FLUOROCARBON

CASE STUDY

SECURING SUPPLY CHAIN CONTINUITY THROUGH MATERIAL INNOVATION

SUMMARY

Following the discontinuation of a legacy thermoplastic vulcanizate (TPV) material grade by the original manufacturer in 2022, an aerospace OEM faced a critical supply chain and engineering risk affecting the manufacture of a tube plug used in an aerospace application. In response, Fluorocarbon proactively partnered with the customer to engineer, validate, and qualify a fully compliant alternative material. This programme followed Fluorocarbon's structured obsolescence-management and material qualification process, aligned with aerospace FAIR requirements, ensuring seamless production continuity, cost control, and long-term reliability.

Following a structured material evaluation, customer-led validation, and successful production trials, Material A was approved as the new material of record. Fluorocarbon has since produced and delivered over 1,500 compliant parts, securing long-term supply for a mission-critical aerospace component.

BACKGROUND:

MANAGING THE DISCONTINUATION OF A LEGACY TPV MATERIAL GRADE

A legacy TPV material grade was historically used for injection-moulded tube plugs produced by Fluorocarbon and external suppliers supporting an aerospace OEM. The discontinuation of this material grade in 2022 abruptly exposed a single-source material dependency that carried the risk of production stoppage, rising procurement costs for remaining stock or last-time buys, and potential certification and compliance challenges.

Beyond immediate supply concerns, the discontinuation introduced engineering and regulatory risk, as any alternative material would require full validation, qualification, and formal approval to ensure compliance with aerospace performance requirements. As a result, Fluorocarbon and the customer jointly initiated a structured engineering change management project focused on identifying a technically equivalent alternative material, validating material and part performance under operational conditions, and securing long-term supply chain resilience while maintaining part quality, consistency, and cost control.

TECHNICAL CHALLENGE

Any replacement for the discontinued TPV material grade was required to demonstrate functional equivalence while maintaining processing stability and long-term in-service performance.

Key requirements included resistance to oils and greases, stability under elevated temperatures, dimensional stability, robust mechanical performance (including tensile properties, elongation, and compression set), and repeatable, stable injection-moulding behaviour suitable for series production.

IDENTIFYING ALTERNATIVES: DATA-DRIVEN MATERIAL SELECTION

Fluorocarbon evaluated alternative elastomeric compounds using the discontinued TPV material grade as a reference baseline. Two potential replacements were identified and proposed to the aerospace customer for review and validation.
For confidentiality purposes, the two shortlisted alternative elastomeric compounds are referred to as Material A and Material B throughout this case study.

Property Area	Legacy TPV Material	Material A	Material B
Density	Comparable	Slightly lower	Slightly higher
Tensile Performance	Baseline	Higher than baseline	Higher than baseline
Elongation	Moderate	Significantly higher	Higher
Compression Set	Low	Comparable	Higher
Hardness	Comparable	Comparable	Comparable
Chemical / Oil Resistance	Suitable	Suitable	Suitable

Both materials passed the customer's initial acceptance and were shortlisted for validation. While both met baseline mechanical and physical requirements, Material A was selected as the preferred solution based on its balanced performance profile, processing suitability for injection moulding, and cost-effectiveness for sustained production volumes.

VALIDATION & TESTING: CUSTOMER-LED QUALIFICATION

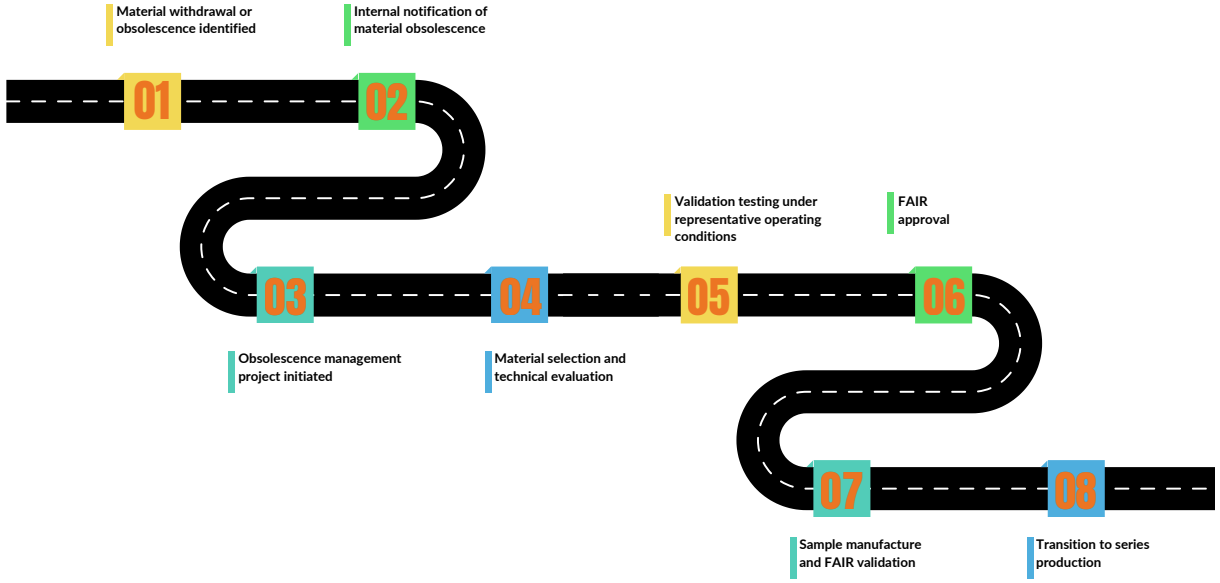
The aerospace customer conducted customer-led validation and qualification testing to confirm the suitability of the proposed alternative materials. Testing focused on material stability and performance under representative operational conditions, with minimal changes observed in key characteristics such as weight, hardness, and dimensional stability.

These results supported the conclusion that both submitted materials were technically acceptable for production and FAIR evaluation, enabling progression to production trials using the preferred Material A.

STRUCTURED OBSOLESCENCE MANAGEMENT & QUALIFICATION PROCESS

The material transition programme followed Fluorocarbon's structured obsolescence-management and qualification process, designed to ensure controlled risk, technical robustness, and full traceability from initial notification of material withdrawal through to high-volume manufacturing.

The accompanying process flow illustrates the generic end-to-end approach, including material obsolescence identification, alternative material selection and validation, sample manufacture and FAIR approval, and transition to stable series production. The process is Fluorocarbon-branded and intentionally customer-agnostic.



COMMERCIAL & OPERATIONAL IMPACT

Despite limited customer disclosure of quantitative data, the structured engineering approach delivered clear operational and commercial value.

Confirmed benefits included secured long-term supply chain continuity following material obsolescence, cost optimisation through selection of a lower-cost functional equivalent, maintained production reliability with no reported quality issues, seamless transition supported by updated BOMs, routings, and drawings, and zero production downtime due to timely identification and qualification of alternative materials.

A PARTNERSHIP-LED ENGINEERING APPROACH

This project exemplifies a strong collaborative engineering relationship between Fluorocarbon and an aerospace OEM. Fluorocarbon provided rapid alternative material samples, supported customer-led qualification and testing, coordinated FAIR submission and documentation updates, and maintained transparent communication throughout every stage of the process. This collaboration ensured technical alignment, timely decision-making, and controlled implementation, enabling a risk-free transition to the newly approved material supply.

Through engineering expertise, material science knowledge, and partnership-led collaboration, Fluorocarbon successfully mitigated a critical supply chain risk for its aerospace customer. The approved transition to Material A now serves as a proven reference model for managing future material obsolescence challenges within regulated aerospace supply chains.