

# Modelling a Meter for Brooks Instruments

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to improve product performance



Brooks Instrument, a subsidiary of Fisher Rosemount, designed and manufactured a thermal mass flow meter used to monitor and regulate gas flow in applications such as semi-conductor processing. We were asked to develop a model of the meter to help Brooks Instrument analyse and predict the meter's behaviour under a range of operating conditions and, as a result, improve the quality and efficiency of the company's calibration services.

In order to develop the model, we needed to understand the fundamental physical principles on which the meter was based, and then apply a range of analytical methods. Our team was drawn from across Sagentia, and the resulting model enabled the analysis of all aspects of the meter's performance. It was flexible, allowing for the study of a range of meter designs, and its elegant concept produced simple equations that revealed the impact on performance of key design parameters.

We worked closely with Brooks throughout the development phase, which allowed the company to refine its requirements and also provided an ideal form of training. The final model was verified using data gathered both from an automated test rig, which we purpose-built, and from a set of precision, infrared images of the meter itself. The model proved to be very accurate, and in fact the observed discrepancies between the model and the actual meter led to immediate improvements in the meter design.

The project demonstrated the range of skills that we can pull together to form a dedicated project team, including analytical modelling, experimental design, the construction of test equipment and automated data acquisition. We provided Brooks with a bespoke design tool which allowed the company to rapidly fine-tune the key design parameters of its product. At the same time, we also brought a wider perspective, providing Brooks with a better understanding of both its own and competing products.