

## PRESS RELEASE

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### **Chip by chip – EMO Hannover showcases revolutionary concepts from the tool industry**

**Frankfurt am Main, 4 February 2013.** – *One word, two figures and a punctuation mark are sparking plenty of animated debate, as did once upon a time the vision of Computer Integrated Manufacturing (CIM): we're talking about Industry 4.0, the new manufacturing concept with web-based networking. But what role are the tools playing in this context? A situation report from the 2012 Tool Conference in Schmalkalden, the meeting point for insiders from the metal-cutting sector.*

The controversial issue of Industry 4.0 – some people are already dubbing it derisively “CIMera 2.0” – was not on the agenda at the 10<sup>th</sup> Tool Conference in Schmalkalden. Nevertheless, the manufacturers and users of metal-cutting tools are not indifferent to the issue: when you take a closer look, you can already discover some tools with the right stuff for Industry 4.0. As indeed the 200 conferees saw for themselves, both in the presentations and during a tour of the test bay and the laboratories of the GFE – Gesellschaft für Fertigungstechnik und Entwicklung Schmalkalden e.V. (Society of Production Technology and Development), who organised this symposium themed around high-precision tools.

### **When the tool transmits ...**

The experts in Thuringia unveiled a mechatronic tool, for example, designed for retrograde machining of large boreholes, which uses telemetry to acquire the ongoing status of the tool during the metal-cutting operation. This tool, which acquires and transmits measured data, fits in neatly with the new concept known as the “Internet of Things”, in which basically all participants communicate with each other just like on the conventional web. To quote GFE scientist Bernd Aschenbach: “The use of mechatronic tools with integrated sensor-monitored actuators can help to downsize the amount of work required for producing retrograde counterbores on large-size machining centres while retaining high levels of process dependability.” In order to reduce the costs involved, GFE has developed a prototype featuring standard electronic modules. What are called Hall sensors monitor the end positions of the hydraulic cutting drive, which are communicated to a base station.

The BMBF's (German Federal Ministry of Education and Research) joint project called Sensomikrosys goes one step further. What's been created here is extremely small sensors that monitor in real-time machines and tool components exposed to highly dynamic loads. These microsystems serve, for example, to measure the forces acting in tools and clamping systems. For this purpose, the GFE had at the Tool Conference in Schmalkalden showcased a test rig for dynamic load testing of tool clamping systems in machine spindles. Sensors of this kind can even be integrated into hand-held tools. Here, too, the term “Tools 4.0” is definitely apposite.

“At the EMO Hannover 2013, we shall be seeing plenty of interesting tool and technology solutions incorporating concepts of this kind with sensors and actuators”, comments GFE's Executive Director Prof. Dr.-Ing. Frank Barthelmä. “The basic idea of integrating machine functionalities into the tool is not entirely new, of course. But for machining jobs like systems for energy technology or components for large-size machinery, we've meanwhile arrived

at quite different dimensions. The EMO is also going to show that besides the innovative content of technical solutions, users are more than ever going to be asking about their cost-efficiency.”

Assistance systems is one of the watchwords at Komet Group GmbH from Besigheim. Its Managing Director Dr.-Ing. Christof W. Bönsch has deliberately adopted the term from the automotive industry. “Parking backwards is for many people a complex task. But there are assistance systems for it that solve the problem”, he explains. “The idea is to arrive at assistance systems in metal-cutting applications as well, designed to make life easier for us.” This is the functional thrust exhibited by the familiar systems for process monitoring, which detect tool wear and tear, for example, or improve the efficiency of the metal-cutting process with the aid of adaptive control systems.

### **“Fingerprinting” the process**

In his view, there are even more possibilities: it would be conceivable, for instance, to create a process fingerprint, holistically covering machine dynamics, spindle behaviours, metal-cutting forces and the clamping situation, and defined as a standard process. These “fingerprints” could be used in process acceptance-testing, after a production operation has been relocated, for example, or when starting up series production in the automotive industry (SOP). “When a gigantic plant is built in China, for instance, then the machines used there are ones that are running in Germany with established processes”, comments Dr. Bönsch in Schmalkalden. “Monitoring the system enables the fingerprint of a process to be created, and then used to implement a self-learning production process.” Here, though, he adds, the tool industry is still in the early stages of development work.

Another issue relates to tool management. The expert from Komet is not talking here, however, about the administering and procurement of tools, e.g. by an outside service provider. “What I mean by tool management is complete-coverage acquisition of all relevant data over a tool’s entire useful life-

time”, says Bönsch. “For this purpose, we have laser-printed our tools with data matrix codes, which can be read using a simple scanner.”

The code serves merely to identify the tool concerned, while the detailed information on important key figures comes from sensors, for example. Thanks to these features, an electronic system now acquires the entire “tool lifetime”, which is stored in a data cloud. This can even go so far as to enable a tool’s acquired process data to be linked to each other. To quote Christof W. Bönsch: “In the cloud, I can file a complete tool history, including all the relevant parameters.”

### **Learning from Google**

Komet has already come up with a method for transferring a tool’s presetting data into the tool management system by simple scanning. But the company (best regards from Industry 4.0) aims to achieve a whole lot more. The goal is a cloud with a large quantity of process and tool data, serving as a foundation for a huge knowledge database, resting on assured statistical underpinnings. It will then be able to provide dependable answers to questions, e.g. on tools’ behaviour during operation, or the nature of any machine malfunctions. But, says Komet, there are even more possibilities, since as larger and larger quantities of data are acquired the error rate will also fall. As evidence, Bönsch points to Google, whose huge performative capabilities are attributable to global networking and multiple usage.

“Statistics play an important role in systems like Google”, says the expert. “When several billion search inquiries are received every day, then the few inquiries that don’t fit in precisely with the subject do not play any significant role.” This means the errors occurring are “statistically irrelevant”. Analogously, a corresponding knowledge database could also be created for tools. To quote Dr. Bönsch: “This could be an instrument enabling us to purposefully evaluate our own data.”

This still sounds a bit like science fiction. Some initial contours, however, will already be on show at the EMO Hannover 2013. Komet is not disclosing very much yet, but for Bönsch one thing is already certain as the new year begins: “The EMO is an ideal opportunity for us to showcase for the public the first industrial implementations of these ideas. We shall be exhibiting some initial mock-ups for the issues concerned, addressing specific job profiles of our customers. The major issues being covered in this context are assistance systems for communalising metal-cutting processes, and cloud-based tool management as an on-demand application”.

*Author: Nikolaus Fecht, specialist journalist from Gelsenkirchen*

**EMO Hannover 2013 – the world’s premier trade fair for the metalworking sector**

From 16 to 21 September 2013, international manufacturers of production technology will be spotlighting “Intelligence in Production” at the EMO Hannover 2013. 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 2011, the fair attracted more than 2,000 exhibitors, and around 140,000 trade visitors from more than 100 different countries. EMO is a registered trademark of the European Committee for Cooperation of the Machine Tool Industry CECIMO.

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