

HP Metal Jet technology powers John Deere tractors

John Deere—the leader in tractor technology—is in the process of taking one giant leap forward, with a little help from HP 3D printing. The company has tapped into the power of HP Metal Jet technology in its Mannheim factory to drive manufacturing innovation through cost-effective production and significant design improvements.



Industry

Industrial

Objective

Cost-effectively mass produce a metal 3D-printed thermal diverting valve for use in John Deere tractors

Technology | Solution

HP Metal Jet technology
HP Metal Jet S100 Printing Solution

Sector

Hydraulics

Approach

John Deere partners with GKN Powder Metallurgy and HP to refine the design and speed production of its first metal 3D-printed part

Material

HP Metal Jet SS 316L



The image above shows green parts of the thermal diverting valve application.

Introduction

True to its motto, “Nothing runs like a Deere,” the Legendary John Deere brand is solidly built on top quality tools and equipment that—quite simply—work exactly as they should. That’s why the company turned to GKN Powder Metallurgy and HP to optimize the design and production of valves used in their tractors that meet high standards for reliability and excellence.

Opportunity

John Deere is the world's leading manufacturer of agricultural and turf equipment. They're known for using state of the art manufacturing technology to produce products and solutions that serve customers.

The company is not new to additive manufacturing (AM), which relies on computer models to create complex parts layer by layer without the use of production tools. In fact, John Deere factories across the globe have used AM for years to 3D print thousands of tools, jigs, and fixtures that improve processes and increase ergonomics.

In its Mannheim design center for small- and mid-size tractors, however, the company is beginning to incorporate metals into 3D production. According to Dr. Jochen Muller, Manager of Global Digital Engineering, this marks new territory. "With the new thermal diverting valve for tractors," he says, "John Deere goes one step further. It is the company's first 3D printed metal part going into production."



Data courtesy of John Deere

Solution

HP's metal 3D printing was the impetus. "An enabler for the project," says Muller, "is the new additive manufacturing process called HP Metal Jet and the cooperation with the company GKN Powder Metallurgy."

HP Metal Jet technology was designed specifically for mass production and delivers both process and cost efficiencies while enabling high-production uptime. A metal powder is glued together, through a binding agent, layer upon layer until a green part is created. The green part is then sintered in industrial-grade ovens, moving from conventional powder metallurgy to high quality, durable, and tough metal parts.

In addition to HP Metal Jet technology, GKN Powder Metallurgy has been instrumental in bringing the John Deere valve to fruition. GKN is the world's leading manufacturer of powder metal products, delivering 3D printed parts to the automotive and other industries.

The product engineers at John Deere and the manufacturing experts at GKN worked closely together to refine and improve the design of the fuel valve for 3D printing—making it the world's first technical application mass produced with the HP Metal Jet process.

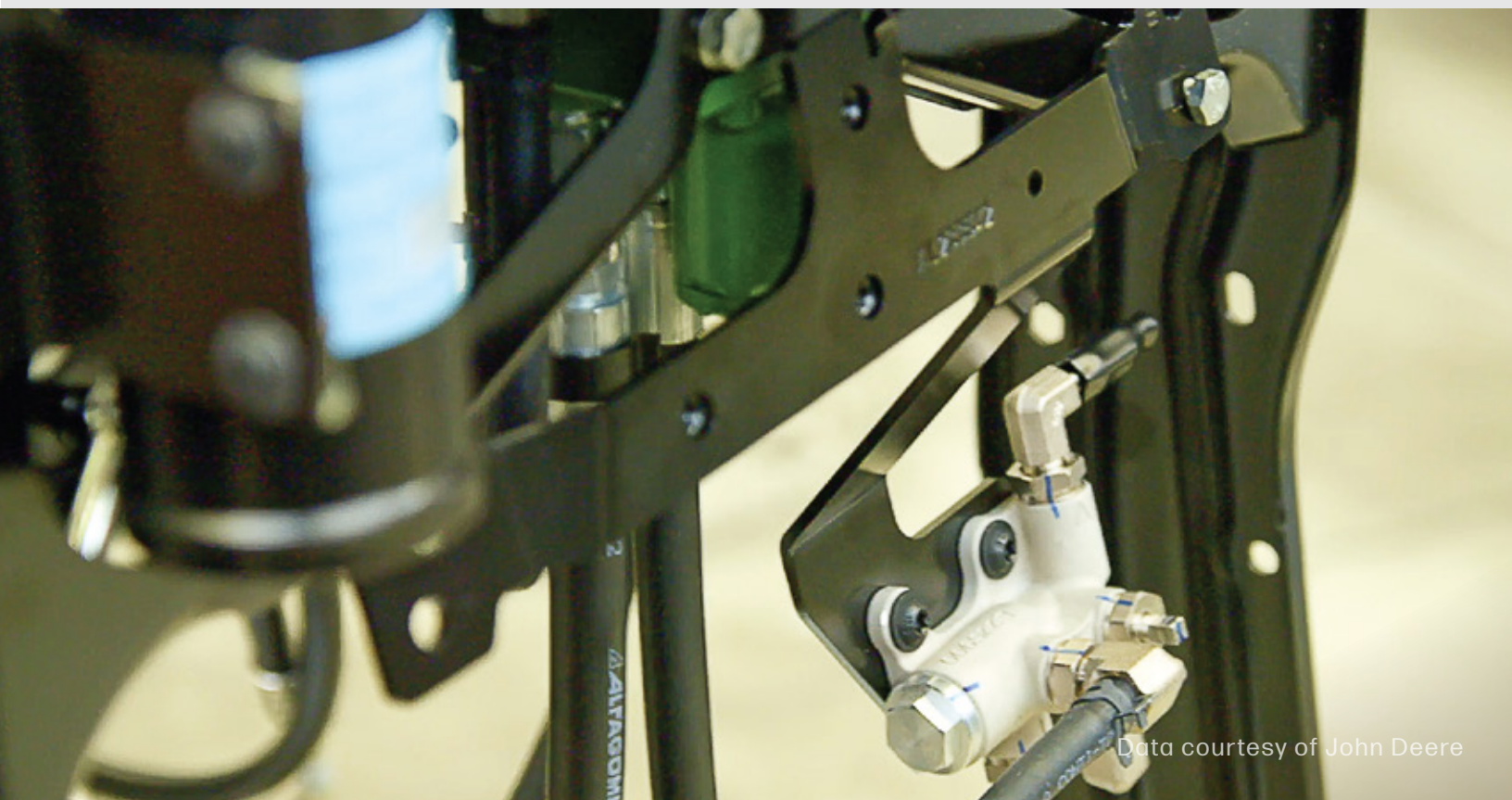
Results

According to Muller, "The thermal diverting valve underwent rigorous testing in order to ensure excellent part quality." He adds, "Currently over 4,000 valves are being shipped from GKN to the John Deere tractor factory for final assembly."

In addition to excellent part quality, HP Metal Jet technology delivers a broad range of other benefits. The ability to perform fast iterations and rapid prototyping is essential, says Muller. "Our innovative, internal 3D printing capabilities allow our designers to easily test their ideas and verify their concepts at a very early stage within the development process. The ability to reduce design and test iterations enables developers to come up with a perfect solution for products very quickly," he adds.

Lower costs and greater agility add to HP Metal Jet's appeal. "Due to this innovative process," says Muller, "the costs per part were reduced, and the performance increased." HP Metal Jet also "unleashes agility throughout the product lifecycle from development to manufacturing and, finally, service parts supply."

The thermal diverting valve is the result of a targeted John Deere strategy, says Muller, adding, "It's one of many innovative 3D printing solutions to come in the future."



Data courtesy of John Deere

The image above shows the final and assembled part of the thermal diverting valve.

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