CASE STUDY:

MODERNIZING CIRCUIT BREAKERS WITH 3D PRINTING

LOCTITE®

Application Introduction

Additive Innovators created a customized electrical switch interlock together with AmPd Labs for industrial generator breaker panels, designed with precision and made more robust than standard alternatives, reflecting the high standards required in electrical power generation and similar industries. The application of advanced technologies like 3D scanning in its development process highlights the industry's ongoing commitment to safety, efficiency, and innovation. For electrical engineers and electronic manufacturers, understanding and leveraging these technologies are essential for staying competitive and meeting the evolving demands of the professional market.

MATERIAL:

LOCTITE 3D IND3380

The Challenge

The main challenge lies in effectively integrating 3D printing technology into current production and maintenance procedures. This involves smoothly blending customization features, choosing appropriate materials such as Loctite 3D IND3380 to meet specific mechanical and physical needs, and ensuring cost-effectiveness to cut down lead times and operational costs. The ultimate aim is to utilize additive manufacturing to boost flexibility, decrease downtime, and enhance equipment performance with tailored solutions, thereby tackling conventional industry hurdles and adopting more agile manufacturing and maintenance approaches.

Henkel

Henkel Adhesive Technologies

CASE STUDY:
MODERNIZING CIRCUIT BREAKERS WITH 3D PRINTING

The Solution

- Material selection: LOCTITE® 3D IND3380

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*
IND3380	*Black*	*190*	*50*	*2*	*3,000*	*3,400*	*13*	*86 D (3 sec)*

Advanced 3D Printing Process

Rapid Production: The print of each part took only 15 minutes on the NEXA3D NXE 400 Pro, which underscores the speed advantage of using cutting-edge 3D printing technology. This capability is especially crucial for reducing downtime in critical applications.

Post-Processing: The post-processing steps (dirty wash with NEXA3D X-Wash, followed by a clean wash, and then curing with X-Cure) ensure the parts meet the required standards for electrical applications. This process cleans the parts and enhances their mechanical properties by curing. IND3380, chosen for its suitability for electrical applications, illustrates the importance of material selection in 3D printing. This material offers essential ESD capabilities, electrical insulation and durability which are crucial characteristics for components used in electrical systems.

Lead Time Reduction: By reducing the lead time by three months, 3D printing has demonstrated its ability to accelerate the production cycle significantly. This reduction is invaluable for maintaining continuous operations and can be a competitive advantage in industries where equipment uptime is critical. The statement that the 3D printed part was 45% less expensive than the OEM part is a significant highlight. This cost reduction can be attributed to eliminating tooling costs, lowering material waste, and efficiently using resources and labor associated with 3D printing. Production Scalability: Printing 20 parts for the order within such a short timeframe and the capacity to produce 100 parts per year showcases the scalability of 3D printing for both small and large orders. This flexibility is essential for responding to varying demand levels without the need for inventory overstock.

Efficiency and Environmental Impact: The efficient use of materials and energy in 3D printing, compared to traditional manufacturing methods, not only reduces costs but also minimizes waste, contributing to more sustainable production practices.

BENEFITS

The application of 3D printing technology represents a paradigm shift in how companies can address the challenges of lead times, cost, and customization in producing specialized parts. By leveraging the NEXA3D NXE 400 Pro and its associated post-processing systems, demonstrated that achieving high-quality, application-specific parts more quickly and cost-effectively is possible than traditional OEM parts. This case study exemplifies the broader potential of 3D printing to transform manufacturing processes across industries, offering a blueprint for others to follow in pursuit of operational efficiency and innovation.

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**