

High Accuracy Liquid Flow Calibration Facility

In February 1942 the Cox flow-metering company designed and built a dynamic flow calibrator for the National Bureau of Standards. The calibrator made use of two collection vessels and three pumps to provide flow meter calibrations in a range from 0.014 to 280 gallons per minute. The machine was first commissioned at the NBS's facilities in downtown Washington DC. In 1967, the Cox bench (as it is known) was moved to the new NBS site in Gaithersburg, MD. Since then, the Cox bench has been the workhorse of the NBS/NIST hydrocarbon calibration services.

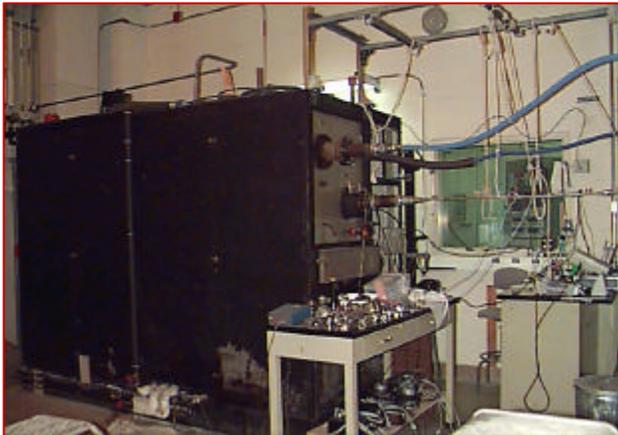


Figure 1
NIST Cox bench

Over the years, the Cox bench has seen little modification, and in recent years, its maintenance has proven problematic due to a lack of spare parts for its 1950's systems. Currently, the bench's mid-range pump has not been used due to its unreliable operation and the temperature control of the bench is at best deficient often leading to long calibration time. Furthermore, modern flow meters have specifications that challenge, or even outperform, the design

uncertainty of the Cox bench of 0.12% of reading.

CCG Program No. 235 requested the procurement of a device capable of calibrating flow meters, using a surrogate liquid for JP-4 and JP-5 jet fuels, in flow rates ranging from 3.5×10^{-5} to $1.5 \text{ m}^3/\text{min}$ (0.01 to 400 gal/min), with an expanded uncertainty of 0.025% of reading. NIST was charged with executing the procurement even though the calibrator would remain NAVY property lent to NIST in perpetuity



Figure 2
New High Accuracy Liquid Flow Calibration Facility

NIST was charged with executing the procurement even though the calibrator would remain NAVY property lent to NIST in perpetuity.