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Swiss Rotary Table Technology

NEWSLETTER

Measurement like on a machine tool

MQ measurement technology



New possibilities in measurement technology: Easily installable CNC rotary tables simplify production-related measurement, making it faster and more efficient. Images: pL LEHMANN

A supplementary CNC rotary table makes a measuring device more efficient for shopfloor use

Measurement technology is increasingly shifting away from measurement laboratories towards measurement stations close to production where workers check parts in-line or post-line. For this purpose, pL LEHMANN offers components that have long proven themselves in manufacturing: highly stressable, very precise CNC rotary tables with multi-functional holders for a variety of workpiece clamping systems. Such additional axes make measuring devices even more efficient and easier to operate.

From the machining center directly to the measuring machine – this saves time and is highly precise when the right equipment is chosen. pL LEHMANN, a Swiss manufacturer of high-quality CNC rotary tables, has developed a program with



Q-Line in use: Measuring an electrode on a coordinate measuring machine

its MQ series that transforms coordinate measuring machines (CMM) from all common manufacturers and other measuring devices (for roundness, contour, surface, ...) into versatile measurement stations.

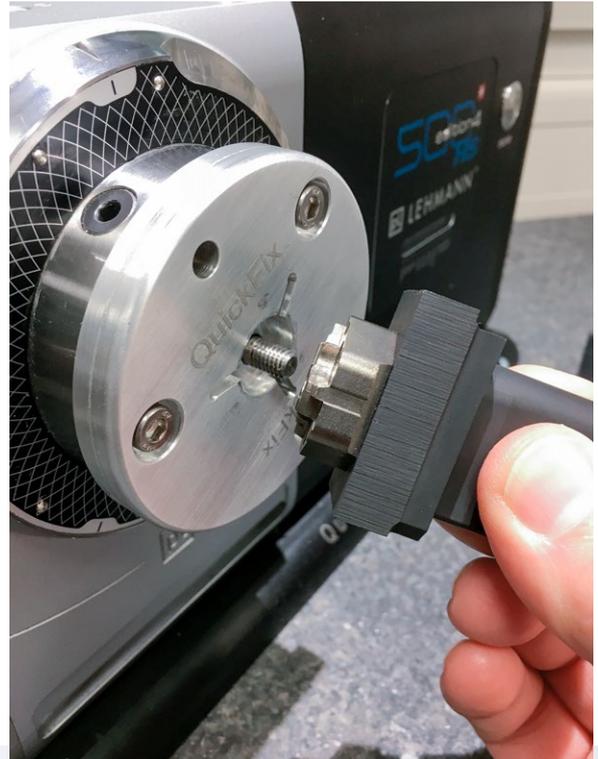
The heart of the MQ series is the proven pL CNC rotary table technology, which supplements the measuring device as a fourth and, if necessary, fifth axis. This allows the workpiece to be measured to be swiveled into almost any position and – for example, for scanning operation – to be rotated continuously as well. The additionally gained degrees of freedom make reclamping unnecessary.

Fast, precise, and highly efficient

There are numerous advantages to a measurement station designed this way – especially in a production environment: because the workpiece can be measured in the same way as it was produced. If the rotary table is equipped with a zero point clamping system – which is highly recommended in many cases – it only takes a few minutes or even seconds to change over from the machine tool to the measuring device. A further advantage: The reference point is retained and the workpiece may not have to be remeasured.

With zero point clamping, for which pL LEHMANN already provides a large range as standard, complicated measuring devices are no longer needed. Machine operators also know how to use it, eliminating the need for extensive training or complicated clamping elements to set up the measuring device.

The fact that the workpiece can be swiveled and rotated leads to further plus points compared to the use of a swivel-



Simple QuickFix zero point clamping system for System 3R

ing probe. For example, not only is positioning significantly faster, but difficult-to-reach undercuts can be measured as well, thanks to the better degrees of freedom.

The pL MQ series is available as the «M-Line» fully integrated by the measuring device manufacturer (OEM). In the form of the «Q-Line», it can be retrofitted to almost any measuring device at any time and automated if required.



The Q-Line from pL LEHMANN can also be used for contour and surface measurement of a shaft.



The TF-507510 two-axis rotary table of the M-Line is suitable for workpieces weighing up to 40 kg. With the ultra-compact angular measuring system, positioning accuracies of up to $\pm 2.5''$ are achieved.

M-Line – integrated rotary axes for measuring instrument manufacturers

Today, most rotary table manufacturers use air-bearing technology for high-precision rotary axes. This technology has proven very successful and provides maximum accuracy as long as the rotating loads are not too large and not too eccentric. The axis position should also be as vertical as possible, because when the axis position is horizontal in relation to the rotary table, only very small workpieces can be moved reliably. However, if considerably larger workpiece weights or eccentric loads are to be moved, especially in different axis positions, the proven air-bearing technology is no longer sufficient.

Rotary tables with roller bearing technology would be the logical solution. However, these were previously too inaccurate and in particular did not provide the required repeatability. With the M-Line from pL LEHMANN, this is history. The high-precision pL bearing technology combined with an integrated thermal brake ensures high repeatability. In addition, pL LEHMANN provides ultra-compact and high-precision angular measurement systems as well as DC servomotors specifically required in measurement technology. M-Line rotary tables operated in such an



The installation length of the ultra-compact angular measuring system for the M-Line – here on an EA-510 single-axis rotary table – measures only 30 mm. It achieves positioning accuracies of up to $\pm 2.5''$.

environment achieve very high accuracies (FR, FT, FA) according to ISO 10 360 – both in vertical and horizontal axis positions, with centric or eccentric loads. For example, measurement tasks can also be performed on CMMs that were previously reserved for special measurement devices.

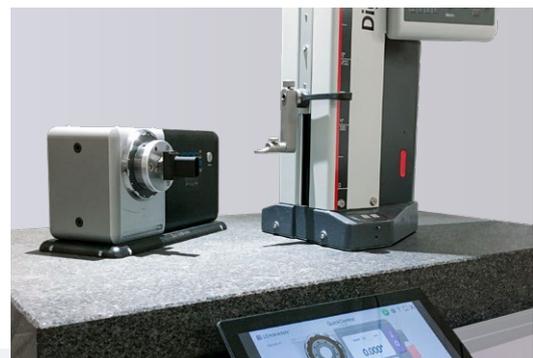
A well-known CMM manufacturer confirms that pL LEHMANN axes are often the only ones that can be used for heavy parts. Because their accuracy is excellent – compared to the competition – which is why this manufacturer opts for pL axes in such cases.



The entry-level model of the Q-Line from pL LEHMANN: the manual, super-flexible MA-508.m Q rotary table. The QuickMover adapter plate can be seen under the rotary table.

Q-Line – stand-alone for all customer groups in measurement technology

If no integrated rotary axis is desired or required, pL LEHMANN has developed the Q-Line, a rotary table series optimized for measurement technology and recommended for stand-alone use. It is suitable for both new and retrofitted equipment. Q-Line rotary tables are optionally available in a housing made of aluminum (e.g. for transmitted light systems) or of spheroidal graphite iron (e.g. for CMMs). In addition, each unit is equipped with an emergency stop switch to meet the high safety requirements.



Q-Line in use: Measurement of angles and parallelism on an electrode on a granite measuring station with elevation meter



A ControlTablet with the QuickControl software, which is available in BASIC and PROFI versions, is used for simple control of the Q-Line rotary axes.

As an entry-level model of the Q-Line – suitable for simple applications on the shop floor or in measurement laboratory – pL LEHMANN offers the manual, super-flexible rotary table MA-508.m Q. It can be combined with height, contour, and surface measuring devices and is recommended for run-out test equipment and coordinate measuring machines. Users can set different ratios to fast or slow in just a few steps. A smooth-running, sensitive handwheel makes it possible to approach any position very precisely and unerringly. A fold-out digital display shows the angular position with a resolution of 0.001°.

The EA-508 Q basic pL rotary table, which is equipped with a motor and indirect angular measuring system, meets higher requirements. With a control tablet and the QuickControl basic software, it is suitable for use close to production on various coordinate, shaft, surface, and multisensor measuring devices.

Even more automation features are offered by the EA-508 Q pro, which can be operated via the Professional version of the

QuickControl software and the M function of the higher-level machine control. It also has a program memory and a teach-in function. In combination with the ingenious QuickProcess function, even fully automated operation can be realized without having to carry out any integration in the machine or control.

Clever accessories – convenience for the user

Special accessories are available for quick and easy use of the Q-Line rotary tables. Particularly helpful is the QuickMover, which can be used instead of the base plate of the rotary table as an interface to the measurement table. By pressing a push-button, the user can gently move the rotary table and bring it into position. When the button is released, the rotary table stands firmly and securely. This is ensured by an air cushion generated by high-precision ground air flow surfaces and a mini-compressor integrated into the QuickMover when this button is pressed.

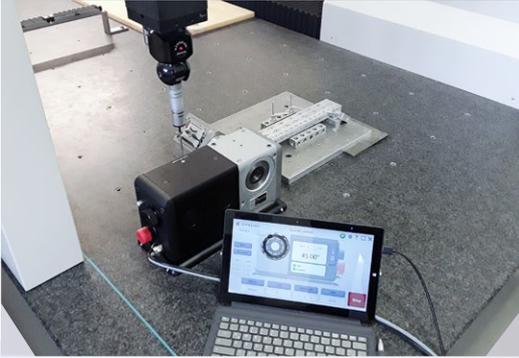
The QuickBar precision stop ensures fast alignment and simple referencing of the rotary axis. It can be mounted compactly and «undisturbed» on the edge of the measurement table by means of an adhesive pad (QuickBar W) but can also be mounted on any other position (QuickBar F) without additional holes having to be drilled. When it is no longer needed, the adhesive pad can be easily removed without leaving any residue.

Tested and proven: Maximum precision and excellent repeatability

The MQ measurement technology developed by pL LEHMANN is suitable for high-precision measuring tasks. Numerous details ensure excellent repeatability and minimal ther-



With the QuickBar zero point system, all rotary tables equipped with QuickMover (air cushion) can be quickly and precisely brought into measuring position. QuickBar is available for both edge and surface mounting. Thanks to self-adhesive pads, no drilling is required. QuickBar also fits on a 200 or 300 mm hole grid.

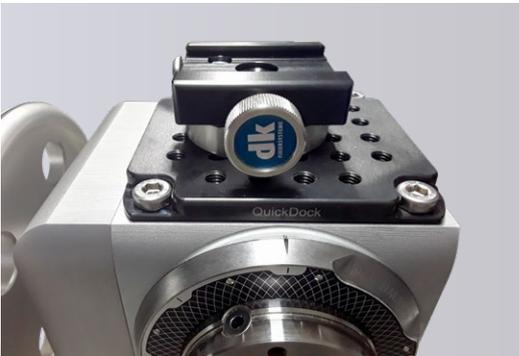


Q-Line on CMM: Angle, slot, surface and bore measurement on complex clamping fixtures

mal runout. For example, backlash-free preloaded high-precision rolling bearings ensure maximum repeatability and extremely high rigidity. The PGD gear unit, which is also preloaded backlash-free, stands for excellent synchronization characteristics. A thermal brake specially developed for measurement technology minimizes thermally induced displacements and inaccuracies.

To ensure that customers can rely on the specified parameters, pL LEHMANN carries out various endurance and stress tests. These investigate the effects of loads, cycles, duration, clamping, angular position measuring systems, etc. The results confirm the specified high thermal and mechanical stability and repeatability, including according to ISO 10 360.

All rotary tables are also equipped for Industry 4.0. They contain a pL-iBox with extensive sensor technology to detect, register, and output – depending on the version – speed, internal pressure, temperature, humidity, shock and impact. This helps to increase productivity and availability, reduce downtime and maintenance costs, and enable rapid fault localization and preventive maintenance.



QuickDock – the perfect interface for supplementary locator systems e. g. from DK.

Rotary tables for measuring equipment

With the MQ series, pL LEHMANN has developed CNC rotary tables that meet the demands of high-precision measurement technology. There are two different product lines based on the 500 series, which has proven itself a thousand times over:

M-Line

- for integrated axes on measuring devices
- primarily for measuring device manufacturers
- usually with angular position measuring system
- with DC or AC servomotors
- for simultaneous (scanning) and positioning work

Q-Line

- for stand-alone axes wherever practical
- without angular position measuring system
- manual or SM motors
- with tablet
- can be automated via QuickProcess or M-function for positioning work

CNC rotary tables with Swiss quality

Founded in 1960 strictly as a contract manufacturer, pL LEHMANN has been developing and producing CNC rotary tables for over 40 years. With innovations and Swiss quality, the family-owned company in the Swiss town of Bärau (Emmental) succeeded in opening up new opportunities for its customers and developing lean machining solutions characterized by high productivity through use of additional NC axes. One of the highlights of the company's history is the powerful and flexible Series 500 – developed in 2009 – which is ideal for the most demanding tasks thanks to its modular design. With the backlash-free, preloaded PGD gear unit – developed in 2014 – pL LEHMANN reached another milestone. In 2017, the company introduced, among other things, the new pL-iBox generation, making their rotary tables ready for Industry 4.0 and digital production. This was followed in 2019 by the introduction of the Series 900 DD (Direct Drive) rotary tables with speeds of up to 5,450 rpm. As an additional new product, the AM-LOCK system, a special zero-point clamping system for 3-D printing, including preprocessing and postprocessing, was presented in 2019.

Contacts: **Peter Lehmann AG**
 Bäraustrasse 43
 CH-3552 Bärau
 Tel. +41 (0)34 409 66 66
 Fax +41 (0)34 409 66 01
 sales@plehmann.com
 www.lehmann-rotary-tables.com

k+k-PR GmbH
 Von-Rad-Str. 5 f
 D-86157 Augsburg
 Tel. +49 (0)8 21 / 52 46 93
 Fax +49 (0)8 21 / 22 93 96 92
 info@kk-pr.de
 www.kk-pr.de