

CASE STUDY

# Laboratory-tested: FORM + TEST and HBK set standards in precision



A national metrological institute of the Republic of Singapore has a calibration laboratory that guarantees maximum measurement accuracy. It offers its customers calibration with test loads of up to 5000 kN – including the calibration of force sensors. The ALPHA 2-5000 S compression testing machine, developed by FORM + TEST Prüfsysteme, is a device for use in laboratories. Its test force of 5000 kN for static compression tests enables the calibration of highly precise measurement systems. It has been used for the first time at the Darmstadt Technical University competence centre for calibration.



## PROBLEM

As traceable reference devices, test and laboratory equipment for accredited calibration laboratories must meet the highest requirements in terms of precision, reliability, and quality. However, guaranteeing that these requirements are met presents the manufacturers of these devices with great challenges.

## SOLUTION

FORM + TEST Seidner & Co. GmbH counts on HBK's reliable and high-precision measurement technology in its ALPHA 2-5000 S compression testing machine for the calibration of force sensors at the calibration laboratory in Singapore, in particular, because HBK was the only supplier to guarantee the calibration of the delivered components.

## RESULT

FORM + TEST's ALPHA 2-5000 S compression testing machine is impressive in its daily use in the calibration laboratory. In particular, the class 00 reference force transducers for compressive force testing according to ISO 376 used in the FORM + TEST build-up system provide reliable and precise measured values, which allow measurements even of very small forces.

## ALPHA 2-5000 S PROVIDES HIGHLY ACCURATE RESULTS

FORM + TEST Seidner & Co. GmbH had the necessary expertise to implement the highly precise special solution required to perform the calibrations as requested by the renowned calibration laboratory in Singapore. Therefore, the experts for high-quality material testing machines and testing systems from Riedlingen in Germany ventured into the development of the measurement device for static compression tests. FORM + TEST's tried and tested compressive force testing machines form the basis of the customized solution, ALPHA 2-5000 S.

The up-to-date, high-precision Alpha 2-5000 S reliably delivers the desired results in the national calibration laboratory of the Republic of Singapore. It guarantees precise calibration of force sensors as well as continuous calibrations in the compressive direction. The measurement system can also cope with the additional requirement of measuring very small force values. The ALPHA 2-5000 S can, therefore, be used with a maximum precision of up to 1 % of its maximum load.

Due to its special features, such as a special, high-precision test cylinder, the ALPHA 2-5000 S provides peak performance in terms of precision and reliability. The cylinder's virtually friction-free bearings and its lateral guide ensure an optimal application of force. Furthermore, the compression testing machine is characterized by the high stiffness of its frame, precise control accuracy due to the DIGIMAXX C30 controller, and a special software interface for automatic calibration procedures.

## FORM + TEST PRÜFSYSTEME RELIES ON GUARANTEED PRECISION BY HBK

FORM + TEST relied on measurement technology from HBK for the implementation of its ALPHA 2-5000 S compressive testing machine. In addition to positive experiences in the past, the company's reputation was also crucial to the decision to use solutions from the measurement technology experts. However, the key factor in favour of HBK was the fact that HBK could guarantee the precision and reliability of its products and the entire measurement chain – making it the only partner eligible for the project.

The central element of the measurement system is a custom-built system, BU18, with three C18 reference force transducers from HBK. In addition, three C15 reference force transducers from HBK, with a 5 kN, 100 kN and 500 kN measurement range, were integrated into the system for high-precision force measurement. These robust (EMC-tested, stainless-steel, shock and vibration-tested) shear force sensors with nominal measuring ranges between 2.5 kN and 1MN meet the requirements of accuracy class 00 according to DIN EN ISO 376 in the exceptionally broad measurement range of 10 to 100 % of the respective capacity.

Due to the required high accuracy, the BU18 was calibrated at the German National Metrology Institute, PTB, in Braunschweig. HBK's build-up system, which was customized for the ALPHA 2-5000 S, perfectly met the accuracy class 00 according to DIN EN ISO 376. This result could be achieved not least due to the excellent cooperation between HBK and FORM + TEST in the run-up to the calibration, in which the transducer was preloaded with 120 % of its capacity by





FORM + TEST as prescribed by PTB. A DAkkS calibration of the BU18 had been performed in HBK's accredited calibration laboratory in advance. Traceability of the calibration to the National Standard (PTB) has, therefore, been ensured.

The DMP41 reference measuring amplifier completes the measurement system. With its unique accuracy class of 0.0005, the high-precision measuring instrument is the most accurate amplifier for strain-gauge-based measurements worldwide. As a result, HBK's DMP41 was the first choice for implementing the ALPHA 2-5000 S.

## AN EXCEPTIONAL CHALLENGE MASTERED WITH CONFIDENCE

With its ALPHA 2-5000 S, FORM + TEST Seidner & Co. GmbH has created a force calibration machine that is unique in terms of its functionality, load capacity, and precision. The cooperation with HBK was key to this success.

On the one hand, the reliable and perfectly matched measurement technology from the Darmstadt experts delivers the required precise results, which HBK, as the only provider, was able to guarantee.

On the other hand, the mutual appreciation and recognition of existing knowledge as well as the cooperation in a partnership were further decisive factors contributing to the joint success of the project.

## ABOUT FORM + TEST SEIDNER & CO. GMBH

FORM + TEST Seidner & Co. GmbH was founded in 1965. Its product portfolio for high-quality material testing machines and testing systems includes compression, bending, tensile and universal testing machines as well as clamping and testing systems for almost all applications and materials. The low-maintenance, durable, practical, and user-friendly solutions are based on FORM + TEST's over 60 years of experience and extensive know-how. In addition, an in-house service and calibration laboratory guarantees users optimal use of their investments.





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