Press release

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On the path toward zero-defect production with Bosch AI

AI system to be rolled out at Bosch plants worldwide

- Bosch AI detects and prevents anomalies and malfunctions in the manufacturing process.
- AI solution to be rolled out at some 50 Bosch powertrain plants worldwide in 2021 and connected to more than 800 production lines.
- Bosch CDO/CTO Dr. Michael Bolle: “The use of artificial intelligence will make factories more efficient, more productive, more eco-friendly – and will make products even better. Our new AI solution will save plants millions in costs.”

Stuttgart, Germany – More precise than any eye or ear, faster than any mind: artificial intelligence captures and processes terabytes of data in a matter of seconds, helping humans understand complex relationships at a glance and take action. The Bosch Center for Artificial Intelligence (BCAI) has developed an AI-based system that detects anomalies and malfunctions in the manufacturing process at an early stage, reliably reduces reject parts, and improves product quality. Speaking at Bosch’s digital AI conference “AI CON” on Wednesday, March 3, Bosch CDO/CTO Dr. Michael Bolle said: “The use of artificial intelligence will make factories more efficient, more productive, more eco-friendly – and will make products even better. Our new AI solution will save plants millions in costs.” Pilot plants where the AI solution is already in use are saving between one and two million euros per year. The plant in Hildesheim, for example, was able to identify and eliminate disruptions in process flows with the help of AI. As a result, the cycle times of the lines dropped by 15 percent Studies have confirmed the AI effect: Industry 4.0 in particular would benefit from the widespread use of AI in Germany. Spread across the various industries, the greatest cost-saving potential – more than 50 percent (182 billion euros) – is to be found in AI-assisted production (source: eco - Association of the Internet Industry and Arthur D. Little, 2019). In 2021, Bosch will be rolling out the AI solution developed by BCAI, starting with some 50 powertrain plants worldwide,

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and connecting it to more than 800 production lines. More than one billion data messages will be stored on the analysis platform every day. Bosch plans to subsequently deploy the AI solution across the company at its roughly 240 plants. The company will also take the experience and technological know-how it gains and incorporate it into the development of new AI technology for manufacturing.

Bosch AI improves production and product

The pilot user of the new AI analysis platform is Bosch's Mobility Solutions business sector. Over the next few years, Bosch will invest some 500 million euros in bringing digitalization and connectivity to its plants. The expected saving will be twice as high: roughly one billion euros by 2025. An integral part of the project is the use of artificial intelligence. Collaboration between BCAI and the division's plants has resulted in a universal AI solution for manufacturing that uses Bosch Connected Industry's Nexeed Manufacturing Execution System (MES) to automatically collect, process, and analyze data from a variety of sources in near real time. Sensor data from machines serves as the basis for, say, determining fluctuations in a wide range of manufacturing processes. The Industry 4.0 software Nexeed "translates" and visualizes the data and codes, the AI system makes a recommendation for action, and the associate decides how to proceed. The main tools in this process are dashboards, individually configured and tailored to local use cases and the corresponding AI analysis. This setup makes it easier to find potential causes of errors. Self-adapting processes for machines and assembly lines can be integrated as well. If, for example, a drill hole deviates from the defined placement, the AI system independently initiates the necessary steps. At times, the AI system receives support from cameras that are positioned along the production lines and record the manufacturing process. On the basis of patterns it has learned, the system identifies deviations, and action can be taken immediately. In addition, field and customer data is linked to the platform in individual cases. This helps the system understand even better how products behave in the field, enabling it to detect defects in good time and predict impending failures.

Bosch uses AI to unlock manufacturing potential

While the manufacturing industry has grasped the situation in theory, it is still lagging behind in practice: more than half of all German companies (58 percent) see disruptive potential in artificial intelligence, but only one in seven (14 percent) is currently using AI for Industry 4.0 (Bitkom, 2020). A clear majority of Germans (60 percent) would like to see AI used more in industry, in sectors such as automaking or aircraft-building. This is a core finding of the Bosch AI Future Compass. Presented in November 2020, the study indicated that more than two-thirds of respondents would welcome the use of AI in diagnosing machine faults

and in other high-tech areas. Bosch is already fully committed to artificial intelligence. In manufacturing operations, the technology helps reduce rejects, improves the utilization of machines and systems, and optimizes production processes. “Artificial intelligence is an epoch-making technology, comparable to the invention of letterpress. It will revolutionize manufacturing. With the help of artificial intelligence, machines and products learn how to be smart and anticipate,” Bolle says. In addition to projects in its own plants, Bosch is launching AI-based solutions on the market. Applications in manufacturing include automated visual inspection of workpieces, software for intelligent production management, and sophisticated energy management. Bosch will present AI solutions for manufacturing at the digital Hannover Messe 2021 (April 12–16).

Bosch anchors artificial intelligence in its corporate strategy

Bosch regards artificial intelligence as a key technology. By 2025, the aim is for all Bosch products to either contain AI or have been developed or manufactured with its help. To this end, the company is investing in bright minds, appropriate infrastructure, and suitable conditions. Bosch aims to train 20,000 associates in AI by the end of 2022. One key lever here is its research and development center for artificial intelligence, BCAI. Just three years after it was set up, BCAI had earned back its initial investment: its contribution to result is now some 300 million euros. Bosch’s objective: “We research and offer AI that is safe, robust, and explainable,” Bolle says. The company is primarily concerned with industrial AI – the connection between artificial intelligence and the physical world, in other words. Bosch has excellent prospects in this area. “Our plants manufacture a wide variety of products – from refrigerators and power tools to powertrains and assistance systems for the automotive industry and automation technology for use in factories. We are now adding AI algorithms to this expertise,” Bolle explains.

Press photos: #23da3d4b7a99, #663e9352f124, #f14126a38258, #6cec244e5b57

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The Bosch Group is a leading global supplier of technology and services. It employs roughly 394,500 associates worldwide (as of December 31, 2020). According to preliminary figures, the company generated sales of 71.6 billion euros in 2020. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At 126 locations across the globe, Bosch employs some 73,000 associates in research and development, as well as roughly 30,000 software engineers.

The company was set up in Stuttgart in 1886 by Robert Bosch (1861-1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-four percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by the Bosch family, by a corporation owned by the family, and by Robert Bosch GmbH. The majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust. The entrepreneurial ownership functions are carried out by the trust.

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