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**Bosch opens new wafer fab in Dresden:
fully connected, full of artificial intelligence**

Dr. Volkmar Denner

chairman of the board of management, Robert Bosch GmbH,
and Harald Kroeger, member of the board of management
of Robert Bosch GmbH,
at the press conference in the new Dresden wafer fab
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Check against delivery.

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Ladies and gentlemen,

Welcome to Dresden, and to the heart of the European semiconductor industry. A warm welcome to you from one of the world's most modern factories. Welcome to Bosch!

Once again, an event is being held digitally. The continuing pandemic means that we have to stay physically distanced. Yet there is scarcely a place and an event more suited to a digital format than where we are standing today: in our new factory, we will be making tiny chips that do spectacular things. Semiconductors are the essential building block for the internet of things – only with them is connectivity possible.

All of us are taking part in this event digitally – whether by laptop, tablet, or smartphone. All devices that feature chips. And many of these chips were made by Bosch. They were manufactured in our Reutlingen plant. Semiconductors are in demand. More than ever. The current supply shortage for semiconductors is also due to the boost the pandemic has given to digitalization. We have to make sure this boost continues. Semiconductors keep digitalization running. No electronic system will work without them. Demand is rising, the market is growing. This year alone, it is expected to grow 11 percent, to more than 400 billion euros.

By building this wafer fab in Dresden, Bosch is leading the way. We are now hitting our stride, and will start production six months earlier than planned. As early as July, the first chips will be installed in our power tools. We have brought forward the start of production of chips for the automotive industry by three months, from December to September. Semiconductors from Dresden will make vehicles safer,

more efficient, better. In electric vehicles, for example, they control energy flows and orchestrate the interplay of energy source and horsepower. Semiconductors are the muscles, sensory organs, and brain of the internet of things. In the future, they will be augmented by quantum technology. We will see sensors that can measure 100 times more precisely and help diagnose neurological disorders more accurately and easily.

Smartphones, smart homes, smart mobility – microelectronics makes the world go round, and enables progress. Yet the semiconductor industry and its products are not just enablers. Chip production itself is a trailblazer. It is highly automated, at the leading edge of Industry 4.0. Semiconductors are made in smart factories in which production more or less organizes itself.

At Bosch, we are taking the next step: we are combining the internet of things with artificial intelligence – a combination we call AIoT. Data gives rise to knowledge. In Dresden, we are opening our first AIoT factory: fully connected, data-driven, self-optimizing.

Long before the first coatings could be applied to our wafers, the new wafer fab was the measure of all things. Right from the start, the complete building had its own digital twin, a virtual double. Nearly half a million 3D objects are documented in this model. They include plant, machinery, pipes, cable ducts, and ventilation systems. The factory exists twice – once in digital form, and now also in the real world. The project took three years. Digital solutions helped with the commissioning of plant and machinery. Thanks to augmented reality and data glasses, experts from around the world were able to share their knowledge with the associates on site, and in this way support

them. In running operations as well, digital transparency offers concrete benefits: machine maintenance can be done predictively, and complications detected before they crop up.

The decisive factor here is artificial intelligence. Connected manufacturing provides data that is evaluated by AI. AI algorithms detect the tiniest errors and every deviation, however small. They are more precise than the human eye, and faster than the human brain. With AI, we are taking production to the next level. In our Dresden plant, we will in the future be relying on solutions provided by the Bosch Center for Artificial Intelligence: at an early stage, our AI-based systems can detect anomalies and malfunctions in the manufacturing process, make learning curves faster, and constantly enhance quality. AI is also used in production scheduling, where it saves time and money as it guides the wafers through as many as 700 process steps at some 100 machines.

In our plant, we are permanently collecting and examining data – this data comes to the equivalent of 500 pages of text a second, or 42 million pages a day. Smart algorithms are used to evaluate this data in real time. This too is a key to the rapid rollout of semiconductor production in our new factory. Using methods of artificial intelligence, we can ensure a high level of process stability. This saves our customers time-consuming tests, curtails month-long trials, and speeds up release processes. In this way, we can not only produce earlier, but deliver reliable products earlier as well.

With this new factory, Bosch is again demonstrating that high-tech is something Germany does well. And together with our partners, high-tech will be something Dresden does well. "Silicon Saxony" is Europe's biggest microelectronics location, and the fifth biggest worldwide. One in three of all chips made in Europe is produced here. The region offers perfect conditions for this: here, modern entrepreneurship rubs shoulders with academic excellence and far-sighted industrial policy. The result is a network of suppliers, universities, and public institutions united by the common goal of making microelectronics a core element of digitalized societies. For Bosch therefore, the decision to make the single biggest investment in the company's more than 130-year history here in this region was a deliberate one: we will have invested roughly a billion euros in this high-tech plant. On 72,000 square meters of floor space, 250 people are already working in the plant. The workforce is set to grow to roughly 700 in the years ahead. The Dresden plant will be an important part of our manufacturing network. With this investment, we are strengthening Germany as a technological and industrial location. In its wafer fabs in Reutlingen and Dresden alone, Bosch has invested more than 2.5 billion euros since 200-millimeter technology was introduced. On top of this, billions of euros have been invested in developing microelectronics. The main beneficiary of all this will be the future of mobility, and my colleague Harald Kroeger will now explain this to you in slightly more detail...

... Many thanks, Volkmar! Ladies and gentlemen,

On this special day for Bosch, I hope you will allow me to be so bold as to say that chips for vehicles are the ultimate discipline in semiconductor technology. This is because in cars, these small building blocks have to be especially robust. Nowhere else are they subjected to such strong vibrations, and this over many years. And nowhere else do they have to withstand such extreme temperatures – from far below freezing to far above boiling point. In other words, chips have to meet higher standards of reliability – reliability over the entire service life of a vehicle. This means that the development of automotive semiconductors is more complicated than in other applications, and requires specialist expertise. Such expertise is something Bosch has amassed over the course of decades. No other automotive supplier has been working intensively on microelectronics since the 1950s. Today, this staying power is paying off. We understand all the microelectronic components in a vehicle because we develop and manufacture them ourselves. This opens up the possibility of systems that prevent accidents and protect the environment – again, developed and manufactured by us. This dual strength – the combination of chip and systems expertise – is strategically important for Bosch.

It is not just us who benefit from our upfront investments in semiconductor technology, but also – and above all – drivers. Many of today's automotive innovations would not exist without microelectronics. Sensors that register impact and trigger airbags and belt tensioners via integrated circuits, sensors that detect wheels locking up and skidding movements so that digital guardian angels such as ABS and ESP can keep the vehicle on track – these are just

two examples of the pioneering work our company has done. So far, ESP has prevented some 450,000 traffic accidents and saved nearly 15,000 lives in Europe alone. Above all, we want to use the semiconductors from our new plant to design applications for the future of mobility: control units equipped with chips from Dresden will make automated and resource-conserving driving possible, as well as occupant protection. More than ever, we regard semiconductor technology as “Invented for life.”

Clearly, the market agrees with this assessment. Demand for automotive semiconductors is rising. As recently as 1998, the value of the microelectronics in a new car was just 120 euros. In 2023 it is expected to exceed 600 euros. This means that semiconductors are a growth area for our company. In 2016, every new vehicle worldwide had an average of roughly nine Bosch chips on board. In 2019, this figure was already more than 17. In other words, their number had doubled in just a few years. In the years ahead, we expect to see the strongest growth in systems for driver assistance, infotainment, and the electrical powertrain. Bosch leads the way in all these applications – also thanks to its own semiconductors.

Chips have remained the basis of our automotive electronics competence. This is why we are systematically expanding both their development and their manufacture – not only in Dresden. Over the next few months, for example, we will extend the share of the clean room in our Reutlingen wafer fab devoted to the processing of 200-millimeter wafers. And further steps are to follow. Our initial investment here will be roughly 50 million euros. The Reutlingen extension will allow us to serve the growing demand for our sensors and silicon-carbide power semiconductors. Because these new power

semiconductors reduce loss in electric motors, they extend the range of electric vehicles. Here as well, our customers include automakers from around the world.

Ladies and gentlemen, Bosch and semiconductors are inseparable – and have been so for more than 60 years. In others words, we are not just creating additional manufacturing capacity in our wafer fabs. Instead, today's Bosch Silicon Day is the latest chapter in a long success story – in Dresden, in Reutlingen, and worldwide.