

Background Information

E-MOBILITY IS OUR DRIVING FORCE:

VITESCO TECHNOLOGIES DEVELOPS DRIVE TECHNOLOGIES FOR A CLEAN FUTURE

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Regensburg, 10/2/2020

Social and Economic Boundary Conditions

The coming decade, i.e. up to 2030, will be characterized by a shift in mobility toward electrified drive systems. 2019 was marked in particular by a growing worldwide awareness about global warming and air pollution. This has led to a noticeable change in direction, not only at a legislative level (stricter regulations) but also in the wider population (demand for environmentally friendly technologies). As far as individual mobility is concerned, the solution lies in the electrification of automotive drive systems. That is the most important technological pioneering development for clean, locally emission-free, highly efficient mobility.

One of the challenges of electrification is that it is required in different forms at the same time, as it is intended to support several of the strategic goals of automotive manufacturers: They want to comply with the CO₂ fleet limits applicable from 2020. For this reason, they need cost-effective solutions for different vehicle segments and price classes in order to be able to fulfill all their customers' use cases as much as possible.

In addition to battery-powered vehicles, electrification enables low-voltage and high-voltage hybrids, as well as electric vehicles with fuel cells as energy converters. And the common denominator of future vehicle architectures is the electric drive. The future is

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electric. The growing market acceptance of such vehicles is illustrated by rising numbers of registrations.

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This is why Vitesco Technologies has fully focused its strategy on electrified mobility. Our company is in an optimal position to help shape this transformation with market-ready technical solutions – and is already doing so successfully. The ongoing transformation offers potential for technological pioneers such as Vitesco Technologies who offer drive technologies for a clean future: in the right market with the right solutions at the right time.

Drive Technologies for a Clean Future

Vitesco Technologies, the former powertrain division of Continental, is a global leader in the development and manufacture of advanced drive technologies for sustainable mobility. With intelligent system solutions and components for electric, hybrid and combustion drive trains, Vitesco Technologies makes mobility clean, efficient and affordable. The product portfolio includes electric drives, electronic control systems, sensors and actuators, as well as exhaust-gas aftertreatment solutions.

We are a trailblazing pioneer in the field of electronics and electrification, ideally positioned to benefit from the trend towards e-mobility and the growth prospects associated with this transformation. Vitesco Technologies is shaping the market by embracing a strong, proactive role. We are represented in all growth markets (China, Europe and North America) with production and development. Our worldwide customer roster includes all the major automobile manufacturers.

We boast a strong presence in the fields of electronics, software and systems integration, and electrification. We are one of the few system suppliers worldwide able to offer a one-stop shop for all degrees of electrification of the drive train – from the 48-volt system to plug-in hybrids to purely battery-powered electric drives and hydrogen-based electric drives. Highly complex power electronics, intelligent sensor technology, integrated axle drives, battery management systems and energy and heat management systems are also part of the portfolio, such as electronics and mechatronics

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for controlling and optimizing the drive train domain. What our drive train solutions have in common is they enable greater efficiency and power and cleaner mobility.

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The requirements of the markets and our competencies are reflected in the organizational structure: With the three business units, Electronic Controls, Sensing & Actuation and Electrification Technology, we pool expertise and products in three key fields for the ongoing transformation of mobility. We offer the precise strengths that the markets need.

Management and Key Figures (2019)

Vitesco Technologies is managed by Andreas Wolf as chief executive officer (CEO). He will also remain on the Executive Board of Continental for up to three years until Vitesco Technologies becomes fully independent. The Finance division will be headed by Werner Volz as chief financial officer (CFO). Ingo Holstein is the chief human relations officer (CHRO) responsible for the Human Relations division.

Wolfgang Breuer heads up the Electronic Controls business unit. Klaus Hau is responsible for the Sensing & Actuation business unit. The Electrification Technology business unit is overseen by Thomas Stierle.

In 2019, Vitesco Technologies generated sales of 7.8 billion euros and the company currently employs almost 40,000 people at around 50 locations – including more than 7,300 engineers with more than 4,300 software and system specialists.

Vitesco Technologies is headquartered in Regensburg, Germany.

Strategy: Lead, Don't Follow

We want to actively shape the market. As one of the leading players, we have been investing in electric mobility since 2007 and covering all scenarios: We have built a broad portfolio for every type of electrification. With our clear strategic focus on electronics and

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electrification and an attractive product portfolio covering all electrification scenarios for the next ten years, our goal is to outperform the growth of the market in the medium term. This applies in particular to the passenger car and light commercial vehicle – or LCV for short – segments.

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We are focusing on the areas with the greatest long term growth potential: We are building on our strengths and ceasing investments in areas that we no longer regard as core technologies going forward – for example, the hydraulics business.

Our electronics business, the sensors and actuators for all drive types (internal combustion engines, hybrids and purely electric cars), and optimization of the internal combustion engine all remain important pillars of our portfolio. We boast outstanding expertise in these fields that we can transfer to future products.

Prospects and Growth

On a global average, it seems realistic that around 40% of all new passenger cars and light commercial vehicles will have an electrical element to the drive train by 2025 (1). Since there will be a large number of variants of electrified drives, suppliers must cover different scenarios. Understanding complete architectures will be key to enabling automobile manufacturers to offer intelligent solutions for cost-effective electrification. According to current studies, vehicle manufacturers are planning to invest around 300 billion dollars in electrification by 2030 (as of April 2020). This will increase the value share of electrification in vehicles (2). If we have the right solutions at the right time, we will benefit from this value creation. At the same time, however, the projected development also means that in 2025, approximately 90% of all passenger cars and light commercial vehicles will still have a combustion engine drive (or at least in part). As a result, emissions reduction (CO₂ and pollutant emissions) remains a high priority. Vitesco Technologies' combustion engine solutions will still be needed for many years, thereby contributing to the cash flow on the growth path to electrification with its above-average medium- and long-term potential.

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Products and Solutions

Vitesco Technologies integrates innovative and efficient system solutions for the drive trains of today and tomorrow for vehicles of all kinds. Thanks to smart principles such as scalability and modularity, we cover the requirements of passenger cars, commercial vehicles and two-wheeled vehicles, as well as new locomotion concepts.

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Electrification Solutions

For the mobility of tomorrow, the electrification of the drive train is the key to sustainability. Vehicles with electrified drive architectures, such as the battery-powered electric drive, hybrid and the hydrogen drive system, will shape the drive portfolio of the next decade. The journey toward zero-emission mobility has already begun. And Vitesco Technologies is one of its technological pioneers. Our pre-development will provide solutions for the requirements of tomorrow.

Our electronic systems provide the “intelligence” of efficient and clean electric drive systems – and will do so in the future too: For the transformation toward domain-based, cross-domain and even server-based architectures, we are one of the technological drivers with our comprehensive electronics and software DNA. We are helping vehicle manufacturers to overcome the ever-increasing complexity of electronics across entire fleets.

Our low-voltage (e.g. 48 volt) electrification plays a key role in further reducing CO₂emissions and the emissions of a vehicle with mild hybrid technology. This convincing and cost-effective hybridization is already underway on a large scale in all vehicle fleets of automotive manufacturers.

At the end of 2019, Vitesco Technologies was one of the world’s first automotive suppliers to bring an electric high-voltage axle drive with integrated power electronics and reduction gears into mass production. This market success is based on more than 12 years of experience with high-voltage electrification: Vitesco Technologies began to develop the drive for the first generation of the Renault Zoe back in 2007. Since then, high-voltage technology (HV technology) has been continuously developed.

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In order to “fuel” electric vehicles efficiently, quickly and conveniently, we offer a range of different charging technology solutions. This includes the family of on-board chargers (on-board chargers, OBC) for conventional charging with alternating current (AC), as well as the vehicle junction box for fast charging with high direct currents (DC).

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For Vitesco Technologies, long-distance suitability and zero-emission fuel cell technology provide the motivation to work on optimizing fuel cell systems. In addition to the reuse of existing sensors, actuators and electronics, this will also involve the further development of the fuel cell stack itself in conjunction with a leading German university.

With intelligent thermal management solutions, we are giving vehicle manufacturers the opportunity to significantly increase the range of an electric vehicle or hybrid. This advantage is particularly important for hot and cold temperature extremes. Thanks to the fact that all components can work at their optimum temperatures, our thermal management solutions shorten charging times on the one hand and prolong the service life of the battery on the other.

In the future, with our pre-development project for the 48-volt high-power machine, we will be enabling pure electric urban mobility in the low speed range at reasonable costs. Furthermore, the 48-volt high-power machine allows for more effective recuperation and greater support of the combustion engine with even higher CO₂ savings.

In order to reduce the cost barrier for the plug-in hybrid (PHEV), we have set up the innovative "cost-efficient PHEV" demonstrator as part of the pre-development. This union of transmission and integrated electric machine simplifies the mechanical transmission to such an extent that significant cost savings can be achieved while an intelligent, compact all-wheel drive solution is also possible.

Combustion Engine Solutions

In order to meet the ever-increasing requirements of legislation, further increases in efficiency and emission reductions in the combustion engine are necessary. Our strong global position in electronic control units for engine control and the management of

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automatic transmissions helps to make driving more sustainable. Highly efficient solutions for the air path make a further substantial contribution in this regard. For optimum temperature regulation of the combustion engine, we offer electric pumps, intelligent coolant valves and sensors. Each product and every solution supports the principle of increased efficiency and therefore lower fuel consumption.

Innovative technologies such as our EMICAT® electrically heated catalytic converter and the associated electronic control unit significantly reduce pollutant emissions by means of intelligent exhaust-gas aftertreatment. Our electronics and electrification solutions make a key contribution to achieving the applicable emissions targets for an internal combustion engine. For example, the EMICAT can be used to ensure that the catalytic converter acts quickly or remains at operating temperature at all times. In this way, emissions can also be minimized when the engine is restarted after an idle phase. Our innovative sensors and actuators deliver the precise data basis and ensure that exhaust-gas aftertreatment is implemented at all times.

We are making a further contribution to clean mobility with systems for the retention of refueling and evaporative emissions (HC emissions). These solutions include sensors and switching valves for leak detection, controlled tank ventilation and HC retention or reduction.

Applications Outside the Drive Train

Vitesco Technologies also uses its core competencies for areas of application outside the drive train. Examples include applications for convenient vehicle access through the use of our sensor expertise or the employment of pressure sensors in the area of brake systems.

Set Up for the Transformation of Mobility

Electronics orders now account for around two thirds of our goods on order. And in the future there will be an even greater demand for this expertise in the area of control, systems and connectivity. At the same time, the company is a pioneer in the field of electrification, so we can already offer experience and market readiness in terms of core products for the electric drive train, and that is attractive to automobile manufacturers: from power electronics, e-machines,

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drive control units and operating strategies through to thermal management. With its e-product portfolio, Vitesco Technologies covers the entire range of electrification with the exception of the battery.

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Regardless of how the distribution of electrification will actually develop in individual ways, we are always ready to provide a service to the market. The underlying core business including electronic control units, sensors and actuators provides a solid basis for these future opportunities. Based on its own assessment, Vitesco Technologies occupied either first or second place in 2019 in the competition, in two thirds of all sales in this area.

The portfolio covers the electronic and mechatronic core of the electric drive train as well as central parts of the combustion engine drive train. This makes it possible to deliver fully developed individual components as well as to develop sophisticated complete systems from a single source. The worldwide ramp-up of an integrated e-axle drive in large quantities at an independent supplier is a clear testimony to this. The comprehensive understanding of all components of the electric drive system and the excellent knowledge base on the individual components also enable efficient drive systems to be optimized at system level.

Sources

- (1) Roland Berger: The car will become a computer on wheels, January 2020; value comparison based on the bill of material of low and high voltage components
- (2) company's own analysis, electrification from 48-volt system and upward

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