

Reliability Assessment of Vectron ViSmart Viscosity Sensor

A 185 hour compatibility test (see Figure 1 and 2) was performed using nine sensors in nine liquids. The materials tested include gasoline (Mobil 87 octane), n-propanol, ethylene glycol in water, flexolam white ink (Coates), polyurethane (proprietary sample), 13N (initial value) NaOH, red automotive coating (proprietary), SAE-50 motor oil, and 95% (initially) H₂PO₄.

The readings from the SenGenuity sensor are presented as acoustic viscosity, which is cP x density. For purposes of this test, the sensors were not calibrated.

Solvents, such as gasoline, n-propanol, acetone (in polyurethane), methyl ethyl ketone (in paint), and ethyl benzene (in paint) had no impact on the reliability of the sensors. The drift over nearly 8 days in flexolam ink was completely attributed to thickening of the sample from solvent loss. Similarly the resins in the polyurethane and in the paint (an acrylic resin) had no effect, nor did motor oil.

Destructive Test -- Low Viscosity

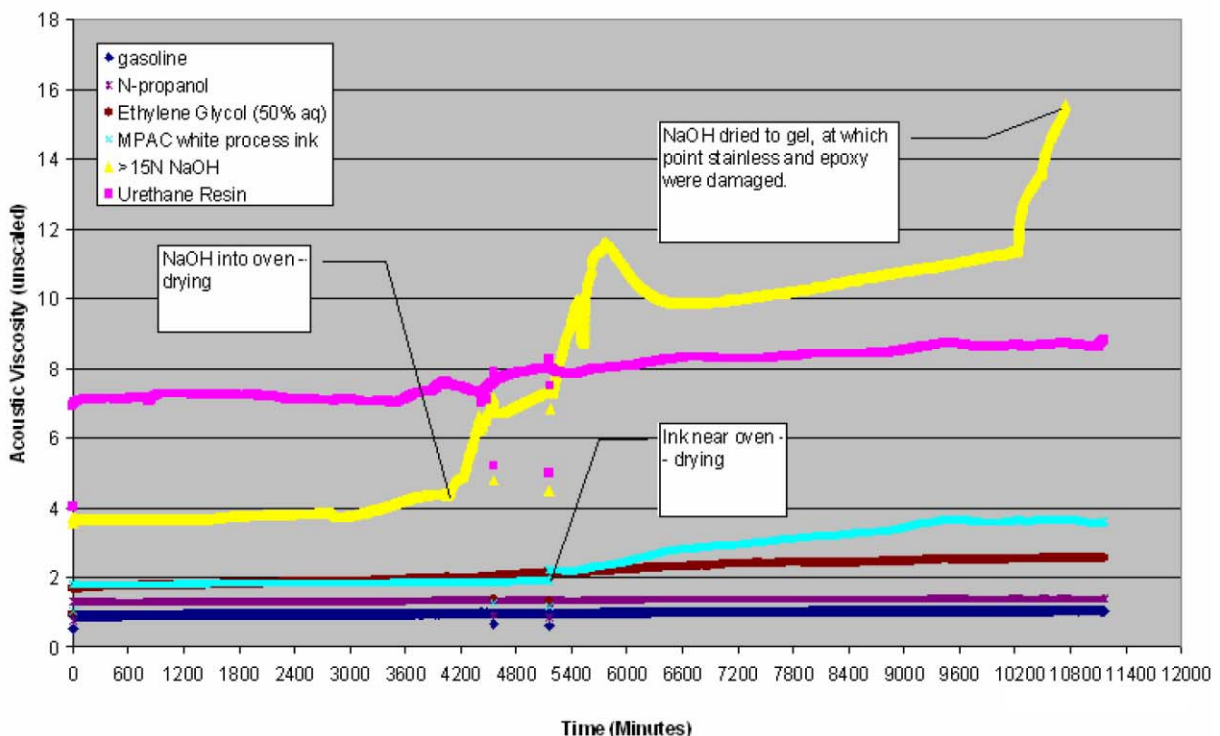


Figure 1: Six sensors in "low" viscosity compounds. Only NaOH (yellow) destroyed the subject sensor and then only after concentrating to a gel at elevated temperatures.

Sodium hydroxide had no negative effect (see Figure 1) until after prolonged heating at 60-90°C, and only then after becoming a gel. The alkali attacked both the 304 stainless steel and the epoxy seals, completely denaturing the epoxy.

Phosphoric acid (see Figure 2) had no immediately observable effect; however it appears to have embrittled the epoxy such that thermal shock led to detachment of the epoxy from the crystal sensor and subsequent leakage. The sensor was replaced and the new sensor functioned consistently; however the acid was notably colored by material leached from the epoxy. Furthermore, the second acid-test sensor failed within two days in a subsequent test in a proprietary polyurethane resin (different from the resin in the present test).

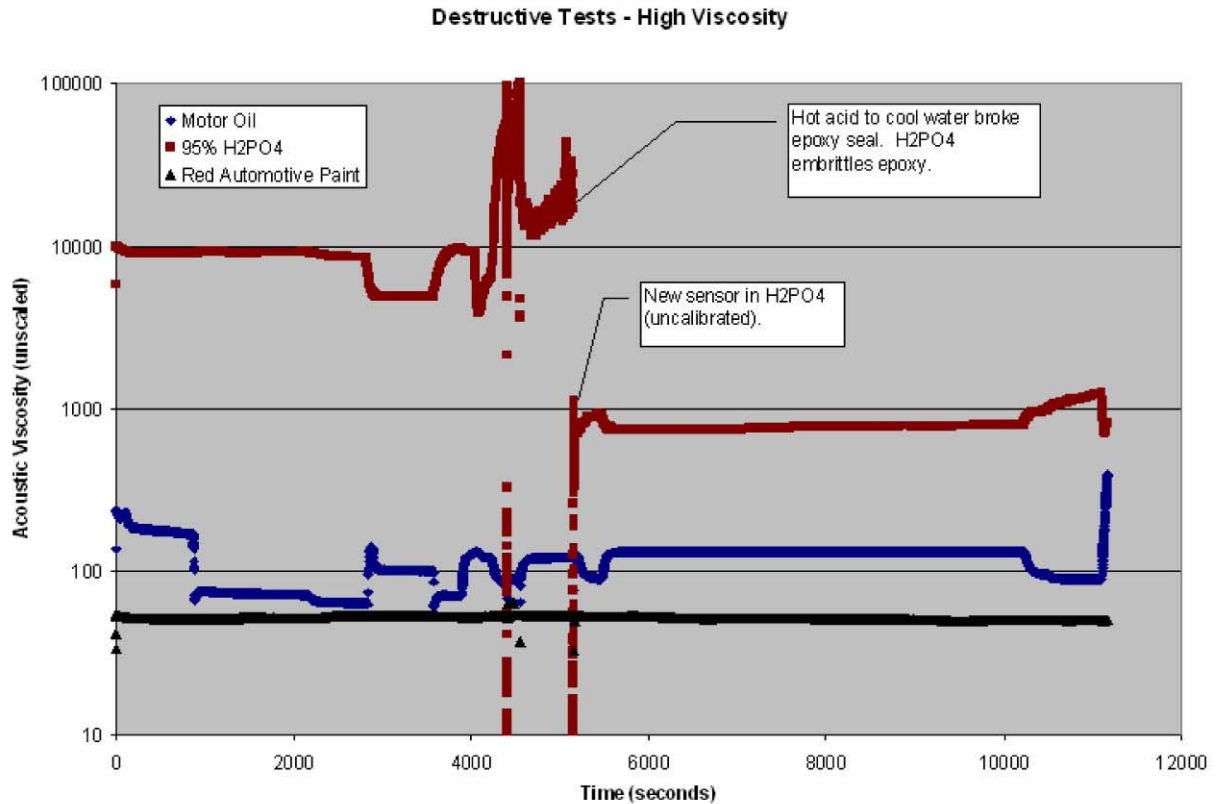


Figure 2: Three sensors in relatively "high" viscosity samples. Only phosphoric acid damaged the sensor and then only at elevated temperatures.

It is clearly evident the SenGenuity VSmart™ sensor is extremely resistant to solvents and mineral oil as well as to aqueous solutions.

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