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BizLink



CASE STUDY

for the Electrical Appliance market

Developing a PFAS-free silicone cable

for a cooking combine oven



Introduction

Special heat-resistant cables have become an essential component in the safe operation of modern ovens. Their ability to handle extreme temperatures, resist corrosion, provide electrical insulation, and remain durable over time ensures that the appliance functions efficiently and safely. Their properties protect users from electrical hazards, overheating, fire risks, and other potential safety concerns.

A possible EU law to forbid plastics containing fluoropolymers as part of the PFAS chemicals now leads manufacturers of household machines to substitute formerly used insulation materials like PTFE while maintaining the mandatory electrical, mechanical, and media resistance performance of the cables used. This case study shows how silicone can help.



Challenge

A manufacturer of cooking combine ovens faced the challenge of finding a cable that met demanding safety requirements and avoided using harmful PFAS materials. The cable was installed as part of the automatic switch-off circuit system, requiring compliance with stringent non-flammability standards, exceptional flexibility for complex routing within the oven's thermal environment, seamless integration with existing connectors and components to minimize production line disruption, and reliable electrical performance under high-temperature conditions.



Project Execution

BizLink started its standard cable design process by thoroughly analyzing mandatory requirements and customer needs. The team then leveraged its expertise to anticipate potential challenges and incorporate them into the design from the outset. The major goals for the new development were:

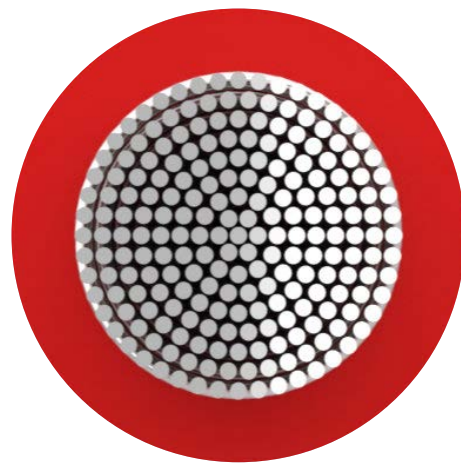
- 1 PFAS-Free Solution:**
Develop a PFAS-free silicone cable solution that meets the customer's strict safety and performance requirements, such as non-flammability and high flexibility.
- 2 Safety Functionality:**
Ensure the cable maintains critical safety functionality, specifically in the automatic switch-off circuit, during all operational phases and control checks.
- 3 Direct Compatibility:**
Guarantee direct compatibility with existing oven hardware to facilitate immediate replacement without costly redesigns.



Solution

A PFAS-free Silitherm silicone cable solution was developed that met all the required specifications.

The cable design incorporated optimized conductor stranding and insulation materials to achieve enhanced flexibility and thermal stability. It was designed as a direct drop-in replacement, ensuring perfect compatibility with existing connectors and components.



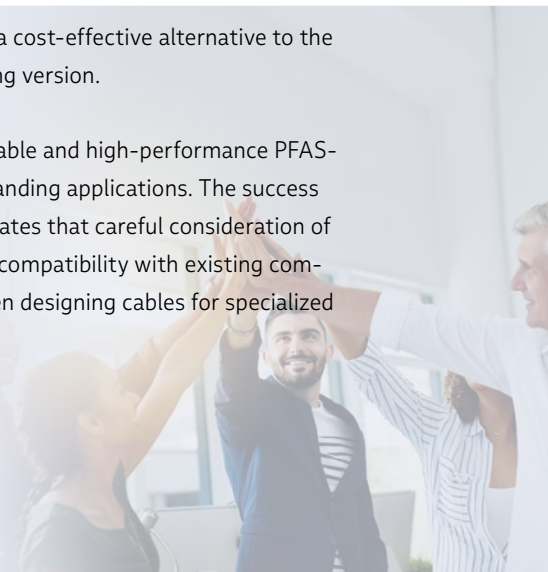
Results & Benefits

The material selection and cable design resulted in a cable that exceeded the client's flexibility requirements while meeting all of the electrical and thermal specifications. Furthermore, it maintained the same safety shut-off functionality of the previous cable. The client received sample cables within a defined timeframe and is currently conducting internal validation.

Positive side effect: The improved flexibility of the PFAS-free BizLink Silitherm silicone cable solution enables the customer to explore new cable routing configurations, facilitating future oven design modifications and potentially reducing assembly time.

The new cable provides a cost-effective alternative to the previous PFAS-containing version.

Silicone cables offer a viable and high-performance PFAS-free alternative for demanding applications. The success of this project demonstrates that careful consideration of material properties and compatibility with existing components is essential when designing cables for specialized equipment.





Problem Identification

> The PFAS problem in cable manufacturing



PFAS >
PERFLUORINATED & POLYFLUORINATED ALKYL SUBSTANCES

PFAS have been at the center of public and political debate for some time. These so-called “forever chemicals” are contained in numerous everyday products due to their special properties, such as water and dirt repellency.

However, their use also poses considerable risks to people and the environment, which is why a complete ban on all PFAS or only certain particularly problematic substances is being debated. Numerous countries, including Germany, have already taken measures to restrict the use of PFAS. For example, the use of PFAS-containing fluoroprotein foams in firefighting is increasingly being restricted, and the textile industry today is relying on PFAS-free impregnations. In both cases, PFAS-containing particles were previously released directly into the environment.

In cable production, PFAS-containing fluoropolymers are used exclusively in solid form. They are used as a material for outer sheaths, inner sheaths, core insulation, or (in the case of PTFE) as tapes to improve the sliding behavior of several elements within a cable.

As long as no PFAS-free alternative has been researched that can fully replace all material properties, cable manufacturers, and manufacturers of production equipment, are faced with the challenge of replacing the versatile fluoropolymers with existing PFAS-free materials at the customer's request without compromising the desired properties.



About BizLink

Founded in 1996 and headquartered in Silicon Valley, USA, BizLink is dedicated to making transformative connections that bring visionary ideas to life.

We specialize in providing essential components such as wire harnesses, connectors, and cables to a broad spectrum of industries including IT Infrastructure, Client Peripherals, Optical Fiber Communications, Telecom & Networking, Electrical Appliances, Medical Equipment, Factory Automation & Machinery, Semiconductor Technology, Healthcare, Motor Vehicles, Mobility, Marine, Industrial, and Solar Energy.

Our global presence, with flexible production resources and R&D teams across America, Europe, and Asia, allows us to proactively drive innovation and enable future possibilities.

At BizLink, our customer-centric approach and commitment to relentless advancement empower us to deliver zero-distance service and continual performance optimization, making a positive and meaningful impact worldwide. We turn possibilities into reality; furthermore, we connect possibilities to world-changing visions.