having a hard time managing a large number of different versions of its products and that places high demands on flexibility in production.”

In conjunction with web-based developer platforms or product configurators, digital material databases, and logic-based sample production, in the future it will be possible to involve external developers and even customers and consumers in the production process much more directly. That means terms like “networked production” or “open source” have a much broader meaning than before. Freely configurable patch placement as a building block for customized mass production could even lead production to move closer to customers once again in many industries. That’s a good opportunity for products “Made in Germany,” which offer local, networked production.

Images:

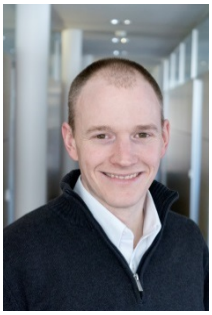

Photo 1: Dr. Martin Steyer manages the area of Integrated Solutions, the breeding ground for new and forward-thinking production technologies at Manz.

Photo 2: Patch placement is used not only in medical technology, but also in customized mass production in the shoe industry, or in producing custom-tailored sports equipment.

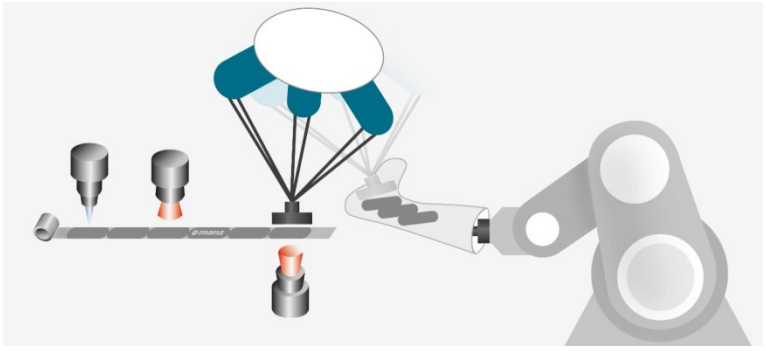

Photo 3: Diagram of the patch placement process by Manz: roll materials are cut, engraved to specifications, and then attached using an additive process, for instance with laser welding.

Company profile:

Manz AG – passion for efficiency

As one of the world's leading high-tech equipment manufacturers, Manz AG, based in Reutlingen, Germany, is a pioneer in innovative products for fast-growing markets. Founded in 1987, the company has expertise in six technology sectors: automation, laser processing, screen printing, measurement technology, wet chemical and roll-to-roll processing. Manz deploys and continuously develops these technologies in three strategic business segments: Electronics, Solar and Energy Storage.

The company has been listed on the stock exchange in Germany since 2006. It currently develops and produces in Germany, China, Taiwan, Slovakia, Hungary and Italy. It also has sales and service branches in the United States and India. Manz AG currently employs around 1,700 people, about half of which are in Asia. Manz's claim "passion for efficiency" offers the promise of production systems of the highest efficiency and innovation to its customers in dynamic, future-oriented industries. With its comprehensive expertise in developing new production technologies and related machines, the company contributes substantially to reducing production costs for end products and making them accessible to large groups of buyers the world over.

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