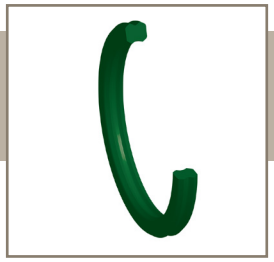
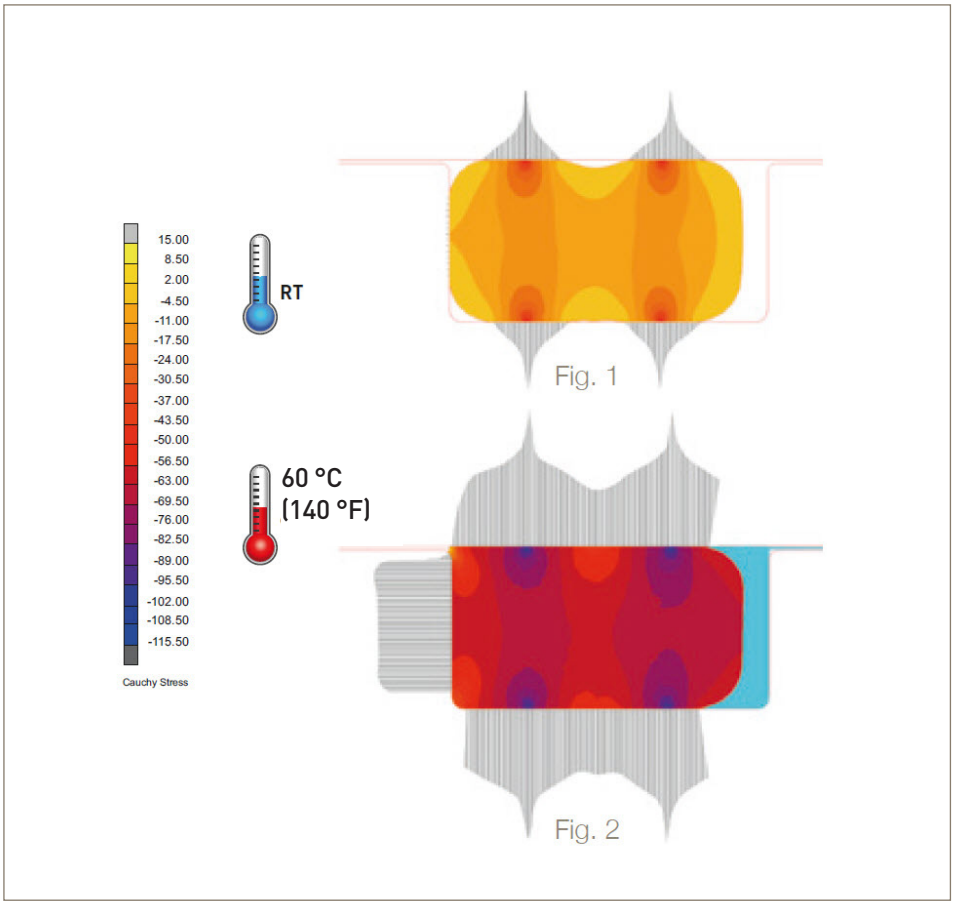
Technology Tip



HS PROFILE HEAD SEALS

Application

The figures show the results of finite element analysis (FEA) calculations on the HS profile in two operating conditions, i.e. when installed at room temperature, in pressureless conditions (Fig. 1), and after pressure loading of 600 bar (8700 psi) plus heating to 60 °C (140 °F)(Fig. 2), each time with a reduced extrusion gap. The color scale shows the stress levels in the seal in radial direction whereas the length of the vertical lines in the contact area between the seal and the groove represents the level of the surface pressure or sealing pressure that acts there.



The compression areas of the sealing edge pairs of the HS profile can be clearly detected in both figures. This compression leads to a distribution of the sealing pressure with two peaks where the pressure amounts to around 20 MPa (2900 psi). In Fig. 2, it is overlapped by the hydrostatic pressure of 600 bar (8700 psi) , with the curve essentially remaining unchanged.

The advantages of the HS seal result from the serial configuration of the two sealing areas, which doubles the protection against leakage compared to a single seal. In addition, with two sealing areas or sealing edge pairs backing up the seal, exceptional protection against twisting of the seal is achieved, both during installation and in operation at pulsating pressures, for instance in combination with breathing components and coaxiality defects of the groove. The use of particularly extrusion- resistant materials, especially Parker polyurethane compounds with 90 Shore A hardness, eliminates the need for back-up rings. This is illustrated in Fig. 2 as here, in the area of the sealing gap on the non-pressurized side, only minor extrusion can be expected even at a pressure of 600 (8700 psi) bar and increased temperature. Furthermore, the elimination of back-up rings provides advantages due to simplified installation.

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