# PRESS RELEASE

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**Quality assurance: “random-sample measurements often no longer suffice”**
EMO 2017: its importance for metrologists is steadily rising

**Frankfurt am Main, 24 January 2017** – *The German-language scientific periodical* *“Bild der Wissenschaft” has described Prof. Gisela Lanza as the “120-per-cent woman”, because for four years she worked simultaneously as the first incumbent of the Shared Professorship of “Global Production Engineering and Quality” at the Karlsruhe Institute of Technology (KIT) and at the automaker Daimler. But how does such an active expert on global production systems assess the new, important role of metrology for quality assurance from the viewpoint of Industry 4.0 and the Industrial Internet of Things (IIoT)?*

**Professor Lanza, how is Industry 4.0 influencing quality assurance and metrology?**

**Gisela Lanza:** Thanks to the increasingly important influence of sensor technology, we will definitely be able to collect very many more measured data, and thus improve our detection of causal connections. I would even venture the hypothesis that in future we will be recording 100 per cent of all important measured values. 100-per-cent testing means: quality data (meaning all critical parameters) will no longer be acquired by random sampling, but with 100-per-cent coverage. This signifies a radical change in quality control, because now we can get a whole lot closer to the tolerance limits.

**What will in your opinion the quality control of the future look like?**

**Gisela Lanza:** I’m predicting intelligent, adaptive quality control strategies. One example here might be a revival of pairing strategies, which production people often hate because of the complicated mathematical approach and the logistical outlay involved. Here, components with different quality features are used in pairs, so as jointly to provide the functions of an assembly with very high tolerance requirements. Pairing strategies are an obvious option if not every component produced is any longer able to meet the specified tolerances. One example here is the injectors used in engines, which have to work with an operating pressure that in future may reach 3,000 bar. Rigorous deployment of inline metrology will here enable even more intelligent, component-specific pairings to be used in conjunction with dynamic modification of production parameters, which open up multifarious new options.

**So will data be increasingly acquired inside the production line?**

**Gisela Lanza:** Yes. There’s an ongoing trend towards more inline metrology, or even towards process-integrated measuring instruments, permitting minimised control loops. Measurements are no longer taken in a separate measuring room, but directly in the production process. This is increasing the demand for metrology applied in modularised mode in plants and production lines, while standard measuring instruments are less sought after. Metrology is turning into a project business, in which the customised application is the crucial competitive factor.

**Talking of sensor integration: can a machine tool be converted into a measuring machine?**

**Gisela Lanza:** This goal has been around for some time, and it continues to be a very exciting task. But there are still numerous challenges involved, such as high costs and interference factors from the production process like temperature or dirt. What’s more, typical metal-cutting parts often require a very high degree of measuring accuracy. Users also want an independent metrological framework, which ideally enables measurements to be taken in parallel to machining – this is known as concurrent measurement. Measuring with the machine tool, however, is nowadays already standard procedure for high-precision products. One example here is the production of diesel injectors at Bosch.

**Wanted: intelligent evaluation of the huge data volumes involved**

**When the machine tool and the production process are able to acquire more data with the aid of sensor technology: what does that mean for signal processing in regard to real-time capability?**

**Gisela Lanza:** In terms of technology, individual sensors are being replaced by distributed sensor networks, because a networked infrastructure is an essential precondition for using the potentials of inline measurements with maximised efficiency. Users want intelligent, interlinked evaluation of the data concerned. Experts here speak of a fusion of data from several different sensors, which lead to a combined metrological result. In order to explain the complex causal connections of a process, data mining algorithms such as neuronal networks are well suited. So the main consideration is that the meaningful data correlations need to be filtered out.

**What role will quality data generated in the factory of tomorrow then play? Can the big-data volume thus created be meaningfully managed and mastered?**

**Gisela Lanza:** At present that’s still not easy to assess. The basic precondition here is a harmonised software architecture. Once this has been established as a basis with harmonised data structures and interfaces, I’m expecting it to be design-enhanced by a gradual increase in complexity – from data acquisition all the way through to adaptive, self-learning control loops.

**How can the different worlds – meaning shop floor (the machine tool industry), networking (the web) plus hardware and software (metrology) be fruitfully reconciled?**

**Gisela Lanza:** Because the classical automation pyramid, from the process itself all the way up to the corporate level, is disappearing, cross-level information interchange is essential. In this context, the Manufacturing Execution System (MES) operating close to the process is gaining steadily in perceived importance. Unfortunately, you see, it would appear impossible in the next few years to directly utilise and evaluate the data from sensors without an MES. What’s more, we need harmonised interface standards like OPC/UA, a standard that is currently gaining wide acceptance for automation technology.

**But the alleged necessity for real-time control now appears to be hampering progress a bit: so does everything really have to be run in real-time?**

**Gisela Lanza:** No. Then there’ll just be three non-conforming parts until then as from Number Four I’m once again manufacturing specification-compliant parts.

**Can you cite an example of best practice?**

**Gisela Lanza:** I see the Bosch Group as a leading key user, embracing full-coverage, harmonised use of its own MES and IoT software, which it also sells as a key vendor, so as to link up process, measured and order data (IoT: Internet of Things).

**China, in particular, is catching up**

**You’re also familiar with global production strategies: where are there international differences in terms of quality assurance?**

**Gisela Lanza:** In what are called the “emerging markets”, meaning the present-day low-cost nations, testing is still often being performed in the traditional manner at the end of the process chain. But the sheer speed of change here is breath-taking: in China, particularly, there is enormous receptiveness for Industry 4.0. The predominant attitude there is: if I’m investing, then I’m going to spend my money on the very latest technology.

**Talking of China: as the Director of the Global Advanced Manufacturing Institute (GAMI) in Suzhou you’ve also had a good look at the quality assurance operations there: what differentiates the strategies of the Chinese production facilities from those of Europe’s industrial sector?**

**Gisela Lanza:** In Europe, the dominant category is the older brownfield plants, which equip their existing lines with sensor technology. In China, there’s a major trend towards new greenfield plants, which fit their new lines with large amounts of immanent sensor technology. I’m observing in China a readiness to make very substantial investments in Industry 4.0. They are spending a whole lot of money on hardware – often in conjunction with automation. However, I see this as problematic, because Industry 4.0 and the requisite system competence are not things you can buy. After all, what use is even the best of measuring machines to me if I don’t understand the system involved? It’s auspicious for China though that the significantly younger workforces there are much more receptive to IT applications. But often, there’s still a lack of basic comprehension of how control loops actually work.

**In the autumn of 2017, the EMO will be held in Hanover: what role does this fair play for you and your staff?**

**Gisela Lanza:** As a specialist in production technology, I shall anyway be going to the EMO 2017. But because metrology is increasingly being integrated into the processes and machines involved, and production technology is merging with metrology, it is becoming progressively more relevant for metrologists as such. In this context, by the way, I was also gratified to note the “Quality Area” at the METAV 2016. This is the right approach, true to the motto of “Get out of the test room and into the production line”.

The interview was conducted by Nikolaus Fecht, specialist journalist from Gelsenkirchen

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**Metrology in actual use: Industry 4.0 and the consequences**

The trend towards Industry 4.0 demands a new form of inline metrology, one that converts a machine tool into a measuring machine, for example. To enable a machine tool to also make ultra-accurate measurements, it has to meet various technical preconditions. These include both precise position measurements and an accurate scanning system, plus a control system that is able to process and evaluate the data concerned. One example here is encapsulated length measuring instruments: they render position measurement in the machine tool independent of thermal and other influences from the ball screw drive. To quote Helmut Kügel, Product Marketing Measuring Instruments at Dr. Johannes Heidenhain GmbH in Traunreut: “This closed-loop control determines the position of the machine table with invariable accuracy. With the 3D-ToolComp option and the 444 scanning cycle, our TNC 640 control system enables the workpiece scanning system to be effectively calibrated.” The machine’s operator can then use his scanning system to measure the surface of his workpiece with maximised accuracy, and the control system can evaluate the quality manufactured against defined tolerance values using the 444 cycle.

“Accuracy, productivity and user-friendliness are our keynote issues,” says Helmut Kügel. “Which is why at the EMO 2017 we shall again be showcasing interesting design-enhancements and new products from the fields of control systems and metrology, for further improving the accuracy of the machines involved and rendering them easier to operate.”

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**Background:**

**CV: Prof. Gisela Lanza**Down-to-earth and adaptable: these adjectives are truly apposite for Prof. Gisela Lanza, since 2008 holder of the professorship for Production Systems and Quality Management at the Karlsruhe Institute of Technology (KIT) and Head of the Institute of Production Science (wbk). Born in the Swabian town of Biberach an der Riss in 1973, she grew up on a farm. She studied business engineering at Karlsruhe University, and then worked initially at the Institute of Production Science (wbk) there, where she gained a PhD in the field of simulation for her dissertation on “Simulation-based start-up support based on the quality capabilities of production processes”. From 2008 to 2011, Ms Lanza as the holder of the first Shared Professorship in “Global Production Engineering and Quality” at the Karlsruhe Institute of Technology (KIT) worked at Daimler AG in strategic planning. Since 2009, she has also headed as Director the Global Advanced Manufacturing Institute (GAMI) in Suzhou (China), with a current staff of 20.

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**EMO Hannover 2017 – the world’s premier trade fair for the metalworking sector**

From 18 to 23 September 2017, international manufacturers of production technology will be spotlighting “Connecting systems for intelligent production” at the EMO Hannover 2017. The world’s premier trade fair for the metalworking industry will be showcasing the entire bandwidth of today’s most sophisticated metalworking technology, which is the heart of every industrial production process. The fair will be presenting the latest machines, plus efficient technical solutions, product-supportive services, sustainability in the production process, and much, much more. The principal focus of the EMO Hannover is on metal-cutting and forming machine tools, production systems, high-precision tools, automated material flows, computer technology, industrial electronics and accessories. The trade visitors to the EMO come from all major sectors of industry, such as machinery and plant manufacturers, the automotive industry and its component suppliers, the aerospace sector, precision mechanics and optics, shipbuilding, medical technology, tool and die manufacture, steel and lightweight construction. The EMO Hannover is the world’s most important international meeting point for production technology specialists from all over the planet. In 2013, the fair attracted more than 2,130 exhibitors, and around 143,000 trade visitors from more than 100 different countries. EMO is a registered trademark of the European Association of the Machine Tool Industries CECIMO.

You will find texts and images relating to the EMO Hannover 2017 on the internet under [*www.emo-hannover.de*](http://www.emo-hannover.de) in the Press section. You can also follow the EMO Hannover using our social media channels

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