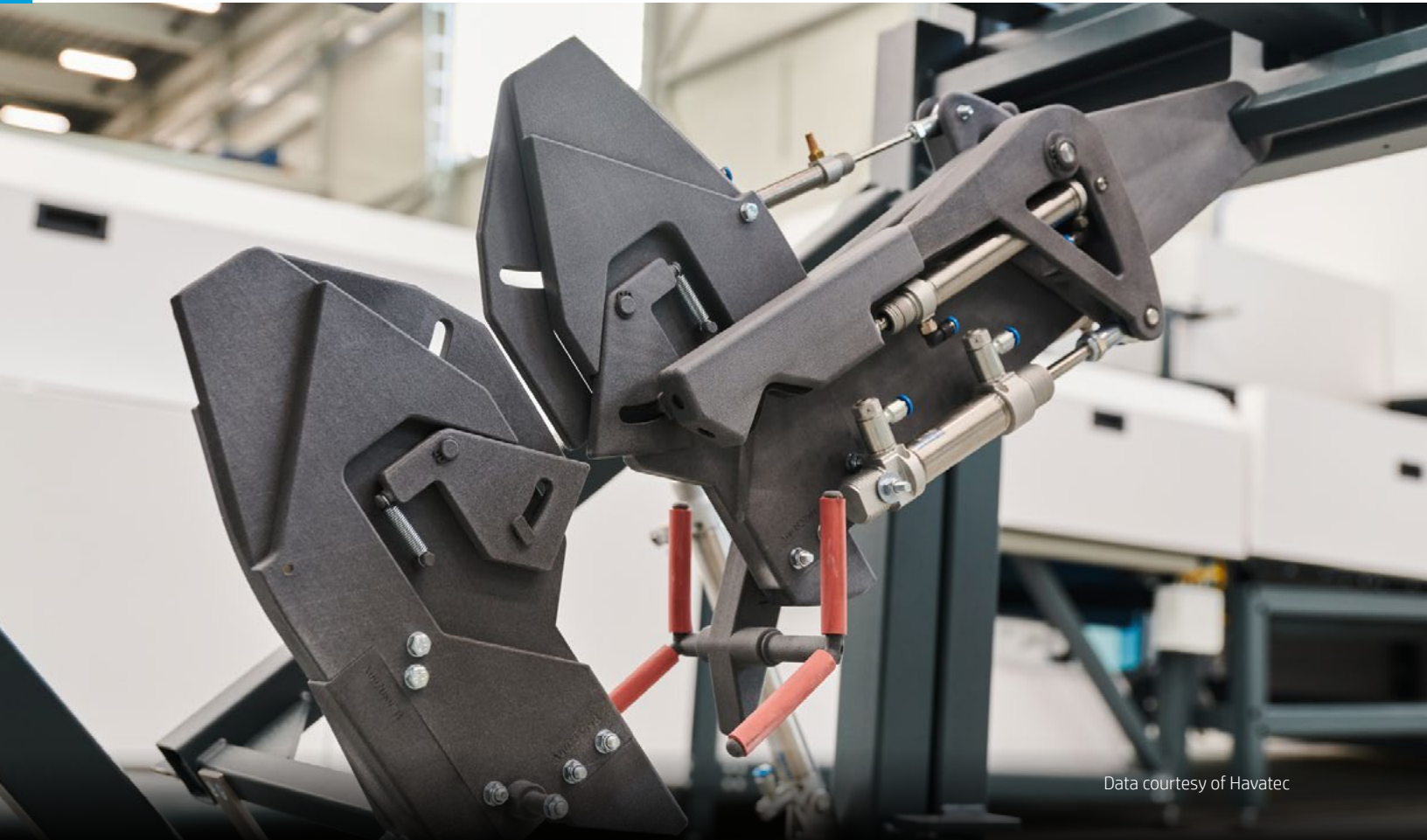


Havatec improves, automates, and accelerates production with HP 3D Printing



Data courtesy of Havatec



HP Multi Jet Fusion technology has allowed **Havatec** to design and produce stronger, more durable parts for its flower-bunching machine



Introduction

Havatec is an international supplier of grading, bunching, and handling machines for the flower-cutting industry. Havatec teams deliver turn-key cut flower projects that provide solutions for flower companies and yield high returns.

Havatec has developed an advanced machine that uses X-ray techniques to grade bulbs and to bunch flowers. Since 2003, more

than 1,000 of Havatec's machines have been installed at leading flower companies around the world.

During the past two decades, Havatec has become a leading supplier for the flower sector while maintaining the key values of mechanization in agriculture: "simple, reliable, and affordable."

- **Industry**

Industrial

- **Sector**

Machinery and equipment

- **Objective**

To integrate 3D printed parts into Havatec's new Wave machine—a machine that mechanically sorts and bunches flowers—in order to accelerate production and prevent operator error.

- **Approach**

Havatec brought in HP Jet Fusion 3D Printing Solutions and used HP 3D High Reusability (HR)¹ PA 11 material to produce strong, ductile², and impact-resistant parts at faster speeds for the Wave machine.

- **Technology | Solution**

HP Multi Jet Fusion technology, HP Jet Fusion 3D Printing Solutions

- **Material**

HP 3D HR PA 11

1. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 11 provide up to 70% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracies.
2. Testing according to ASTM D638, ASTM D256, and ASTM D648 using HDT at different loads with a 3D scanner for dimensional accuracy. Testing monitored using statistical process controls.

Challenge

A bunch of harvested delphiniums usually undergoes five steps to sort the varieties of the flowers by type, length, and color. This process was previously performed on a table, which was strenuous manual work for employees who rushed to achieve the fast production speeds that managers strove for but did not always result in uniform bunches.

Havatec began to test 3D printing technologies (e.g., FDM and SLS) to prototype select parts for their new “Wave” machine, a machine

that mechanically bunches flowers rather than relying on manual bunching. Technologies like SLS did not satisfy all requirements for some of the Wave parts and the materials showed wear in the early stages of production, so Havatec had to experiment with other manufacturing processes for such parts.

Once they saw the opportunities to not only create prototypes with 3D printing but also to create final parts for their products, Havatec management decided to expand their use of 3D printing.

Solution

Havatec went through a lengthy process to decide in which 3D printing technology they wanted to invest.

“In this process, we came across HP Multi Jet Fusion (MJF) technology,” said Teun Geerlings, Mechanical Engineer at Havatec. **“As an innovative company ourselves, we saw it as a good fit to work with HP. HP MJF would help us to create parts faster for innovative projects as well provide us with the opportunity to use 3D-printed parts in the production environment.”**

Havatec considered several options and technologies but ultimately chose HP Multi Jet Fusion technology because of its ease of use, agile unpacking, and its ability to foster a better working environment (due to the closed build unit and its unpacking method) compared with other machines and technologies. They also were impressed by the robustness of the parts, which were suitable for mechanical final parts production.



Data courtesy of Havatec

Result

The Wave machine features optical cameras to determine each stem's overall length and thickness. Based on this, the sorting takes place. Each stem is grabbed, shifted, and then placed in a certain position to be cut by a circular knife unit at the middle of the machine. A stem that doesn't meet the required sorting criteria (e.g., stem thickness, length) is discarded so that it does not interfere in the creation of uniform bunches. The belt will open and move the qualifying stems to the 3D-printed "bunching heads," which hold the flowers in place until a specific number is reached, at which point the bunch of flowers is gently transferred onto a binding belt. Then the stems are tied together with a string to form a single bunch.

Havatec engineers developed the Wave machine with more than 200 different part SKUs which were 3D printed using HP 3D HR PA 11 material, with several copies of each SKU integrated in one machine unit. Examples of such parts include mechanical electrical sensor units and parts that comprise the alignment unit.

Currently, Havatec produces approximately 5 to 10 of these machine units per year, expecting to increase production yearly. This results in an average of two to three HP MJF-produced buckets per week, including both final parts and prototypes. With each production cycle, Havatec engineers

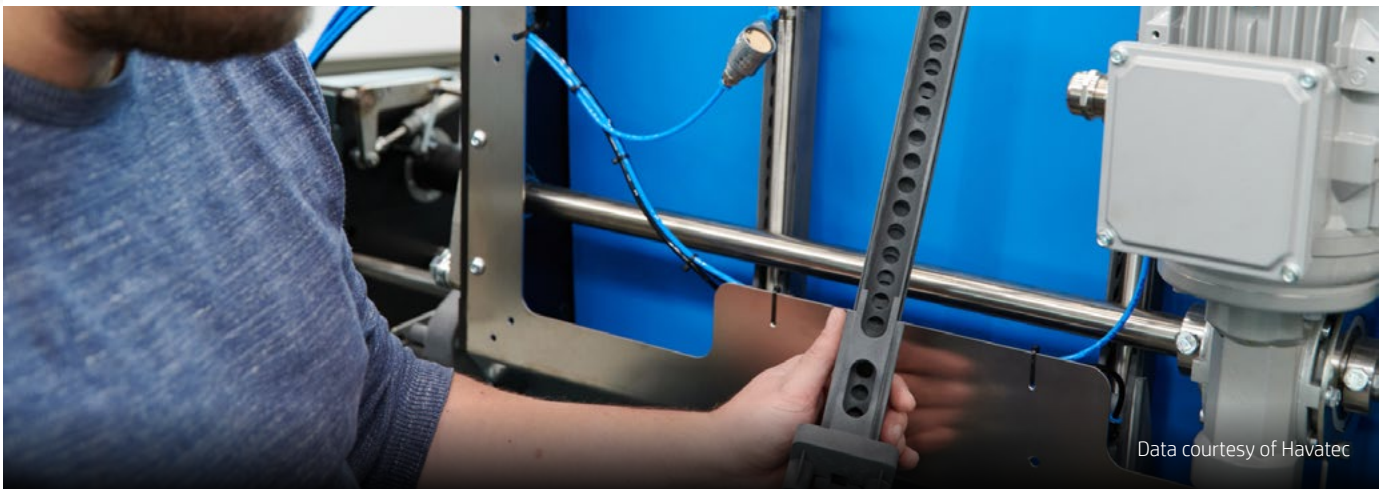
take advantage of the design freedom and experiment with new parts and mechanisms using HP Multi Jet Fusion technology, while benefitting from robust parts and a reduced lead time compared with traditional manufacturing.

With the Wave machine, Havatec customers currently produce an average of 1,900 stems per hour, with a maximum of 4,000 stems, with just three employees: one at the beginning of the Wave who places the flowers on the supply belt, one at the end who collects the bunches, and a third to manage logistics.

All HP Multi Jet Fusion parts produced for the Wave machine are made from HP 3D HR PA 11 material. Havatec engineers selected this material because of its enhanced elongation at break² and impact resistance, properties that contribute to better machine performance. Thanks to the strength and durability of this material, Havatec's tests validated that their parts made with this material lasted for approximately 5 million cycles.

In the future, Havatec expects HP Multi Jet Fusion to help them further innovate and reduce time to market.

"The use of HP MJF will increase," said Jan Kok, Managing Director at Havatec. **"We are glad we chose HP MJF since we can produce faster, smarter, and better parts."**



Data courtesy of Havatec

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4AA7-7015ENW, March 2020

