FLUOROCARBON

CASE STUDY

HIGH PERFORMANCE PCTFE VALVE SEATS FOR HYDROGEN APPLICATIONS

THE CHALLENGE

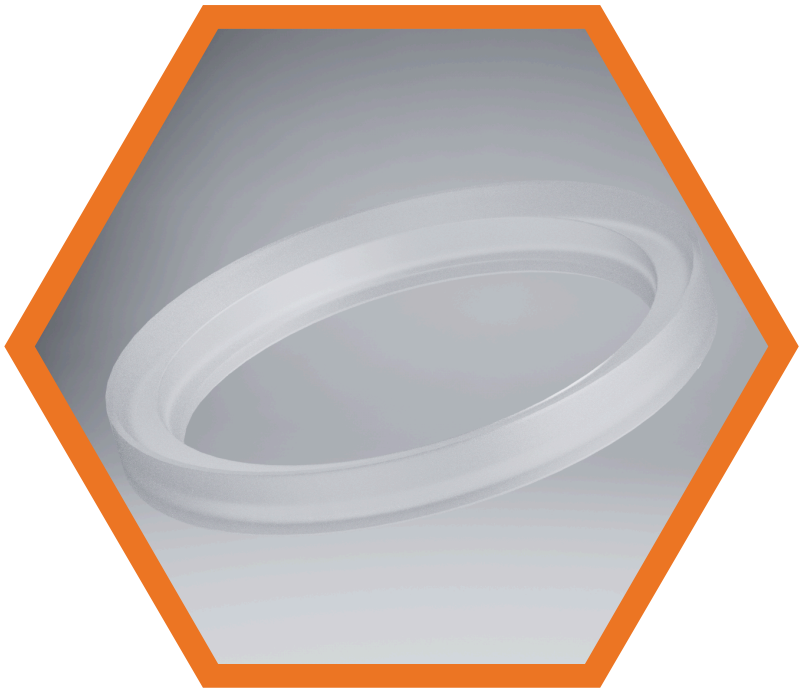
A company in the UK approached us with a technically demanding project involving the development of a unique valve concept. Their goal was to create valves capable of functioning in both high-pressure hydrogen gas and cryogenic liquid hydrogen environments.
Their primary challenge was selecting suitable materials for the valve seat components that could withstand these extreme conditions.
The application required materials with exceptional mechanical integrity, chemical resistance, and thermal stability. A critical concern for the client was ensuring performance at cryogenic temperatures, which significantly narrows the field of viable materials.
Additionally, for one of the valve designs, minimising material porosity was vital to maintaining seal effectiveness under gaseous hydrogen conditions.

THE SOLUTION

Following the initial consultation, we provided a tailored material solution and engineering support. The project was divided into two distinct application streams, each requiring a specific approach:

- For the cryogenic application, we recommended and supplied PCTFE – Fluorinoid® FL325. This material was selected for its reliable performance at extremely low temperatures and its chemical compatibility with liquid hydrogen.
- For the second application, which involved gaseous hydrogen, we addressed the requirement for low-porosity sealing materials by supplying Virgin PTFE – Fluorinoid® FL100.

These choices were guided by our expertise in hydrogen-compatible fluoropolymers and the need to balance performance with manufacturability.
In addition to material specification, we offered design consultation to address feasibility concerns.
Our engineering team evaluated the initial tolerance requirements and concluded that, although achievable, they would result in impractically high failure rates. We communicated this risk to the client, who subsequently revised the component drawings to include a broader and more realistic tolerance band.
This adjustment enabled a viable production process without compromising the critical sealing function of the valve seats.



THE OUTCOME

The customer placed an order for both PCTFE – Fluorinoid® FL325 and Virgin PTFE – Fluorinoid® FL100 components. These parts were intended for use in prototype testing, marking a key milestone in the development of their hydrogen valve technology.

Our collaboration helped ensure that the selected materials met the performance demands of both liquid and gaseous hydrogen systems.

By working closely with the client throughout the process, we contributed not only high-performance materials but also strategic guidance on engineering design. The outcome was a well-supported and technically sound prototype phase that allowed our customer to continue innovating in the hydrogen sector with confidence.

WHY FLUOROCARBON

Our success in this project stemmed from a deep understanding of fluoropolymer materials and their application in extreme environments.

Our expertise in polymers such as PCTFE and PTFE allows us to make informed recommendations that align with the client's performance requirements. Beyond materials, we offer responsive and practical engineering support, ensuring that designs can be efficiently translated into manufacturable products.

Throughout the project, our commitment to collaboration and clear communication enabled us to adapt quickly to evolving needs. By combining technical insight with a focus on commercial viability, we delivered a solution that met the client's expectations and contributed to the advancement of next-generation hydrogen valve technology.