



Solving a High-Deflection Sealing Challenge for a Thin Composite Tube

M Seals was approached by a composite materials R&D facility to solve a challenging sealing application involving an extremely thin composite tube.

The tube was subject to significant movement under pressure, causing it to “breathe” by up to 1.3 mm. This level of movement meant that the existing O-ring could not maintain reliable sealing contact, resulting in leaks and seal failures.

M Seals was tasked with developing a solution that could accommodate this movement while maintaining reliable sealing performance without creating excessive friction.

ASSESSMENT

Following a detailed review of the application and operating conditions, M Seals’ engineering team identified the movement of the composite tube as the key challenge.

The existing O-ring was unable to compensate for the changes in the sealing gap caused by the tube’s movement. Simply increasing the interference of a conventional O-ring could improve sealing but would also risk increasing friction and affecting the operation of the equipment.

A solution was therefore required that could provide high deflection and sufficient interference, while maintaining controlled friction.

After assessing the application, M Seals determined that the existing O-ring should be replaced with a KB20W low-friction piston seal, specially adapted for the application.

SOLUTION

M Seals designed and manufactured a special high-deflection, high-interference KB20W seal specifically for the thin composite tube.

The KB20W was well suited to the application due to its low-friction design and small contact sealing bulb, which provides a reduced frictional footprint during operation while maintaining effective leakage control.

The sealing face is supported by two tapered back-up rings, helping to prevent extrusion damage, rolling and spiral failure when operating under system pressure.

The bespoke design provided sufficient interference to maintain sealing contact as the tube moved, while avoiding excessive friction.

OUTCOME

The specially engineered KB20W successfully solved the sealing issues experienced with the original O-ring.

The seal maintains reliable contact even as the composite tube “breathes” by up to 1.3 mm under pressure, providing consistent sealing performance despite the significant movement.

The result was complete elimination of the leaks experienced with the original O-ring and therefore a 100% reduction in seal failures.

The customer was extremely satisfied with the performance of the new sealing solution.