Lynxter

INDUSTRIAL SEALING WITH SILICONE & PU 3D PRINTING

MANUFACTURING

Industrial sealing is a critical aspect to ensure both reliability and efficiency of machinery and equipment across all sectors: automotive, aerospace, oil and gas, etc...

Silicone 3D printing emerges as a transformative technology that addresses challenging operating conditions by enabling the creation of high-performance, and custom-designed seals with enhanced durability and reliability.

CHALLENGES

Industrial sealings faces challenges, including ensuring perfect seals under extreme temperatures, pressures, and chemical exposures. Material selection is a critical point to withstand these conditions.

Traditional methods for producing customized seals for specific applications are not ideal, leading to increased complexity and cost. In contrast, silicone 3D printing provides an innovative solution that simplifies sealing design and enables the creation of advanced smart seals.

RESISTANCE

One of the main advantages of silicone in industrial sealing is the material's exceptional resistance to extreme conditions. Silicone can withstand a wide range of temperatures (from -50°C to +250°C), making it suitable for use in harsh environments. It is also resistant to chemicals, UV radiation, and weathering, ensuring long-lasting performance in various industrial applications.

Silicone 3D printing eliminates the need for molding processes and enables on-demand production of functional and customized seals with rapid iteration.

OLD AND NEW SHAPES

Silicone 3D printing is the solution for parts obsolescence. It acilitates the creation of seals that can no longer be produced due to outdated molds or minimum order quantities. It allows for the production of non-standard shapes, complex geometries, and innovative designs like lattice and honeycomb infills, hollow seals. This capability is especially advantageous for industrial applications, where custom-designed seals and gaskets enhance performance and fit.

The flexibility of silicone 3D printing allows rapid prototyping and production of bespoke solutions. tailored to specific applications, enhancing the efficiency and effectiveness of sealing systems.

Gasket, O-rings, flat seals, lip seals, labyrinth seals, possibilities are endless.

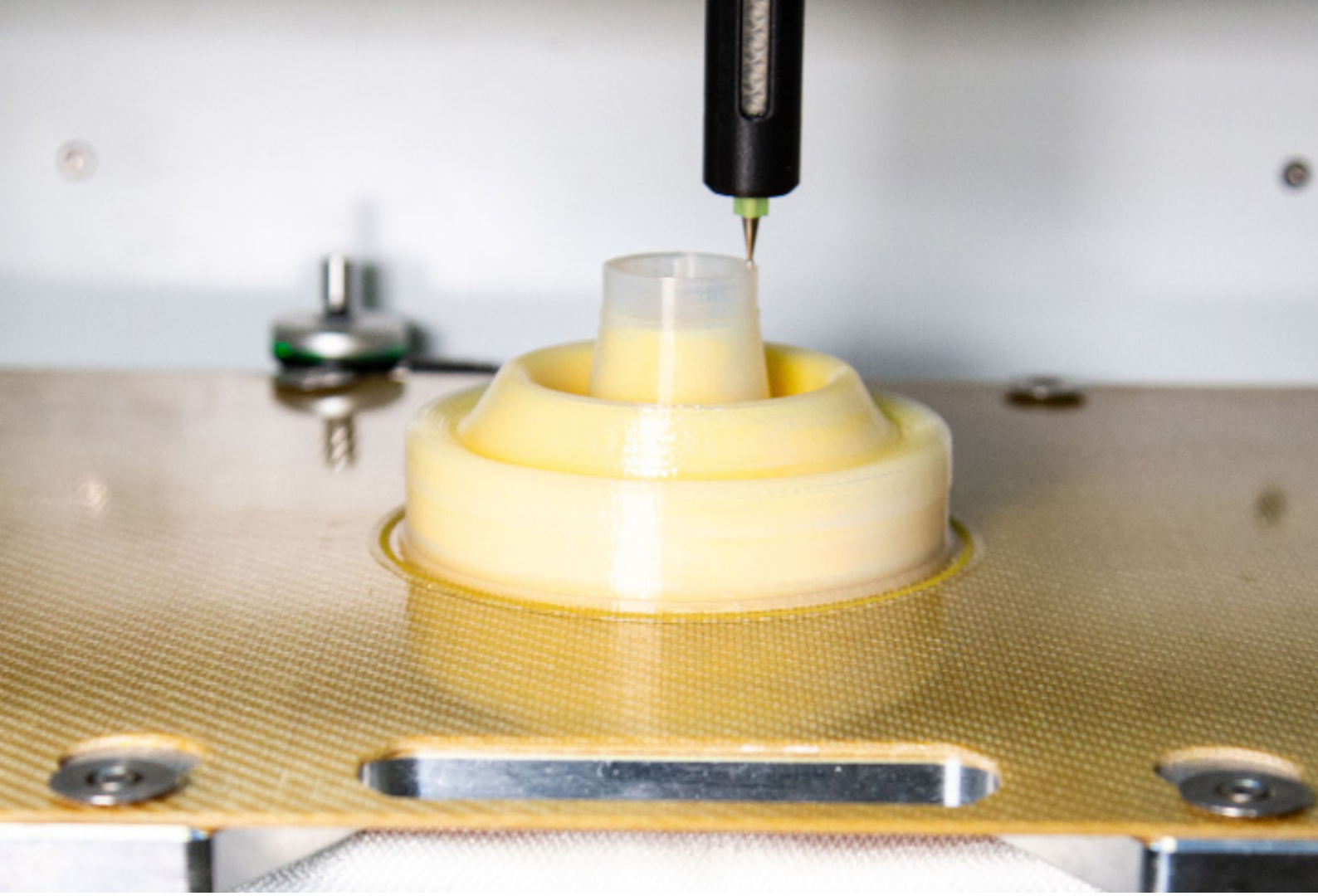
Check page 10 for printing information.

TECHNOLOGY

We offer additive manufacturing by material extrusion (MEX). By adjusting extrusion flows, depth, trajectories, and material hardness, we achieve shapes and creations that cannot be realized with traditional processes.

Industrial and medical-grade silicones (RTV1, RTV2, LSR, etc.), polyurethanes, hydrogels, inks—we can adapt endless formulations to meet specific requirements, from color and fillers to rheology or specific reactivity. We can use bio-sourced materials, design recyclable materials, and adhere to strict HSE constraints for the user.

Lynxter can work on 3D printing of fire-smoke FST silicone, conductive silicone, filled silicone, and many other possibilities.



PROCESS

Before printing, digitize your designs in dedicated software. Any CAD software or 3D scanning allows generating geometry for 3D printing.

To create the part, material is extruded through a precise nozzle that moves via multi-axis programming. We can also alter their physical state during or after printing using various techniques: mixing, heat, humidity, or UV exposure as needed.

The support material, which is completely water-soluble, can be easily removed.

SPARE PARTS

When seals and gaskets wear out or get damaged, 3D printing offers a quick and efficient method for producing replacement parts. This reduces the downtime associated with waiting for custom parts to be manufactured and delivered. Additionally, 3D printing streamlines maintenance operations avoiding the need for extensive spare part inventories through digital inventory management and on-demand production.

IMPROVE

Lynxter's open ecosystem ensures that your R&D team can work autonomously on material formulations, printing techniques, and innovations, leading to better-performing seals.

For example, integrating smart technologies, such as sensors and real-time monitoring, into 3D-printed seals can enable predictive maintenance, further optimizing the performance and lifespan of sealing systems

PROPERTIES

Material	Young modulus	Hardness	Elongation at break	Tensile strength	Tear strength	Resilience	Compres-sion set
SIL-001	3.2 (±0,1) MPa	48 (±3) shA	279 (±20) %	7.34 (±0,5) MPa	7.74 (±0.5) N/mm	54.42 (±0.5) %	7.4 (±0.5) %
PU-001	7.5 (±0,1) MPa	72 (±2) shA	391 (±20) %	6.82 (±0,5) MPa	33.4 (±1) N/mm	45.25 (±0.5) %	79 (±1) %

PRINTING INFORMATION

PRINTED SEALS	PRINTING TIME	NOZZLE SIZE	LAYER HEIGHT	DIMENSIONS	MATERIAL
	2 h15	0,69 mm	0.35 mm	200 x 19 x 14,4 mm	SIL-001
	1 h38	0,69 mm	0.35 mm	40 x 40 x 11,3 mm	SIL-001
	1 h10	0,69 mm	0.35 mm	189 x 189 x 13,5 mm	SIL-001
	27 min	0,86 mm	0.50 mm	100 x 168,4 x 4,5 mm	SIL-001
	40 min	0,69 mm	0.35 mm	137,3 x 119,1 x 6 mm	PU-001
	15 min	0,69 mm	0.35 mm	50 x 50 x 5 mm	SIL-001
	1 h	0,69 mm	0.35 mm	180,2 x 179,2 x 9 mm	SIL-001

MORE

Learn more about our uses case in those three articles:

From Additive Manufacturing Village 2024 (European defense MRO event) : https://lynxter.fr/en/blog/chronicles/am-village-2024-functional-elastomer-3d-printing/

Industrial maintenance : https://lynxter.fr/en/blog/chroniques/how-silicone-3d-printing-reshapes-industrial-maintenance-and-production-dynamics/

From Additive Manufacturing Village 2023 (European defense MRO event) : https://lynxter.fr/en/blog/chronicles/defense-enhancement-the-benefits-of-modular-am-in-expedient-repair/

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