

User Report

HELLER SETS NEW STANDARDS IN ABSOLUTE VOLUMETRIC ACCURACY BY CALIBRATION WITH THE ETALON LASERTRACER

VOLUMETRIC ACCURACY OF MACHINE TOOLS

Geometric accuracy of machine tools is of great importance for the quality of manufactured products. This is especially true in flexible manufacturing, in which error-free production from the first part is desired and a reliable geometry in the whole working volume is indispensable. In addition, there is an increasing requirement from users for the control of geometric quality of products directly at manufacturing level instead of in the measurement room. In order to achieve this requirement, better calibration and certification processes for machine tools are crucial.

GEBR. HELLER MASCHINENFABRIK GMBH SETTING NEW STANDARDS

The name Heller stands not only for a wide range of powerful machines, but also for successful project and



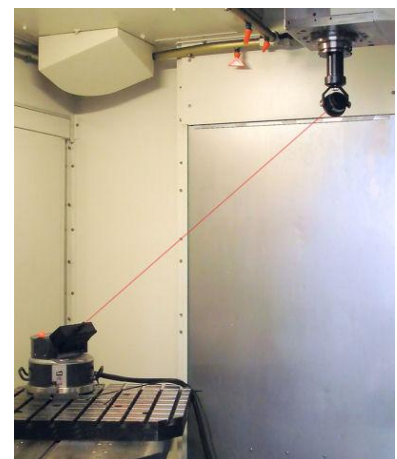
MACHINES FROM THE MCH SERIES ARE TRUE ALLROUNDERS. WHETHER USED FOR HIGHLY PRODUCTIVE OR FLEXIBLE MANUFACTURING IN THE GENERAL MACHINE OR AUTOMOTIVE INDUSTRY.

process management complemented by a comprehensive range of services. For more than one hundred years, Heller's company values of quality, tradition and continuity, technological and application competence have been the foundation of Heller's success story. At the same time, Heller has been a pioneer in the application of innovative processes with high value for the customer.

Uniquely for the industry Heller provides its customers with detailed test protocols of the machine's geometry. The broad experience of its testing team constitutes an essential base for the high quality of their machining centres.

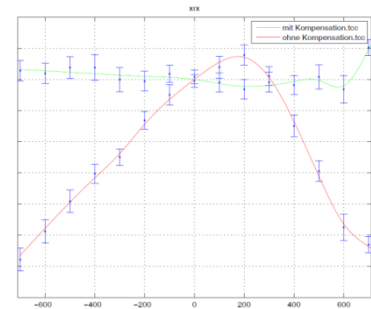
Heller has been an early adopter of testing volumetric compensation on its machining centres with Etalon technology; always involving key-customers in this process. The main motivation has been the possibility to further increase the high accuracy of the Heller machines using fast measurement procedure of the Etalon technology in combination with volumetric compensation.

Through a six-month test phase, Heller tested the Etalon LaserTRACER in its facility. Various machines were calibrated and compensated, accumulating experience about the efficiency of volumetric compensation.

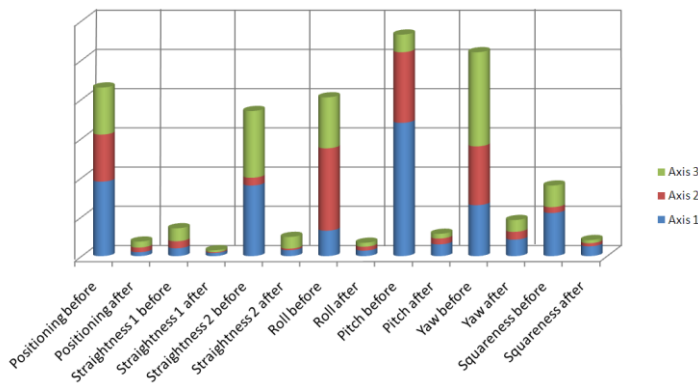


THE LASERTRACER BEING APPLIED TO A MACHINE OF THE MCH SERIES

The results confirmed the high expectations: the volumetric accuracy of the machine could be considerably increased. While conventional compensation can achieve the accuracy of a few micrometres only in previously calibrated lines parallel to the axis, volumetric compensation of the Sinumerik 840D sl controller shows a clearly improved result: The same accuracy can be achieved in measuring both axis-parallel and diagonal lines. For instance, after the volumetric compensation of a machine with working volume 1800 mm x 1000 mm x 2000 mm there was, including diagonal measurements, a confirmed maximum deviation of less than 5 µm. When comparing each single kinematic deviation before and after compensation, the improvements can be clearly seen. In addition rotation deviations, which before were of the order of microradians, could be almost entirely eliminated through compensation.



EXAMPLE: COMPARISON OF THE ROLL IN THE X-AXIS WITH (GREEN LINE) AND WITHOUT (RED LINE) COMPENSATION



RESULTS OF THE COMPENSATION OF A HELLER MACHINING CENTER: A REDUCTION OF OVER 80% IN THE GEOMETRICAL DEVIATIONS WAS ACHIEVED!

After establishment of the measurement procedure the time necessary to a complete volumetric measurement of the machine with the Etalon system was of the order of two hours. Mr. Rendsburg, leader of machine testing team at Heller: „The high expectations on the Etalon system in regard to measurement accuracy and speed were fully achieved in our testing phase. Now, we will integrate Etalon technology in our processes with our customers to take the best advantage possible from this new technology.“

Because of the exceptional repeatability of the Heller machines, the effectiveness of a numerical compensation is very high. The chart shows the comparison of the effective machine errors before and after compensation.

HELLER SEES THE LASERTRACER AS A PROFITABLE TECHNOLOGY FOR LONG-TERM CUSTOMER BENEFITS

For Heller, customer benefits have been the focus since the beginning: volumetric compensated machines are able to reduce the start up time of manufacturing processes and increase the geometric quality of manufactured work pieces. In both small volume and flexible high volume manufacturing, these features are a customer requirement, essential for increasing the effectiveness of the processes. There is also one more benefit seen at Heller; the volumetric compensation can be applied at intervals during the entire life of the machine to restore it to optimal accuracy. In this way, Heller is able to provide optimal customer support throughout the entire life cycle of the machine.

ABOUT HELLER

Heller develops and produces state of the art machine tools and manufacturing systems for the metal cutting industry. As a manufacturer of machine tools for over one hundred years, Heller has always focused on the quality of its products and services. The increasing demands of Heller's customers are reflected in a comprehensive quality and environmental management. The position of Heller in the international market is not being left to chance; Heller actively promotes its developments with innovative ideas, clear messages and targeted actions. More than 2200 coworkers worldwide guarantee the success and solve everyday challenges in the global market.

ABOUT ETALON

Etalon AG is a specialist in calibration, monitoring and accuracy improvement of machine tools and coordinate measuring machines. Etalon is located in Braunschweig (engl. Brunswick) and was founded in 2004 as a spin-off from the Physikalisch Technische Bundesanstalt (PTB), the Germany national metrology institute. Etalon offers its customers innovative and user-friendly solutions, academic know-how, standardization requirements and metrological experience integrated in its software. Renowned customers in mechanical engineering, automotive industry and research institutes rely on Etalon technology.

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