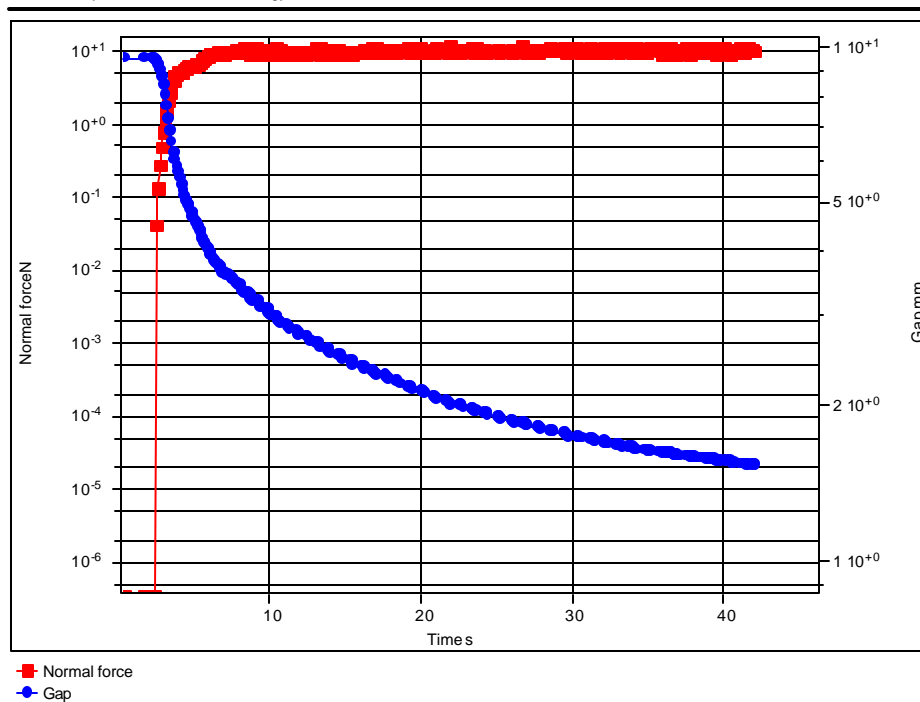




Squeeze Flow

The behavior of polymers in extension is useful to study for many different polymer processes such as blown film extrusion and blow molding. The STRESSTECH and DYNALYSER rheometers can both be used to measure the rheological behavior of polymers in squeezing flow, or biaxial extension. In RheoExplorer™, the operating software of these instruments, you can preset a target stress or force that is maintained by the rheometer as the gap is approached. This data can be recorded and used to measure the behavior of polymer samples under constant axial force.

Figure 1 illustrates the behavior of PDMS under constant normal force using a 25mm plate and an initial gap of 10 mm. A ball of material was placed between the plates. The initial behavior that is observed is a result of the sample first being squeezed to fill the void between the plates. After about 5 seconds, the polymer fills the plate gap. The target normal force is 10N, which is maintained with good accuracy until the target test gap is reached. In order to maintain a constant normal force on the sample, the vertical speed must decrease exponentially. The change in gap is shown in blue in Figure 1.



Web: www.atsrheosystems.com ▼ Email: info@atsrheosystems.com
Headquarters: 52 Georgetown Road, Bordentown, NJ 08505 Tel: 609 298 2522 Fax: 609 298 2795
Satellite Office: 12344 Burbank Blvd., Suite 5 North Hollywood, CA 91607 Tel/Fax: 818 753 2960

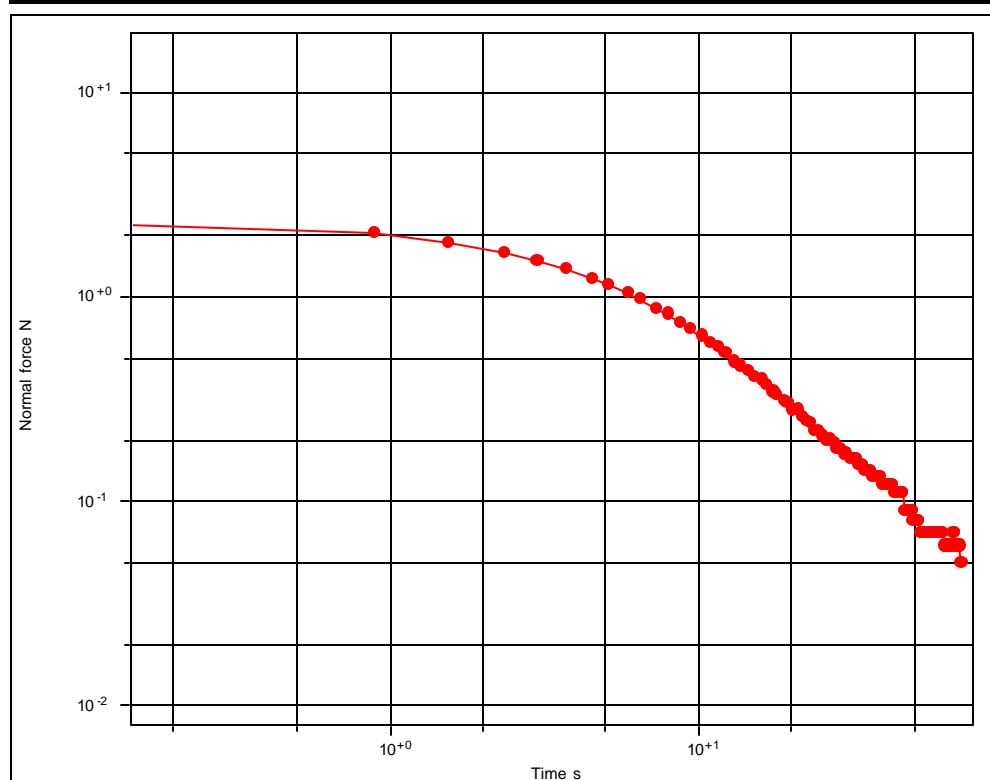
Figure 2 shows the normal stress relaxation for a sample of PDMS with a target stress of 2 N. RheoExplorer™ enables the user to measure the normal stress relaxation at user defined intervals, the data here were sampled every second for 100 seconds. Note that the normal force signal is smooth and noise free, and there is ample sensitivity to measure relaxation to much lower forces available in the transducer.

The patented Differential Pressure Quantitative Normal Force Sensor has excellent transient response to applied normal forces, in contrast to strain gauge and rebalance systems which have inertial effects at short times, limiting the quality of transient normal force measurements.

Squeezing flow complements the shear flow testing that is already possible with the STRESSTECH and DYNALYSER rheometers, making them a complete package for characterizing the rheology of polymeric materials.



ATS RheoSystems, We Make Rheology Real !



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