



Weigh better

With new legislation placing ever tighter limitations on automobile exhaust, demands on systems for the gravimetric measurement of particulate emissions continue to rise. In order to achieve the required level of precision, the measurement must be performed under clearly specified environmental conditions with high-precision scales. pure engineering GmbH & Co. KG has developed a workbench for performing such automotive testing based on B&R technology. This state-of-the-art solution eliminates the need for costly clean rooms, and its integrated touch panel earns it points in user-friendliness. >>



Measuring emissions under clean room conditions: The new pureGMC workbench establishes a contained working area with a dust-free environment.

pureGMC workbench for particulate measurement without a clean room

pure engineering GmbH & Co. KG stepped up to this challenge by developing the new pureGMC workbench. Within a contained working area, this solution creates the climate conditions and dust-free environment specified by legislation for conditioning and weighing the filter plates used to measure particulate mass. The result is a low-cost alternative to the climate controlled clean room. The working area has been designed large enough to function either as a conditioning unit or as a weigh station for the filter plates.

The front of the work area is guarded by a glass plate with infinitely variable height adjustment, which can be opened and closed using an electric drive.

The front plate can also be equipped with two optional iris openings that allow the filter samples to be weighed without opening the plate, which allow the dew point temperature to be regulated with a precision of at least 0.5 K and the temperature to be controlled within at least 0.2 K.

The work area is flushed with a low-turbulence displacement flow, and the air and dew point temperatures are regulated precisely. The atmospheric pressure is also measured at the weigh station.

Reliable automation technology in international use

These processes, as well as control of the entire workbench, are handled by a CPU from B&R's X20 series, connected to a Power Panel via X2X. Modules from the X20 line form the interface to the countless sensors and actuators located throughout the pureGMC.

What's good for the environment - reduced emissions from modern combustion engines - means new measurement challenges for automotive manufacturers. With the accompanying reduction in particulates contained in the exhaust, the testing methods for proving adherence to legal limits must also be refined. One of the most commonly used methods is gravimetric measurement, which involves measuring the accumulation of particulate emissions from a combustion engine over a specified period of time, such as one complete operating cycle. A constant partial flow dilution taken from the exhaust is passed through a Teflon filter or a Teflon-coated fiberglass filter. An ultra-microbalance measures the change in weight of the filter to determine the mass of the accumulated particulate matter. Since it would only take a few molecules or a slight deviation in the air temperature to distort the results or endanger the repeatability of the measurement, the procedure must occur under clean room conditions and precisely controlled environmental conditions. To build and maintain such clean rooms, however, is a costly investment.



All measurement data is recorded and evaluated using a Power Panel.

"I've really come to appreciate the extreme reliability of B&R's automation technology. Reliability is key for us because our machines are used in development and production laboratories around the world, and downtime cannot be tolerated. The Austrian automation experts also provide the same exceptional quality when it comes to support, including the way it is handled technically and logistically," says Ralf Bräuer, Managing Director of pure engineering GmbH & Co. KG, explaining the decision to use B&R technology. "This, and the wide range of programming options, such as the extensive function block library provided with the Automation Studio engineering environment, convinced us that B&R was the way to go."

Bräuer is especially pleased with the fact that Automation Studio allows both the control application and the visualization application to be programmed in a single environment. The engineers at pure engineering took advantage of these functionalities to create a multilingual operator interface that is clearly designed and exceptionally efficient and intuitive. The air density in the work area can be sent to the ultra-microbalance via the Power Panel's Ethernet interface, allowing it to provide a measurement value corrected for buoyancy. Alternatively, the Ethernet or USB interfaces on the Power Panel can be used to send measurement data,



The increase in weight of the particle filter is monitored for emissions measurement.

such as historical trend data describing the work area climate, to a PC for further processing.

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Managing Director
pure engineering

The pureGMC workbench meets the highest demands when it comes to user-friendliness, ergonomics, functionality and cost-efficiency. With B&R's help, the engineers at pure engineering were able to create a compact workbench that satisfies all the criteria for performing high-precision gravimetric measurements. The system is designed for universal application in the laboratories of international automobile manufacturers and engine developers and represents an efficient alternative to costly clean room solutions for conditioned handling and weighing of particulate filters. ■



Exact particle measurement using ultra micro-scales.

**pure engineering
GmbH & Co. KG:**

pureengineering
managed precision

Founded: 2010

Locations: Weinstadt (DE)

Products and services: Conception, design and development of measurement systems and specialized climate control systems with exceptional demands on precision and reproducibility in the measurement and regulation of thermodynamic variables

www.pure-engineering.de