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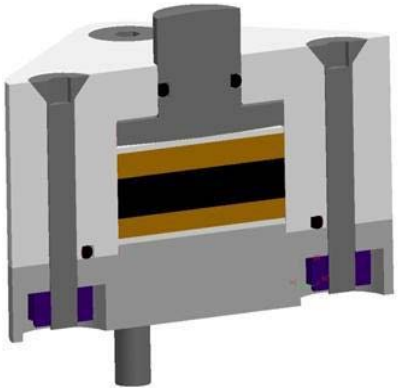
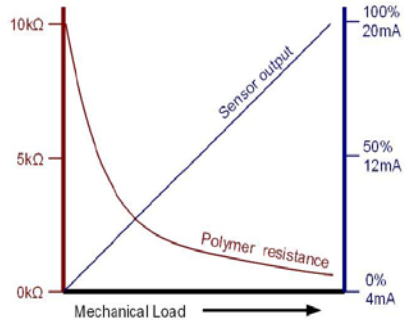
SensorTech Load Cells – How Do They Work?

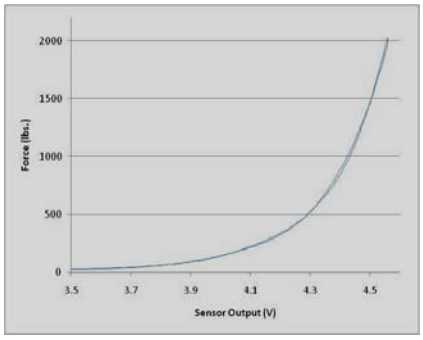


For its load cells, SensorTech uses a conductive nano-particle filled composite of polyphenylene sulfide (PPS). To make a load cell using the partially conductive polymer composite, SensorTech places the polymer between two copper electrodes that are in the load path – one electrode on top of the polymer composite, and one electrode on the bottom of the polymer composite.
Because the load path travels directly through the copper electrode/polymer composite sandwich, the polymer sees the full load applied to the load cell.

The polymer's surface resistivity decreases with an increasing load, as seen in the figure to the left. This non-linear response of the polymer is linearized with a conditioner module that has a 4mA-20mA output and a display. The fact that the resistance drops so sharply at low mechanical loads means that the load cell is inherently more accurate at lower loads, which is opposite of strain-gage based load cells. SensorTech still derives its calibration data at 50% of full scale, to get comparable figures to strain gauge load cells.



Hysteresis has been one of the big challenges to overcome using this technology. Recently SensorTech has been able to get hysteresis below the 1% level, and this a constantly improving effort. The figure to the right shows applied force vs. the raw (non-linearized) output of the sensor during loading and unloading.



Along with improving the hysteresis, varying processing parameters are constantly improving the repeatability as well, leaving this technology poised to replace strain gage technology in load cells in the coming years.