LOCTITE®

PRECISION SPRAYING FOR SMARTER AGRICULTURE

Application Introduction

The Merlin IC System provides an optimized solution for the precise application of crop protection chemicals. This advanced system utilizes specialized valves with Pulse Wave Modulation nozzles and Ultrasonic Flow Meters to ensure accurate control over chemical distribution across all sections of the boom. These features allow applicators to monitor and adjust multiple flow rates simultaneously, enhancing application accuracy and minimizing waste.

Engineered to meet the demanding conditions of agricultural environments, the valves in the Merlin IC System offer robust chemical resistance and durability, capable of withstanding pressures up to 80 psi. This resilience ensures consistent performance and supports the long-term reliability of the system in real-world applications.

APPLICATION:
AGRICULTURAL FLUID MANIFOLD

MATERIAL:
LOCTITE 3D IND249

Henkel

The Challenge

Designing and manufacturing the valve for the Merlin IC System posed unique challenges, primarily due to its function in retrofitting existing sprayer systems by intercepting fluid flow at the section level. To operate effectively, the valve needed to divert flow through a series of precisely engineered internal pathways that enable passive mixing and continuous recirculation. Achieving this complex flow control within a single, consolidated assembly required innovative solutions, as the design replaced approximately 50 separate components with a streamlined alternative.

Material selection further complicated the manufacturing process, as the valve required a chemically resistant material to endure the harsh agricultural environment and ensure long-term durability. Given the complexity of the internal features and the necessity for functional prototypes, traditional manufacturing methods were inadequate for achieving the required precision and performance. This challenge ultimately prompted the exploration of advanced manufacturing techniques capable of meeting the stringent functional and structural demands of the Merlin IC System's valve.

The Solution

The valve component was successfully produced in just 12 hours using Loctite® 3D IND249 material on an MSLA printer, providing an efficient solution to our design challenges. After printing, the parts were carefully cleaned in isopropyl alcohol to ensure optimal finish quality and performance. A significant advantage of this solution is the material's non-porous, chemically resistant properties, which meet the demanding requirements of agricultural applications. With successful testing of this material, production can be seamlessly scaled by adding additional printers without the need to validate a new material, allowing us to meet increased demand while maintaining quality and production efficiency.

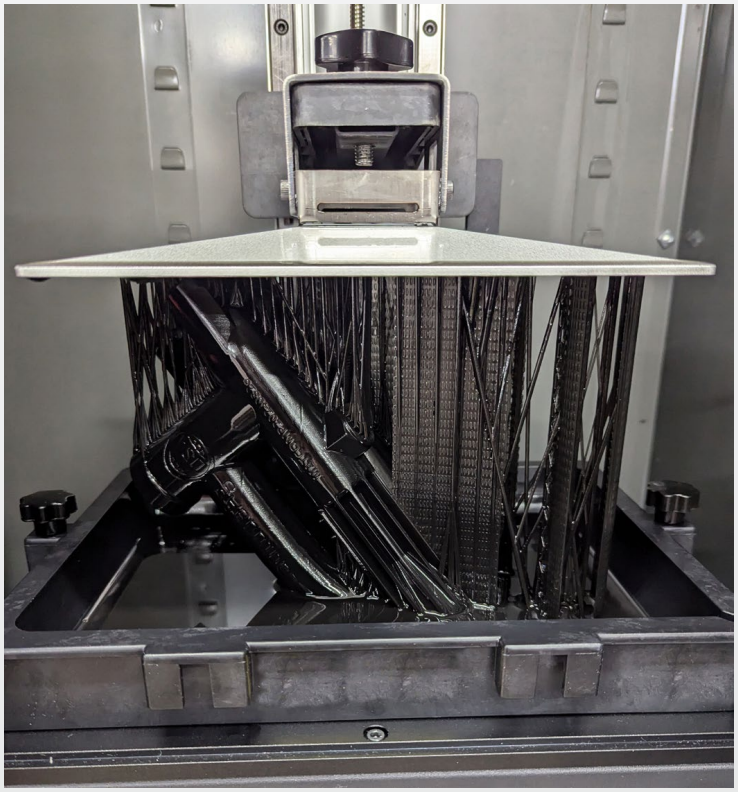
Henkel Materials Used

	Color	HDT at .455 MPA (°C)	Tensile Stress at Break (MPa)	Elongation at Break (%)	Young's Modulus (MPa)	Flexular Modulus (MPa)	IZOD Impact Notched (J/m)	Shore Hardness
		ASTM D648	*ASTM D638*	*ASTMD638 (D412)*	*ASTM D638*	*ASTM D790*	*ASTM D256*	*ASTM D2240*
IND249	*Black*	*115*	*98*	*5*	*3,300*	*3,600*	*24*	*88 D (3 sec)*

BENEFITS

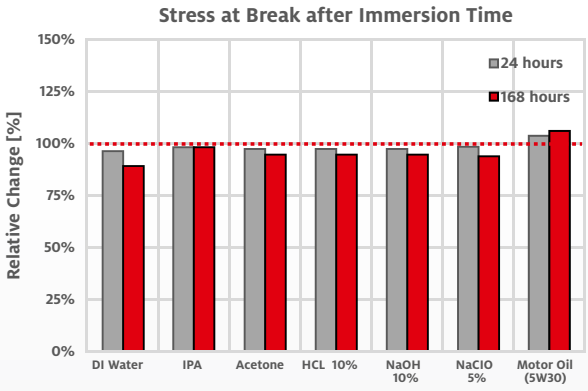
Earlier prototypes were initially produced using a powder-based nylon additive manufacturing method. However, product performance significantly improved after switching to a resin-based approach and bringing production in-house. This transition also offered the added benefit of a smoother surface finish compared to powder-based manufacturing. The smoother surface enhances both cleanout performance and fluid flow, contributing to the overall efficiency and reliability of the Merlin IC System.

LOCTITE® 3D IND249™ BK has been tested after chemical ageing according to ASTM D543. The influence of chemicals was tested by measuring mechanical properties after different test times (Immersion test for 24 and 168 hours). Learn more.

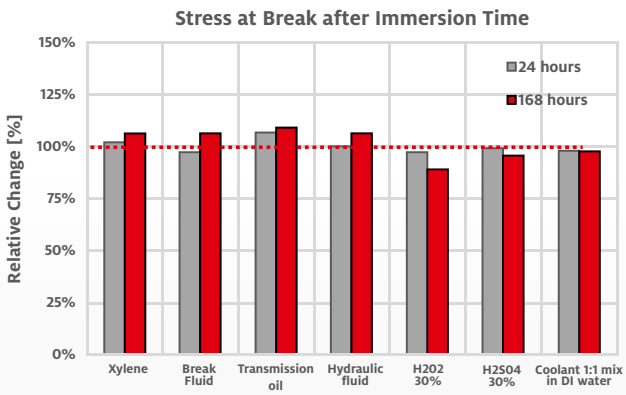


AGEING AND ENVIRONMENTAL EFFECTS - CHEMICAL RESISTANCE INDUSTRIAL

INDUSTRIAL



AUTOMOTIVE



Want to learn more about Henkel's unique material solutions for the additive manufacturing industry?
Visit Henkel's LOCTITE 3D Printing at LoctiteAM.com or reach out to us via loctite3dp@henkel.com

About LOCTITE

LOCTITE Additive Manufacturing delivers unique photopolymers with production capability, customized resins and engineering services to identify the best application to address your needs. With a constantly growing portfolio of high-performance materials, specialized equipment and post-processing solutions, LOCTITE overcomes the limitations of conventional 3D printing to enable additive manufacturing for the production of durable, functional parts. Through its strategic partnership with technology leaders for specialized equipment, LOCTITE is driving the adoption of 3D printing beyond prototyping and toward the production of final parts.
www.LoctiteAM.com

About PRIMARY MFG

Primary MFG, based in South Dakota, is a leading contract manufacturer specializing in additive manufacturing. Utilizing state-of-the-art equipment, we deliver high-quality, precision-engineered products to clients nationwide. Committed to excellence, we provide tailored production solutions with a focus on innovation and quality. Our customer-centric approach ensures responsive, professional service, making us a trusted partner in the manufacturing industry. We continuously invest in the latest technologies to stay at the forefront of the industry, offering advanced solutions that drive success for our clients.

About LatitudeAg

At Latitude-Ag, our mission is to empower agricultural professionals with innovative, precise, and environmentally responsible crop protection solutions. We are committed to delivering cutting-edge technology, exemplified by our Merlin IC System, which optimizes chemical application through advanced multiport-injection and continuous flow systems. By enhancing efficiency, reducing waste, and promoting sustainability, we provide applicators and farmers with tools that save time and cost while preserving the environment. Latitude-Ag is dedicated to improving agricultural practices and supporting the success of our clients in every field.

© 2024 Henkel Corporation. All rights reserved.