

Tutorial title: **Reliable Flow Measurement**

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**Abstract:**

For a vast variety of different applications, material is conveyed in gaseous, liquid or solid form. The measurement of material flow rate and material velocity can be seen as one of the most important parameters in industrial processes and is also relevant for several applications in agriculture or the domestic area.

The proposed tutorial will introduce the most important measurement principles for gas and liquid flow, considering the broad bandwidth of applications: Different scales ranging from lab-on-chip applications or micro-tube pressure-based flow measurement up to flow measurements in pipes of several meters. Also requirements due to different flow velocities and properties of materials conveyed make a selection of different flow measurement principles necessary. Applicability, advantages, disadvantages and potential of the different approaches will be pointed out.

An important focus of the tutorial will be on the online measurement of mass flow and particle velocity in two-phase gas-solid flows. For industrial applications, one of the most popular methods of transporting particulate solids is pneumatic conveying. Solid materials, such as powders or pellets, are transported by an air stream, either by means of pressure operation or by means of vacuum operation. In gas-solids flows, triboelectricity, dust development, material abrasiveness etc. all require robust measurement principles. Not only well-established principles to determine mass flow and particle velocity in gas-solid flows will be presented, also new and innovative approaches are discussed.

Advanced data processing is a crucial part in modern flow measurement and several techniques will be presented. This also includes techniques to determine cross-sectional distribution of flow parameters and methods to assess flow stability and reliability.