# INVESTIGATION OF A LOW COST PIEZORESISTIVE PRESSURE TRANSDUCER FOR TIME-RESOLVED MEASUREMENTS

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Unsteadiness in turbomachines is a dominant complexity for managing such design issues as turbine vane heat transfer, compressor stability, structural fatigue and other critical reliability and performance factors. Thus, continued improvement of fast response measurement technologies will provide the industry with valuable tools for advancement of the state of the art.

An experimental investigation of the feasibility of using a low cost pressure transducer for time-resolved measurements was undertaken. The selected transducer is a common automotive component, which offers a 100 time reduction in cost compared to previously used transducers (Endevco or Kulite.)

Investigation included calibration for pressure sensitivity and temperature sensitivity, followed by compressor testing. When compared to the best available VKI tests of high cost transducers, the test sensor proved to possess comparable pressure sensitivity, reduced temperature sensitivity, and superior temperature compensation ability. The low cost sensor repeatability was also superior, with noise levels comparable in pressure and better in temperature. Compressor testing indicated a system frequency at approximately 220 kHz.

The feasibility of using the low cost Lucas NovaSensor for time resolved measurements was convincingly demonstrated. For application of the sensor to unsteady angle measurements, a three-sensor probe was designed.

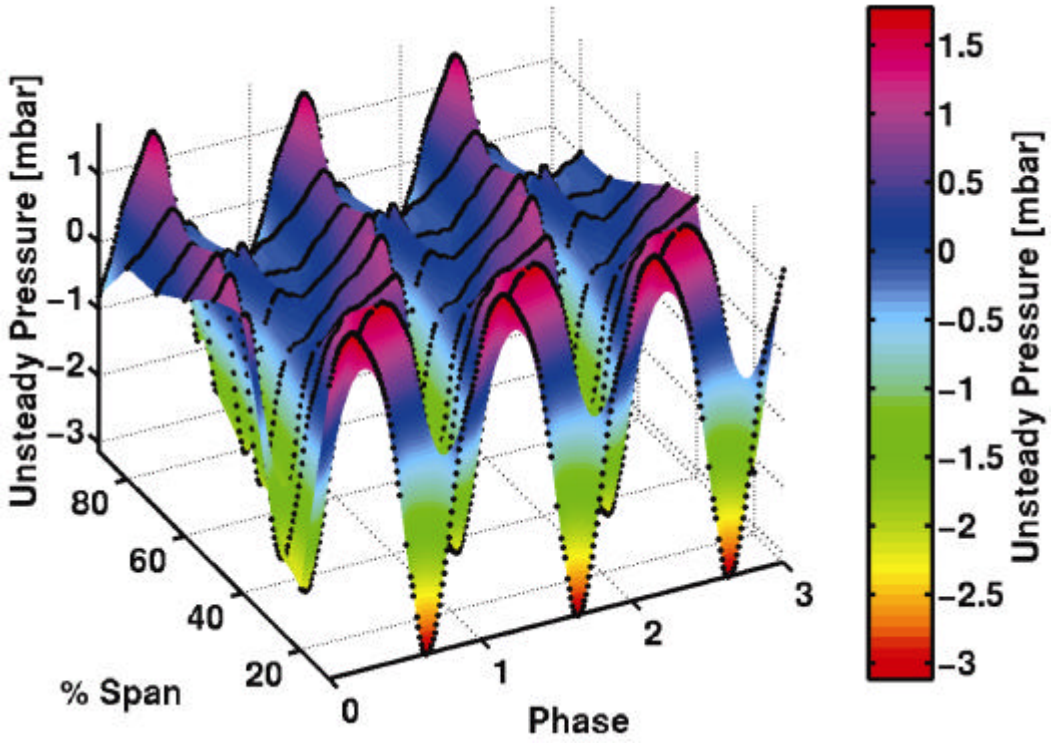


*Figure1: Rotor downstream unsteady pressure phase lock averaged*