

**CASE STUDY -**  
DIESEL ENGINE DESIGN & DEVELOPMENT



**Client:** OEM

**Customer:** Research and development

**Products:** New bellows design for a new on-engine

Our client requested a design solution for an on-engine diesel exhaust manifold expansion joint.

The original design concept incorporated two carbon steel flanges into the final 'V' clamp manifold. Our team developed new tooling arrangements to manufacture a complete assembly from a single hydraulically pre-rolled seam welded tube. The 'V' Flange flare was the key design element which allowed the performance criteria to be met. Not only saving time in manufacture but removing one fatigue point on the new design and an internal welding band removed and replaced by the inner flow sleeve.

Put on test, this new design outperformed the existing design, provided a substantial cost benefit to the OEM client and improved the look of the entire manifold section. When required to work at high altitude and extreme temperatures, the bellows element can be offered in Alloy Grade material.



Engine presented at show

**Axial Compression:** + / - 3.2mm

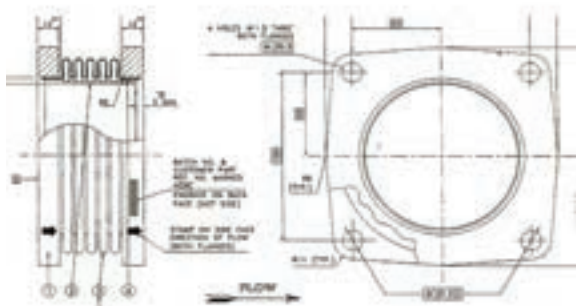
**Compression - Lateral Design:** =/ - 0.5mm

**Material:** EN 1.4541 (321 Stainless Steel)

**Exhaust temperature:** 600 Deg C

**Axial Natural Frequency:** 419 Hz

**Lateral Natural Frequency:** 2344 Hz



Single Axial Bellows Existing Design incorporating a single bellows convolution with internal flow liner and two expensive carbon steel end flanges with internal welds