Development process and third party test results of a Coriolis mass flow meter with superior density performance

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Coriolis metering in general is in favour over older mechanical based technologies such as orifice, positive displacement and turbine metering. Additionally to mass flow this multi-variable process sensors also determine density, temperature and some even viscosity. A new type of Coriolis mass flow meter is presented which combines the tremendous technological progresses of the recent years. Among other highlights like new lows for both zero point and the pressure drop which equates to highest usable flow range and drastic improvements in measurement performance on applications were entrained gas is present the focus of this paper is on fluid density measurement. The exceptional density measurement performance under real world process conditions is ideally suited to serve the highly demanding application of volumetric custody transfer in the Oil & Gas Industry and also high end concentration measurement in Food & Beverage Industry. It will be explained how all aspects of the meter design have been optimized to ensure robust density performance in the field. These include tube shape, superior temperature measurement, as well as the most advanced compensation techniques for the effects of temperature, pressure, flow and viscosity. During design process FEM and CFD simulation have been heavily used. This results in a superior out of the box density measurement performance. Finally the meter was third party tested and verified to be within the stated ±0.2 kg/m³ specification on a broad range of densities, viscosities, fluid and ambient temperatures as well as various installation conditions.