



SPOTLIGHT

How automated post-printing makes scalable AM production viable

AM-Flow's automated solution for part identification and sorting drives down the cost-per-part of 3D printing, enabling scalability like never before

In partnership with 



AM-Flow's solution is fully modular, consisting of many automated steps. At the center of its solution: the AM-VISION.

Production-grade additive manufacturing is a target that has more or less been reached. Industrial 3D printing hardware is capable of printing high-quality components suitable for functional end-use applications. The challenge now is scalability. Not so much of 3D printing technologies themselves—the integration of more industrial-grade systems makes scalability possible—but of the end-to-end process, particularly post-printing.

Today, post-printing workflows, which encompass post-processing steps, picking, identifying, sorting and quality control, are held back by their lack of automation. The largely manual nature of post-printing workflows has made it difficult for manufacturers to match the scale of their AM production capabilities in a time and cost efficient way. That's where AM-Flow comes in.

Based at the Brainport Industries Campus in Eindhoven, the Netherlands, AM-Flow has its sights set on one key goal: to revolutionize post-printing automation and lower the cost per part for AM with its scalable, modular solution stack. "Our mission is inspired by delivering on the main benefits of 3D printing: full freedom of design, minimizing waste, local on-demand manufacturing, reducing transport emissions and enabling true customization. All these benefits will remain out of our grasp if the industry does not automate its workflow, and the cost per part will be the limiting factor," says AM-Flow CEO Stefan Rink

AM-Flow was founded in 2018 and can be understood as the confluence of two elements. On one side, a startup that was seeking to commercialize a software solution that offered an infinite library

of 3D shapes. On the other, a 3D printing service provider, which was struggling to find a scalable post-processing workflow.

Stefan Rink, then VP of Global Manufacturing at this service provider, had tried to find solutions to this problem, even teaming up with companies such as Philips and Siemens at that time. These efforts were without success. When he was contacted by this software startup, however, he immediately saw potential. "Stefan saw the potential power of the solution to automate the post-processing workflow," AM-Flow explains. "And with Stefan on board, the startup pivoted to AM-Flow and focused on part recognition for the additive manufacturing industry," adds Carlos Zwikker, CCO of AM-Flow.

With Stefan Rink at its helm, AM-Flow has successfully navigated the challenge of automating the post-printing workflow, bringing to market an intelligent and modular part recognition system, a sorting solution and other modules that create a more cost-efficient workflow as manufacturers scale their printing capacity. "AM production facilities, service providers and internal AM departments have grown their output incrementally," Carlos explains. "Starting with convincing internal and external customers that 3D printing can provide exceptional geometric output. The next step was increasing the output as demand grew. Initially, the output was one-offs, prototyping and such. But as time progressed, quality increased, materials were added to the portfolio and additive manufacturing proved

The AM-VISION automates part identification using cameras and intelligent software to match printed parts to their STL files.



that it could supply larger numbers. All this output was handled by highly educated people on the work floor since the production facility wasn't set up for automation because there previously hadn't been any need. It was success that created the bottleneck of post-printing and emphasized its lack of automation."

From part identification to quality

Today, AM-Flow offers a multi-faceted solution that automates the workflow between several post-printing steps. The company's core competence is its AM-VISION module, which automates part identification based on infinite geometry. AM-VISION uses cameras and intelligent software to match printed parts to their STL file in under a second. The identification information generated in this step makes it possible to sort and route the printed parts accurately.

"Based on this core competence, identified parts can be sorted to the next step according to their bill

Once identified, parts are automatically sorted by item or batch.



Image: AM-Flow

of materials," Carlos adds. "Parts are then sorted into bins, going from a one piece flow to a batch of parts and vice versa. We have also developed other modules to support this workflow further: AM-PICK to place parts on the conveyor belt; AM-ROUTE to transport bins from the sorter to the required post-processing workstations and back; and AM-BAGGING to bag and label 3D printed parts ready for shipping.

"Based on demand in the market we have also launched AM-QUALITY, the first standalone geometric quality assessment solution. This is one in a line of quality assessment products we are working on with the aim to ultimately provide an in-line solution at high speed. Finally, we also offer AM-ID which enables identification based on alpha-numeric labelling, QR-codes or barcodes. All modules are connected through AM-LOGIC, our operating system that collects all data of parts passing through the system, thus enabling full track and trace of all parts."

It is worth re-emphasizing that AM-Flow's solution is entirely modular: customers can choose what auxiliary automated solutions they want to support the central AM-VISION system. In general, AM-Flow's customers are high-volume manufacturers, producing at least 300 parts per day. "3D printing service providers are of course a main element of our core target group as they attract multiple clients and generate high-mix output. Given the current growth rates and growth strategies, this almost always implies high-volume production. But we are also being approached by many different production facilities looking to scale their production by introducing fully automated production lines."

The bottom line is cost per part

AM-Flow's unique post-printing automation solution makes it possible for manufacturers to scale up their



The ultimate goal of AM-Flow's automated post-printing solution is to drive down the cost-per-part of additive manufacturing to make it more viable for full-scale production.

production while still maintaining a good cost per part ratio. And the company is continually striving to bring this number down, both through its own solutions and their influence on broader market trends.

"If we can reduce the cost per part, more business cases become viable and more applications can enter the AM arena," Carlos explains. "This in turn will impact perspectives on what is possible to achieve with AM and push adoption further. The resulting higher volumes will impact pricing once again. In other words, cost per part becomes the flywheel for scalability in the industry. And we provide hardware and software that enable and sustain end-to-end automated production lines."

Ultimately, achieving full-scale production for AM is a multi-pronged effort. Printer manufacturers are

working to improve the quality and efficiency of their systems. And materials companies are bringing new materials for AM to market and increasing production volumes. Both these efforts will eventually lead to a lower cost per part for additive manufacturing. AM-Flow's solution, for its part, is designed to underpin and support the AM workflow as these other changes are taking place by providing seamless automated part sorting and handling.

The company sums it up well: "Our focus is on providing a strong middleware solution that generates fully transparent production, which ultimately can contribute to fully certified end-to-end automated production processes." It is this highly automated production workflow that will lead AM to fully scalable production.