ANNUAL MAGAZINE 2015

INTERVIEW WITH THE EXECUTIVE BOARD

KENDRION’S RESILIENT MARKET PLACE

TRENDZ! 2030

MEET OUR EMPLOYEES

TRENDS IN THE AUTOMOTIVE AND INDUSTRIAL MARKETS

MARKET GROWTH
MARKET GROWTH

Kendrion is a high-tech solution provider and world market leader that develops, manufactures and markets innovative high-quality electromagnetic and mechatronics systems and components that meet the highest technology standards. It has a global network of production, engineering and sales facilities. Kendrion is known for its balanced spread of operations aimed at meeting different market opportunities and mitigating risks. Kendrion operates in a resilient marketplace with ample room for growth in both the automotive and industrial markets. The existing portfolio enables high-end R&D and technology transfer. Not only within the company, but also in the value chain in close cooperation with our customers. The result of this is a constant drive for innovation. This ensures that Kendrion has a wealth of opportunities for further sustainable growth in the years to come. And that’s why the theme of this year’s Annual Magazine is Market Growth. We are taking you inside our world to explain our scope for growth. Together, we magnetise the world!
MARKET GROWTH

INTERVIEW WITH THE EXECUTIVE BOARD

A TWO-FACED YEAR
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This publication includes a supplement containing a summary of the official 2015 Annual Report of Kendrion N.V. The official 2015 Annual Report of Kendrion N.V. dated 24 February 2016, on which Deloitte Accountants B.V. issued an unqualified independent auditor’s report, is available on the corporate website along with other publications such as press releases and CSR Reports. Kendrion’s CSR Report 2015 will be available around the end of March 2016.

www.kendrion.com
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**TRENDS AND DEVELOPMENTS IN THE AUTOMOTIVE AND INDUSTRIAL MARKETS**

- Meet our employees
- Dedicated to success
- Taking Responsibility
- Automotive markets: trends and developments
- Industrial markets: trends and developments
- Magnetising the Chinese dragon
- The essential ingredients for cooperation
- The Kendrion way
- MagHyst®: measuring in a split second
- The Smart Factory is already here!
2015: SHORT & SIMPLE

PEOPLE

Total number of employees
(at 31 December)

2015 2014

2,730 2,808

2.8% reduction

Total number of employees by gender
(in %)

51%

Training costs
(as a % of wage costs)

0.8%

0.8% (2014)

49%

PLANET

Absolute energy consumption
(in million kWh)

2015 2014

25.5 24.9

2.5% increase

Relative energy consumption
(in tons kWh / million added value)

2015 2014

160.3 157.7

1.7% increase

Absolute CO₂ emission*
(in tons kWh)

2015 2014

5,254 5,254

14.1% compared to 2014

Relative CO₂ emission*
(in tons kWh / million added value)

2015 2014

33.1 33.1

13.2% compared to 2014

* All plants in Germany, Eibiswald (Austria) and Prostejov (Czech Republic).

PROFIT

Revenue
(EUR million)

2015 2014

442.1 428.9

3% increase

EBITDA
(EUR million)

2015 2014

45.2 49.3

8% decrease

Net profit
(EUR million)

2015 2014

16.8 20.2

17% decrease
Acceptance of Supplier Code of Conduct

Number of supplier CSR audits (in total)

Consumption of materials (in tons, best estimate)

Average number of years’ services (in years)

Average number of years’ services

2015 2014

10.8 10.4

2015 2014

368 214 (2014)

Solvency

(2015 2014)

49.8% 46.0%

Working capital

(2015 2014)

9.8% 10.5%

October 2014

2015 2014

36 23 (2014)

Investments

(EUR million)

Accidents and Lost Time Injuries (LTI in days)

Illness rate (in %)

Copper

Permanent magnets

Consumption of materials

2015 2014

1,893 1,568 (2014)

Relative CO2 emission

* (in tons kWh / million added value)

2015 2014

33.1 13.2%

863 506 (2014)

2015 2014

Average rate of absenteeism (in %)

10.8 10.4

0.4

2.5% 2.3% (2014)

2.5% 2.3% (2014)

41 863 (2014)

0.4

22.3 20.6

8%
OUR PROFILE

KENDRION develops, manufactures and markets high-quality electromagnetic and mechatronic systems and components for industrial and automotive applications.

For over a century we have been engineering precision parts for the world’s leading innovators in passenger cars, commercial vehicles and industrial applications. As a leading technology pioneer, Kendrion invents, designs and manufactures complex components and customised systems as well as local solutions on demand.

Committed to the engineering challenges of tomorrow, taking responsibility for how we source, manufacture and conduct business is embedded into our culture of innovation.

Rooted in Germany, headquartered in the Netherlands and listed on the Amsterdam stock exchange, our expertise extends across Europe to the Americas and Asia. Created with passion and engineered with precision. Kendrion – we magnetise the world.

OUR ORGANISATION

KENDRION N.V.

INDUSTRIAL

- INDUSTRIAL MAGNETIC SYSTEMS
  Electromagnetic components and mechatronic solutions for advanced technologies.

- INDUSTRIAL CONTROL SYSTEMS
  Customised mechatronic solutions designed to optimise automatic processes.

- INDUSTRIAL DRIVE SYSTEMS
  Full-line provider of electromagnetic brakes and clutches for industrial applications.

AUTOMOTIVE

- PASSENGER CARS
  Electromagnetic, mechatronic, and electronic components and systems for specific customer applications in the automotive industry.

- COMMERCIAL VEHICLES
  Individual systems for commercial vehicles and off-highway applications as well as the hydraulic industry.

- Development, production and marketing of high-quality electromagnetic and mechatronic systems and components
- 2,700 employees (including about 80 temps) in 15 countries
- Revenue: approximately EUR 442 million
- Listed company on Euronext’s Amsterdam Market
‘LINING UP FOR THE FUTURE’

Led by a new CEO, Kendrion is entering the next phase towards sustainable profitable growth. With former CEO Piet Veenema’s strong legacy as a favourable starting point and a solid basis for further development, the company is eagerly anticipating the opportunities the future has in store.

Chairman of the Supervisory Board Henk ten Hove says: ‘To get straight to the point, Kendrion performed below expectation in 2015. We grew in terms of revenue, but lagged behind in profitability. In some business units the order pipeline was not filled up fast enough; while in others existing projects were delayed. A positive event was that the first deliveries of the active damper project took off in December. In spite of still-uncertain market conditions, I expect to see some improvement in 2016 with a better balance between revenue and profitability.’

PROMISING FUTURE

Putting things into a historical perspective and looking at the favourable market conditions from which Kendrion can benefit, Henk ten Hove concludes that the future looks promising: ‘All credit goes to Piet Veenema, who together with his team took this company from a very difficult situation in 2003 to where it stands today. Our new CEO, Joep van Beurden, is inheriting a high-tech, high-quality company that is totally focused on electromagnetics, is financially sound, and occupies resilient positions in its relevant global markets.’

CHANGES IN THE SUPERVISORY BOARD

‘It has taken time and effort to find a worthy successor but we are very happy to have found Joep who meets almost all of our requirements and criteria. He is the man destined to lead Kendrion to the next level, supported by CFO Frank Sonnemans and a Supervisory Board which to a large extent will also be renewed over the next 16 months. Horst Kayser stepped down early January; Maja Sanders will be leaving this year; and Robert de Bakker next year. Maja and Robert have completed their terms in office. Horst Kayser can no longer combine his Board membership with his regular job. Marion Mestrom has been nominated to succeed Maja. Marion has extensive experience in international business and strategic and operational HR. We will ensure a smooth transition, creating the right balance between competences, experience and gender.’
A TWO-FACED YEAR

Joep van Beurden
2015 was a year of transition that was marked for Kendrion by the pre-announced resignation of Piet Veenema as CEO of the company and the entry of Joep van Beurden as its new CEO. On the business side, results were relatively flat, with a strong start but a weak finish. The long-term outlook, however, remains intact.
‘There are great projects to be proud of in 2015,’ says Piet Veenema, former CEO of Kendrion. ‘Think of the start of production of Kendrion’s biggest project ever: the active damper systems for ThyssenKrupp Bilstein. But during the year we also saw a gradual slowdown in developments across the full spectrum of our customer portfolio.’

Kendrion’s CFO Frank Sonnemans adds: ‘Last year was a mixed year, the orders kept coming and our projects progressed but we did see growth reducing during the year. This, of course, has had an impact on revenue and profitability, as the moderate growth did not offset the cost inflation and certain one-off costs. The effect is not dramatic but it reminded us of the need to stay alert. This is why, at the same time, we successfully put a significant amount of effort into further reducing our working capital and increasing our free cash flow which enhanced our strong financial position. This is a very positive development.’

Joep van Beurden, Kendrion’s new CEO, says: ‘It’s hard to identify the exact causes and reasons behind it but there is an undeniable feeling that German industry is slowing down a little. Growth rates are less euphoric than before. This might also have something to do with the impact on German export figures to China which is struggling with declining economic growth figures.’

**MOVING FORWARD**

2015 was a two-faced year in another respect too. Literally, in this case. Last December, after 23 years with Kendrion, 12 of which as the company’s CEO, Piet Veenema handed over the leadership to Joep van Beurden. The new CEO has no intention of fundamentally changing the direction the company is taking, although he does foresee a slight shift in emphasis: ‘The company has grown in scale immensely over the last five years. Major acquisitions, such as FAS Controls in the USA and Kuhnke in Northern-Germany, have contributed to a doubling of revenue. Together with the company’s 6% organic growth, this has led overall to a 15% annual increase in revenue over the last five years. This is a remarkable result and not easy to achieve. But compared to this top line performance, the bottom line has lagged behind. We now want to translate our larger scale and footprint into greater profitability. Growth and profit will be equally important. This will mean aiming continuously at simplifying our business processes, and increasing awareness of how ideas and innovation help Kendrion move forward. We will dive deeper into the what, how and why in our upcoming Mid-term Plan.’

**THE MARKET**

Part of the shift in emphasis will be a review of some of Kendrion’s financial objectives. Some of these, such as a 35% solvency margin, were reached long ago, others, such as 10% organic growth, have proven more difficult to achieve. Frank Sonnemans: ‘We want long-term objectives and targets to be challenging and achievable. This will be combined with a renewed focus on cost effectiveness and on profitable growth across the company.’

Of course, Kendrion’s market approach, competitiveness and ambitions remain largely unchanged. Innovation has become one of the company’s unique selling propositions and competitive advantages in the market. Frank Sonnemans: ‘In anticipation of new projects, we have again invested significantly in research and development and capital expenditure in 2015. No pain, no gain! It’s up to us to balance the cost structure and profitability. This is strongly supported by our position as the global innovation leader in electromagnetics.’
'What I find really interesting, with a view to the future, are innovations like our sound systems,' says Joep van Beurden. 'They’re an inspiring product and an example of Kendrion’s innovative spirit that really makes us stand out from the crowd. This is a product that underpins Kendrion’s reputation as an innovative solution provider. It’s also a product, originally developed for the automotive industry, which offers sales opportunities in a variety of other markets, such as machine building, the aviation industry and the construction sector.'

TECHNOLOGY FOCUS
Joep van Beurden adds: 'The quality of our products is the second cornerstone of our position in the market. Producing large volumes at reasonable cost is difficult enough but doing that at an attrition rate measured in parts per million is quite an achievement. We all know that nowadays quality is a hygiene factor, but there are degrees of quality and Kendrion has built up the knowledge, experience and resources to deliver quality at the highest level.' Surveying, plotting, analysing and assessing the market and deciding on the attractiveness of market segments is an ongoing action of both the Automotive and Industrial Divisions of Kendrion. How big is the market? What is relevant and appealing to Kendrion? And where do the company’s abilities, qualities and competencies match the demands and needs of (potential) customers? Joep van Beurden: ‘Automotive serves a limited number of customers with, generally speaking, large volumes. The Industrial Division serves a more fragmented market with many customers and small volumes. These differences require totally different market approaches. What our two divisions successfully share is their technology focus on electromagnetics. That’s our business.’

OUTGOING
In the dynamic world of business, a 12-year term as CEO is exceptional but Piet Veenema is clear about his decision to leave Kendrion. The outgoing Kendrion CEO, who worked for the company for a total of 23 years, says: ‘It’s a good thing for a company to have new ideas, concepts and views coming in.’ Of course, Piet Veenema will continue to follow Kendrion’s development closely, but from a distance: ‘It’s time to go and I’ve taken about two years to get used to the idea. I’m only too pleased that the Supervisory Board has found a five-legged successor like Joep.’

INCOMING
Before joining Kendrion, Joep van Beurden was the CEO of Cambridge-based and publicly listed company CSR, which specialises in high-tech products for the automotive, consumer electronics and music markets. He studied physics and started his career working in Lusaka, Zambia for three years. He gained commercial experience working as an oiltrader for Shell, as a consultant for McKinsey and as Head of Sales for Philips in California. Joep is married and has four children and, after 18 years abroad, is looking forward to moving back to his home base the Netherlands. From there he will be travelling the Kendrion world, in close contact with all the Kendrion locations and customers.
Joep van Beurden: ‘It’s a pleasure to be working at Kendrion. I really am surprised by the unique dedication of all the staff members I’ve met during the last few months. I’m proud to be the CEO of such a great company.’
ON THE VERGE OF THE ERA OF SMART MOBILITY

The average car generates huge amounts of data. Some of this information is shared with the driver, through dashboard controls and indicators for example. Most of it is visual and/or auditory. Think of the fuel gauge, the speedometer or the parking assist system. But revolutionary developments in power train, drive, and data transfer and exchange systems open up many more opportunities to enhance safe, economic and environmentally friendly driving. We are on the verge of the era of smart mobility and Kendrion is part of it.

FEEDBACK

The introduction of advanced driver assist systems is a new development. One of these, and directly related to Kendrion’s core business, is the active gas pedal. This not only enables the driver to control the speed of the car but also provides haptic feedback, adding a vital sensory function to the excitement of driving a car. In close cooperation with Continental, Kendrion has developed and now produces the force actuator for the Accelerator Force Feedback Pedal in the Daimler S-class, which gives the driver feedback on the current driving mode: electric or combustion. This mode can be changed by pressing the pedal.

THE FUTURE IN MOTION

This is only one of the active gas pedal’s possible functions. In a variety of projects, Continental and Kendrion are also working on gearshift indication, speed guidance and warning signals. Continental’s sees great potential for driver assist systems: It is not without reason that they apply the slogan ‘The Future in Motion’ in their approach to the market.
MARKET STRATEGY 2016–2018: ‘FOCUS ON MARKETS, MARKETS IN FOCUS’

Kendrion has a clear focus on creating an even better geographical spread, which will lead to more growth outside Europe. With its strategy plan for 2016 - 2018 ‘Focus on markets, markets in focus’ Kendrion is well underway to achieve further growth.

Automotive markets

Focus market Passenger Cars
- Fuel Systems
- Active Damping
- Engine Management
- Sound Systems
- Human Machine Interface

Focus market Commercial Vehicles
- Thermal Management
- Powertrain / Chassis
- Mobile & Standard Hydraulics

Industrial markets

Focus on the Energy, the Process Automation and the Industrial Appliances markets, split in specific focus markets:

Focus market Industrial Magnetic Systems
- Energy
- Locking & Safety
- Process Automation

Focus market Industrial Control Systems
- Aviation Engineering
- Industrial Appliances
- Medical / Analytical Technology
- Electrical Automation

Focus market Industrial Drive Systems
- Servo Motors
- Elevators
- Asynchronous Motors

Revenue development 2011 - 2015
Annual revenue in EUR million

2011: 267.9
2012: 284.9
2013: 354.0
2014: 428.9
2015: 442.1
KENDRION’S RESILIENT MARKET PLACE

Kendrion carried out a mid-term market survey. This survey confirms that Kendrion is operating in a resilient market place with attractive niche markets with ample room for growth. Kendrion’s relevant market has an estimated total size of over EUR 3 billion, well spread over industrial and automotive markets with a healthy geographical spread, and well-defined growth drivers.

The total market space is EUR 12.5 billion (2014) growing at 4.8% per annum through 2019 to EUR 15.8 billion.

The automotive market shows a bigger market volume, but the industrial market shows a higher growth rate.

*CAGR is Compound Annual Growth Rate.
Kendrion has a well balanced spread of operations and risk mitigation in the automotive and industrial markets.

**Market focus** for Kendrion is EUR 3 billion.

**Geographical break-down** of market volume:
- 25% Europe
- 25% USA
- 50% Asia and rest of the world

**Opportunities**
- Kendrion has many attractive market opportunities in both its Industrial and Automotive Divisions
- So far the focus of Kendrion’s most activities has been on the European markets, which means there is a lot to gain

**Growth drivers 2016-2018**
- Understand the market and the customer expectation
- Global technology and innovation leader in the electromagnetic and mechatronic field with balanced niche products and customer portfolio
- Achieve a result which enables further growth and business flexibility
- Develop products based on the international network and local production with new and combined technologies out of the existing business units
- Attractive company for customers, suppliers, employees and interested parties
- Managing risks and processes / delivering high quality
HIGHLIGHTS 2015

JANUARY
ROLLING OUT KOBRA

Developers, engineers and marketers of Industrial Drive Systems started the development and introduction of a new spring brake range for servomotors.

JANUARY
INSPIRATION DAYS 2015

The 2015 Kendrion Inspiration Days were devoted to mechatronic solutions (Automotive) and the identification of new products and sales opportunities (Industrial).

MARCH
KENDRION SYMPOSIUM ON MEGATRENDS

Participants from all over the world were told about the impact, consequences and opportunities of megatrends in joint sessions, workshop meetings and product presentations.

JULY
GROUNDBREAKING IN ENGELSWIES

To expand capacity and to modernise production, a new building is constructed at the Kendrion Industrial Magnetic Systems location in Engelswies, Germany.

AUGUST
JUNIOR SCIENTISTS DISCOVER TECHNOLOGY

Kendrion supports the educational TECHNOlino project in Baden-Württemberg (Germany) and welcomed 18 pre-schoolers who wanted to learn about magnetism.

SEPTEMBER
PASSENGER CAR SYSTEMS WINS INNOVATION AWARD

At the Top Management Meeting in Olomouc (Czech Republic), the Passenger Car Systems business unit was chosen as the winner of the Kendrion Innovation Award 2015.

SEPTEMBER
KENDRION PROSTEJOV WINS CSR AWARD

Kendrion awarded its third Taking Responsibility Award to Kendrion Prostejov (Czech Republic) for its integral approach to the full range of CSR topics.

APRIL
START OF SECOND HIPO GROUP AND GRADUATION OF FIRST GROUP

12 participants from all business units and from around the globe started their High Potential Programme with the creation of their roadmap for personal and professional development. The participants of the first HIPO Group all finished their programme successfully in 2015.
NOVEMBER
AAAA STATUS
KENDRION SUZHOU
In 2015, Kendrion was awarded by the Chinese Suzhou labour security bureau one more ‘A’, receiving the AAAA status. The company received this standard for being a harmonious and social company without employee complaints, no labour issues and positive employee survey results.

JUNE
KENDRION KUHNKE SUPPLIER DAY
Kendrion Kuhnke Automation hosted 16 of its strategic suppliers and partners for a meeting on the latest developments and to extend partnerships.

JUNE
FIRST DELIVERY TO KIA/HYUNDAI
Kendrion Automotive Control Systems is proud of the first sound actuator delivery to the new customer Kia/Hyundai. Starting with European models, further applications are following.

OCTOBER
KENDRION INVESTORS AND ANALYSTS VISIT KENDRION VILLINGEN
Kendrion organised an Open Day for investors and analysts at its plant in Villingen-Schwenningen in Southern Germany.

OCTOBER
KENDRION PREMIUM SUPPLIER TO RATIONAL
Kendrion Donaueschingen in Germany was honoured by Rational for very high supplier reliability and outstanding quality, and was awarded the title of Premium Supplier.

MAY
ISO 14001 CERTIFICATION FOR INDUSTRIAL MAGNETIC SYSTEMS
The environmental commitment of Kendrion Industrial Magnetic Systems (Donaueschingen, Germany) is underpinned by an environmental management system, certified to the ISO 14001 standard.

MAY
KENDRION IN ITALY
Kendrion’s new legal entity in Torino (Italy), with Vincenzo Leo as its Managing Director, covers the Italian market for Industrial Magnetic Systems and Industrial Drive Systems.

DECEMBER
KENDRION WELCOMES NEW CEO
After 23 years with Kendrion, 12 of which as the company’s CEO, Piet Veenema handed over to Joep van Beurden who is taking up the challenge of moving Kendrion into the future.
New technology has brought us to the brink of great changes. Moore’s law, which predicts that the speed of the microchips in our computers will double every two years, is as valid now as it was 50 years ago. Big data, the Internet of Things and new industrial products, such as robots and drones, force us to rethink business models and are at the basis of many disruptive innovations.

Trendwatcher and futurologist Richard van Hooijdonk shares his ideas and reflections on what’s coming down the line, and when, because the future might well be here quicker than we think.
BIG DATA

Big data is increasingly important in every industrial sector and is becoming more and more useful in everyday life.

What is its relevance?

‘Big data gives us an insight into using our time in a more effective way, it helps us monitor our health, enables us to avoid hazards and risks, and tells us how certain decisions will influence our lives. Data generates information and information triggers actions. By 2030, we will have five times as much data as we have now: information which is generated by technology and which helps us manage technology. With data we can put things in motion, predict, prevent and reduce costs. Take Amazon, for example, which applies self-learning algorithms to expose patterns in sales orders and uses them to predict shipping, even before the orders are taken!’

ROBOTISATION

Within 15 years, robots will take over many of our jobs, especially low-grade work. What do you see as the main consequences of this development?

‘A very interesting trend both economically, because robots can do the job a lot cheaper than people, and socially, because robots will earn an increasing proportion of our gross national income and put many people out of work. Discussing whether this is desirable or not, totally misses the point. We don’t have a choice. Robotisation and automation are going to affect every sector: from transport and health care to agriculture and the automotive industry. The computing power of robots is so much greater than ours. My brain has not been updated for the last 50,000 years but my MacBook was updated yesterday! When I talk about this in my presentations, I see awe, bewilderment and disbelief. The awareness of what is going to happen has yet to come.’
THE INTERNET OF THINGS
The Internet of Things is an endless network, a backbone to which everything in this world is connected. What impact does this have on the industrial world?
'All products, and in fact everything around us, will in future have a digital layer that communicates with the cloud. These signals will be analysed and processed and will trigger systems, products and devices to take action. In future, products will not operate separately but always in conjunction with each other. Products without connections will be useless. We will see the rise of connected and triggered factories. All processes and systems – raw materials, transport, production, stock and use – will be connected and will act on each other’s actions. Our world will change into a data-led economy and the profession of the future will be that of the data-scientist who is capable of transforming data into relevant information. It’s time for companies like Kendrion and other, comparable companies to take action, automate production processes, introduce connected factory concepts, offer services around products and develop new business models.'

3D PRINTING
3D printing offer endless opportunities for saving costs and reducing the negative impact on resources and the environment. But disrupting existing industrial processes is something quite different.
'Don’t underestimate the impact of 3D printing. Production will move from global to local. Printers for home use will cost no more than 100 euros, for industrial use they will be around 1,000 euros. Have a look around the internet and find out what products have already been printed in 3D! In the near future, hospitals will employ printers to produce human organs. And this is only the beginning. All these factories worldwide, all these warehouses, all these traffic flows… they will all be replaced by local 3D printing processes. Our world will be one of raw materials and models. You’ll download a specific model of a bike that you like from the internet, upload it to your 3D printer and your bike will be ready for use on the very same day. Many of the companies I work with are already running experiments with 3D printing. I expect it to take them another five to eight years to make this into a real business. By 2030, we will see a huge number of new business models centred around 3D printing. Our industrial world will be totally different.'
WEARABLES
Sensors in and on our body, FitBit, electronic pills, Google Glass, smart contact lenses and lots of other so-called wearables will influence our lives. What consequences will this have?
‘I have totally changed my life. Working with several hospitals and a research institute, I’m going to have a few chips implanted in my body to measure and generate all kinds of information on my health. Think of checking my blood pressure and my heart rate but also of detecting cancer cells, even before they start to grow. Based on all this data, my personal digital trainer will advise me on actions to perform and steps to take. In the near future all Kendrion employees will wear a FitBit wrist strap which will help them sleep better, move more, live healthier and lead a balanced life. This will enhance the ‘happiness factor’ and reduce sick leave.’

CYBERCRIME
Cybercrime will develop as quickly as IT itself. Could this cause negative disruption?
‘At the moment we are seeing a kind of vacuum in which the cyber crook is smarter than we are. But robotisation and the development of algorithms will also enter crime fighting. Many systems are like leaky sieves due to ignorance and naivety but many companies that have already entered the new economy are not affected by cybercrime at all. They are in control. I think within the next five to ten years we will have tackled this problem and will have algorithms in place that recognise and prevent break-ins.’
Small revolutions – they are all around us. They are hidden inside the intelligent technologies that drive our everyday lives. They are the components that power the world’s most advanced systems. They comprise the thousands of smart solutions that help us drive faster, fly higher and perform better. Small revolutions are all the precise little details that positively affect our lives.

PERMANENT-MAGNET BRAKES
CONQUERING THE CHINESE WIND TURBINE MARKET

When it comes to wind energy, China is the unrivalled global leader. And with the Chinese government’s ambitious non-fossil fuel targets for 2020, Chinese wind energy capacity is estimated to triple in the coming decade. This growth will be fuelled by enormous new onshore and offshore wind farms, but also through upgrading of the country’s current low- and medium-capacity wind turbines to higher capacity models upwards of 5 Megawatts (MW). And it’s precisely the high-torch 5MW-plus wind turbine market where Kendrion excels.

As the exclusive supplier of permanent-magnet brakes to the world’s leading wind turbine makers, Kendrion Industrial Drive Systems is very much in the mix of China’s wind energy revolution. One Kendrion product in particular, the Cold Climate Version (CCV) of its permanent-magnet brake, offers a solution to the increasingly complex challenges facing this market. Uwe Gnauert, Director Global Research & Development in Villingen, Germany: ‘With its ability to reliably secure the angle and pitch of a turbine’s rotor blades in any weather condition, Kendrion helps maximise the turbine’s overall efficiency. Our permanent-magnet brakes are engineered to perform in the most extreme weather conditions, between –40°C and +70°C. In fact, with our patented technology we are the only company that can deliver on such a broad temperature range. For 5 MW wind turbines, a high-precision electromagnetic brake is essential. Our permanent-magnet brakes are safer, more reliable, more powerful, more compact and require less maintenance than the lower-capacity and industry standard spring-applied brakes.’

Turnover in permanent-magnet brakes has almost quadrupled in China since 2013.

Not surprisingly, Kendrion’s turnover in permanent-magnet brakes has almost quadrupled in China since 2013. And Gnauert expects it to double again in the next five years, with growth fuelled both by China as well as the increased focus on wind energy in emerging markets such as India.
In Europe and the USA, commercial vehicles can reach upwards of 90 tonnes and travel long distances on well-paved roads. In India, however, transport trucks are much smaller but overloaded and have the time-consuming task of having to navigate poor roads. The result is enormous fuel inefficiency across the market. To help Indian OEMs tackle this problem, Kendrion introduced its electromagnetic fan clutch to the Indian market, cutting transport fuel consumption by 4% a year.

The electromagnetic fan clutch is the latest example of how Kendrion is using German-engineered components to help Indian OEMs tackle their enormous transportation challenges. The electromagnetic fan clutch is a smart alternative to the standard bimetal clutch. It controls engine temperatures very precisely, reacts immediately to temperature changes and automatically turns on and off as needed but at the same time it is still easy to control. This ‘on-demand’ activation makes it possible to regulate truck engines more efficiently and, as a result, saves fuel.

‘Fuel in India is expensive – often even more expensive than the drivers themselves,’ says Sameer Deshmukh, Managing Director of Kendrion (Pune) Private Limited. ‘Reducing fuel consumption is a very interesting argument for Indian vehicle manufacturers to adopt our clutch over the existing bimetal solution.’

Kendrion expects to double its clutch sales in India by 2018.

The electromagnetic clutch was designed at Kendrion’s headquarters in Germany, and was introduced to India in 2011 through Kendrion’s first customer Ashok Leyland, India’s second-largest maker of commercial vehicles. Part of the deal was to produce the fan clutch locally for the Indian market in order to save costs. Today, roughly 70% of the clutch components are produced in India, and Ashok Leyland uses the fan clutch in approximately 65% of its vehicles. Kendrion is currently in negotiation with almost all of India’s major OEMs concerning its engine-cooling portfolio. Backed by this growth, Kendrion expects to double its sales in India by 2018.
For all their advantages, hybrid cars and electric vehicles have one serious safety disadvantage: silence. Between 0 and 30 km/h, electric cars and hybrids make literally no noise. This poses a problem for pedestrians, cyclists and even animals, which can’t hear the cars approaching. But it is also an issue for the drivers, whose driving behavior is influenced by engine noises. For drivers, the revving of an engine is both a navigation device and offers a sense control.

**EUROPEAN LEGISLATION**
To address this problem, in 2014, the European Parliament approved legislation that will make acoustic alerting systems mandatory in all new electric and hybrid vehicles by 2019. With its electrodynamic structure-borne sound actuator, Kendrion is already providing original automotive makers (OEMs) with a highly precise and highly sophisticated acoustic solution. Kendrion’s sound system not only offers a wide range of customised engine sounds, but it also produces an array of signals.

**POWERFUL TOOL FOR BRAND EMOTION**
‘While safety is driving the industry, sound design is also a powerful tool for brand emotion,’ says Uwe Dettmann, Head of Kendrion’s sound design technology. ‘Our sound engineers are able to precisely replicate basically any engine sound, as well as produce a large array of original, customised and brand-specific sounds. Our automotive partners understand the potential of sound in creating a harmonised brand experience. Our actuator is a superior alternative to loudspeakers,’ says Michael Richter, Kendrion Sound Engineer. ‘A loudspeaker is moved by a piston-like membrane, or a cone. With our system the membrane uses a seismic suspension voice-coil drive to bend soundwaves. It is an entirely new system that can be completely integrated into the vehicle’s surface. In other words, there is no cone or loudspeaker opening. In fact, you can’t actually see Kendrion’s sound actuator. The sound simply emanates from underneath the dashboard (interior) or the bumper (exterior). In terms of sound quality, Kendrion’s sound actuator distributes sound more widely than a typical loudspeaker, which means it offers a more evenly distributed sound field. Moreover, as a closed system, it is dust-tight and waterproof, making it virtually maintenance-free for commercial operators.’

**EXPLORING NEW MARKETS**
Kendrion is now exploring new markets where high-quality, low-cost and compact sound actuators are prevalent. Campers, buses, airplanes and trains, for example, all vehicles that require reliable and durable sound actuators are for public announcements.
Even in the midst of the economic crisis, Kendrion Italy managed to generate growth. Now that the market looks brighter, it’s time to accelerate, says Vincenzo Leo: ‘The market is beginning to see, recognise and accept us. The competition is becoming aware of our presence. Gaining a bigger share of the highly segmented Italian market starts with close cooperation between our business units. That’s beginning to take shape.’

**SUCCESSFUL**

For 2015 Kendrion Italy can boast a number of successful projects. A smart application with maximum usability was developed for a mid-size Italian producer of components and subsystems for harvesters and tractors. In the very promising food sector, Kendrion supported a major new customer with innovations in the development of its vending machines. Vincenzo Leo: ‘Now we are working on two important projects in the power generation and distribution sector and in the textile market. Sales, consultancy and project management are our responsibility; our colleagues in Germany carry out research, development and engineering. Cooperation helps us to deliver higher added value. Our focus is mainly on the industrial segment but the next step will also involve the interesting Italian automotive sector.’

**CHERRY-PICKING**

For Vincenzo Leo profitability is the key criterion for expansion. But market share is equally important for building a stable position. ‘That is why, in the run-up to further growth, we will continue looking for interesting cherries we can pick, in every niche, in every segment. Nelle botti piccine.’
MEET OUR EMPLOYEES

Even for a high-tech company like Kendrion, people are the single most important asset. With their know-how, experience, capabilities and competences, it is the people who make our company and its success. In building Kendrion, we do not apply a one-size-fits-all approach but prefer to promote diversity, in background, education, gender and culture. Meet our employees.

‘THIS IS THE PLACE TO BE FOR THE YEARS TO COME’
Lukas Bremer, trainee at Kendrion Kuhnke, Malente, Germany

“I started my vocational training in 2011 and finished it as a qualified electronics technician for devices and systems in February 2015 with the best results of all the graduates in Schleswig-Holstein, Northern Germany. From my second year onwards, I combined the vocational training with my studies at Lübeck University of Applied Sciences. Last February I received my bachelor’s degree in electrical engineering. I wrote my bachelor thesis on the design and implementation of a module for the Kendrion Control Technology I/O-line which provides position and force control for switching solenoids.

I knew Kuhnke as the manufacturer of pneumatic valves we used in the science lab at school and then I saw the advert for a trainee position. When I learned more about the company and its products, I was delighted to be part of it as it offers great opportunities for my personal development and career. Kendrion is a technology leader with a wealth of experience and expertise and access to global customers. This is the place to be for the years to come during which I will combine a part-time job with a master’s degree.’
Jana Prachařová: ‘I joined Kendrion as an assembly operator in 2001 after my maternity leave. Later, as an assistant shift-leader, I started to train new operators and supervise their work and their compliance with working procedures and standards. I was promoted to my current position in 2005. I support newcomers by providing them with all the information necessary to succeed in their new job. In a way it is like bringing up my own children, giving them the very basic guidelines and gradually letting them do things independently.

The most important parameter is quality which is ultimately customer satisfaction. There can be no compromise on quality and we have to focus on it in all our day-to-day activities. Besides training new employees, it is our key duty to maintain a smooth lean manufacturing process to meet the flexible demands of our customers. We enjoy working here and always try to generate a pleasant working atmosphere. People make this company, so our team needs to perfectly fit the overall “company picture”. I really love working here.’
DEDICATED TO SUCCESS
Wheels, tyres and shock absorbers connect a car to the road surface and are essential prerequisites for safe driving. Invisible to the naked eye, Kendrion’s electronically adjustable valves for the shock absorbers of ThyssenKrupp Bilstein add not only to safety but also to comfort and CO₂ reduction.

ThyssenKrupp Bilstein is a leading supplier of high technology, high-quality shock absorbers and suspensions. With an annual production output of more than 10 million shock absorbers as original equipment or replacements for tuning and motorsport, ThyssenKrupp Bilstein has become one of the biggest and most widely respected companies of its kind in the world. The big car brands throughout the world trust in the experience of this specialist. Less than three years ago, in close cooperation with Kendrion, it started a project developing a completely new concept in ‘normally open’ electronically adjustable damping systems. The so-called DampTronic® sky shock absorber resolves the conflict between driving comfort on the one hand, and the driving safety and agility of the car on the other.

NEW GENERATION OF SHOCK ABSORBERS
In this new generation of shock absorbers, two continuously variable valves adjust the damping force in each shock absorber fully automatically and in milliseconds: one valve controls the extension phase and the other the compression phase. Using data it receives from the acceleration and wheel-path sensors, the control module of the suspension system eliminates the effects of rough-road conditions. This enhances driving comfort for the passengers and at the same time controls the shock absorbers to ensure optimum stabilisation of the chassis.

A STEEP RAMP-UP CURVE
Kendrion is ThyssenKrupp Bilstein’s preferred supplier for the adjustable valves for the normally open version of the shock absorbers. In 2015 Kendrion put special manufacturing equipment and production processes in place in Eibiswald (Austria), saw the Start of Production (SOP) in the second quarter and is now in the middle of a steep ramp-up curve which will eventually result in the production of several million of these special valves a year. In a shared development project, ThyssenKrupp Bilstein and Kendrion have now started on an additional version of the shock absorbers.

BIGGEST PROJECT IN KENDRION’S HISTORY SO FAR
For Kendrion, the ThyssenKrupp Bilstein project is the biggest in its history so far. Martin Kollmann (Managing Director Kendrion Eibiswald) and Wolfgang Keller (Sales Manager Passenger Cars) are very enthusiastic and enjoy the fantastic challenge: ‘Every ramp-up in automotive comes with its own issues but so far everything is going really smoothly and according to plan. After the first units in 2015, we will ramp up significantly this year and come close to the installed capacity in years to come. We would like to stress that this has only been possible thanks to the involvement, dedication and hard work of the whole team here in Eibiswald.’
It is Kendrion’s mission that Corporate Social Responsibility (CSR) and sustainability are intrinsic, integral elements of Kendrion’s operations. Kendrion wants to conduct business with consideration for climate effects and energy sources, with a feeling for people and the environment, and on the basis of a responsibility for the chain in which the company operates. This form of entrepreneurship pivots on the creation of multiple value – and consequently not just Profit, but also People and Planet.

**CSR POLICY**

For Kendrion Taking Responsibility means:
- **Innovation and acceleration** – these are the drivers of our industry.
- **Passion for technology** – this is the foundation of our company.
- **Transparency, flexibility and attention to detail** – this is how we engineer precision components for the world’s leading innovators.

The culture that drives our innovation is the very same culture that defines our approach to Corporate Social Responsibility. To us, social responsibility isn’t a separate pillar in our organisation, but an ambition integrated into our everyday decision-making. At Kendrion, CSR is not just about being responsible; it is about TAKING RESPONSIBILITY. To us, taking responsibility is a strategy to stay ahead.

Kendrion focusses on the following material themes:

- Energy efficient, safe and sustainable products
- Attractive labour standards
- Safe and healthy working environment
- Efficient use of materials; sustainable business processes
- Focus on energy & CO₂ reduction and environmental protection
- Takes supply chain responsibility within its sphere of influence
- Transparency and fair business conduct
- Support local communities

**TRANSPARENCY BENCHMARK**

Kendrion participates in the Dutch Ministry of Economic Affairs, Agriculture and Innovation’s Transparency Benchmark, which monitors the Netherlands’ 500 largest companies. Kendrion improved its ranking in each of the last 5 years. Kendrion was ranked number 37 in 2015.

**UN GLOBAL COMPACT**

Kendrion joined the UN Global Compact in September 2009. The UN Global Compact is the world’s largest network initiative that unites companies, UN organisations and civil society in support of ten principles encompassing human rights, labour, the environment and sound business practices.

>>> TAKING RESPONSIBILITY PROGRAMME

See for more information about Kendrion’s Taking Responsibility Programme 2015-2017 pages 4 and 5 of this Magazine and the separate CSR Report 2015.
In our integrated value creation model, we illustrate how and by what means we create value – from input to output to outcome – for our stakeholders, including our impact to society.
FOCUS ON COMFORT, SAFETY AND ENVIRONMENT

‘IT’S ESSENTIAL TO HAVE AN INTERNATIONAL FOOTPRINT’
Bernd Gundelsweiler, CEO Kendrion Automotive Division
2015 was another hectic year for the automotive market. The European and US markets are growing again, China is experiencing a slowdown in car sales. The sector saw a lower increase of e-cars and the effects of introducing the Euro 6 standard began to show. New technologies related to comfort, safety and environment are in the pipeline. Time for an update on trends and developments and on the way Kendrion addresses these with its drive for innovation.
In the development of both passenger cars and commercial vehicles, fuel efficiency and downsizing are key, with reductions in fuel and CO₂ emissions and a longer life cycle as the desired results. Against this background, all OEMs involved in the production of cars, trucks and buses are working on innovations that meet the increasingly high demands of the market. Kendrion relentlessly aims at a position as the technology leader in its markets and fits in perfectly with the current trends in fuel reduction and life span extension.

**ELECTRIC MOTORS AND COMBUSTION ENGINES**

The rise of hybrid and fully electric cars is impressive and unstoppable. But there are still some major drawbacks. The battery is still very expensive, the distance covered on one charged battery is limited and the battery-charging infrastructure is not yet fully in place. This, added to the present decline in fuel prices, explains why the ‘good old’ internal combustion engine is still being developed at the same time and why new technologies are being introduced, for instance gasoline engines with variable valve lift technology and reductions in weight and CO₂ emissions.

**SMALL AND COMPACT IN A HYBRID SOLUTION**

Throughout the automotive sector there is a drive for small, compact cars. Preferably in combination with a hybrid solution (i.e. equipped with electrification of the powertrain and a high-voltage vehicle electrical system, including brake energy recuperation) and totally geared to complying with the Euro 6 emission standard. Fuel cell technology, based on the use of hydrogen, may well play a part in this trend towards electrification. It is hard to predict at this stage which powertrain technology will eventually come out tops.
CONNECTIVITY: WEALTH OF DATA
And there is more. Connectivity or ‘the Internet of the car’ is another major trend in automotive. A single car can generate a wealth of data which can be intelligently used for all kinds of purposes. Think traffic jams, the search for parking spots, speed, the relationship to other road users in the event of accidents, traffic violations and more. Using the benefits of car data generation and evaluation is only in its infancy!

DRIVER ASSIST SYSTEMS
Self-driving cars or autonomous driving is a serious development. Driver assist systems, such as lane departure, rear-view, distance, (emergency) braking and speed, are all steps towards this final goal. All these systems offer safety as well as comfort functionality. The car communicates with the driver through visual cues, sound or haptic signals. This development is a precursor to autonomous driving and will provide a strong impetus for Kendrion’s business in the near future.

PASSenger CARS
In this particular passenger car market, the Kendrion Automotive Division was pleased to acquire its biggest project ever. Together with 1-tier supplier Bilstein, Kendrion develops highly advanced active damping systems for the high-end car segment. 2015 saw the start of production in Eibiswald, Austria, which will be ramped up steadily in the years to come. For more information see pages 28 - 29. This project is of strategic importance and could lead to interesting spin-offs in the near future. For the passenger car markets, Kendrion Automotive is concentrating on fuel systems (diesel common rail, gasoline direct injection), active damping (chassis suspension), engine management (fuel efficiency, thermal management), sound systems (interior and exterior) and human machine interface solutions (comfort seats, active gas pedal).

FOCUS ON INNOVATION
In this turbulent automotive sector, Kendrion focuses constantly on innovative solutions in electromagnetics and mechatronics. In close cooperation with customers, Kendrion’s Automotive business units work meticulously on components and (sub-)systems that contribute to the customer’s performance and success in the market. Kendrion offers a proven, global, state-of-the-art development and production network in which, for example, it integrates its advanced MagHyst® measuring technology for the validation of quality and performance.

LOCAL AND GLOBAL
Business intelligence assists Kendrion to understand the market and manage customer expectations. It also helps it to secure its position as global technology and innovation leader in the electromagnetic and mechatronic field with a balanced niche product and customer portfolio. ‘Being very close to our customers and markets is key for us,’ says Bernd Gundelsweiler, CEO Kendrion Automotive Division. ‘At the same time, and based on this local-to-local approach, it’s essential to have an international footprint. This facilitates knowledge transfer. In the Kendrion Mechatronics Center we have built a dedicated platform to share and further develop our fundamental technologies on a worldwide scale.’

COMMERCIAL VEHICLES
The market for commercial vehicles is completely different to the passenger car market. Production volumes are smaller and much more varied. The customer base for passenger cars is relatively limited, whereas the number of customers for commercial vehicles is much bigger. It is therefore not easy to compare the two from a market perspective; there is value, however, in sharing knowledge and experience. The Commercial Vehicles business unit focuses on three product categories: Thermal Management (engine cooling, fan drives, thermal modules, angle gear boxes and compressor clutches for air-conditioning); Powertrain/Chassis (vibration absorbers, clutches for auxiliary devices, angle gear boxes and valves for powertrain applications) and Mobile & standard hydraulics (solenoids for hydraulic applications and valves).
CLEAR CHOICES IN A RAPIDLY CHANGING ENVIRONMENT

‘IN TEN MARKET SEGMENTS WE WANT TO BE THE MARKET-ORIENTED EXPERT’

Marcel Zegger, CEO of the Kendrion Industrial Division
For most industrial markets the intensity of competitive rivalry is the key determining factor in competitiveness. The different segments in this market all have their own specific market circumstances and challenges. These are actively addressed by the three dedicated business units of Kendrion’s Industrial Division. Time for an update on trends, developments and Kendrion’s position in the industry.
It often feels as though developments in industry are constantly moving into a higher gear. There is pressure on acceleration in research and development; product life cycles are getting shorter; technologies are becoming disruptive. Many industrial companies are competing with each other in this fast changing world. Constant innovation is not a non-committal, free-standing activity but simply the key to survival. Amidst all these changes, what trends and developments can we identify that Kendrion can capitalise on with its appreciation of renewal and its urge for innovation?

**POPULATION GROWTH**
The growth of the world population, and therefore the demand for all kinds of products, is an unstoppable development. Mass migration and the emergence of megacities are important trends resulting from this development. Just to give you an idea: in 1800 2% of the world population lived in cities. Two centuries on, this figure is 50% and the total number of people living in cities will increase to 70% of the world population by 2050. We can only begin to imagine the scale of the industrial smart solutions for transport, lighting, energy, infrastructure, comfort and safety that will be needed.

**ENERGY EFFICIENCY**
Growing inequality of income/capital, globalisation of crime and worldwide terrorism – the awareness of sharply increased risks stimulates the call for stricter safety requirements and the demand for products and systems which address this need. The effects and consequences of a growing world population, however, are even greater. Consider the aging of this expanding population and climatic changes due to increasing CO₂ emissions and resource depletion. These developments call for energy efficiency at the highest level and for more sustainable products and production methods.

**FROM HEALTH CURE TO MASS PREVENTION**
In health care, new treatments will improve the average life expectancy. Diagnostics will shift the health care focus from cure to mass prevention. And, on the downside, all these developments will inevitably result in higher costs for health care. In order to meet all the needs and demands these developments call for and in view of the drive for cost reduction and efficiency, the industry is changing rapidly. Production systems are becoming increasingly intelligent, e.g. by interconnecting all their elements. ‘The Internet of Things’ is certainly having an effect on industrial production.

**MAKING CHOICES**
Kendrion has a vital role to play in this development, which is known as Industry 4.0 or Smart Industry. Robotisation is an almost fundamental prerequisite for success in the intelligent factory. Kendrion produces the innovative brakes that robots are equipped with. ‘It is just one example of the position Kendrion assumes in this field,’ says
Marcel Zegger, CEO of Kendrion’s Industrial Division. ‘Each one of our three business units has analysed its current market segment status, its differentiators, the attractiveness of markets and its competitive power, all with the aim to focus on specific markets. Where are we now? Where do we want to go? And how do we get there? It’s all about making choices.’

**SOLVING PROBLEMS**

Kendrion’s Industrial Division has chosen to actively serve ten market segments. Industrial Magnetic Systems (IMS) concentrates on energy (generation and distribution), locking & safety (access control and fire protection) and process automation (logistics and manufacturing). Industrial Control Systems (ICS) serves customers in aerospace engineering, industrial appliances (kitchen and laundry), medical/analytical engineering and electrical automation (e.g. food and packaging). And Industrial Drive Systems (IDS) focuses on asynchronous motors, elevators and servomotors. Marcel Zegger: ‘In these markets we want to be the market-oriented expert and a major player in meeting the needs of our customers and solving their problems.’

**THE KOBRA BREAKTHROUGH**

Marcel Zegger and his colleagues at the IDS business unit are particularly proud of the developments around the KOBRA product. Introduced as Kendrion’s ‘green’ spring-applied alternative, there is now also a version for servomotors. KOBRA was originally developed autonomously and in a so-called laboratory situation. After implementing a number of modifications, adapting the technology and extending its market positioning, stressing life cycle and torque, IDS Sales Director Boris Weber observes growing interest in the market: ‘We are targeting a significant number of global customers with our KOBRA spring-applied brake and are sure that this will be an important driver for the years to come.’
Despite the economic slowdown, the east coast of China is one of the world’s industrial epicentres. A dynamic place where things happen twice as fast and which still shows growth rates the Western world can only dream of. From a low-cost haven for offshore outsourcing China is developing into a highly attractive local market, offering massive opportunities to companies around the globe. One of these is Kendrion which decided to move into the fast lane quite early with production locations in two Chinese towns: Suzhou and Nanjing. How does Kendrion magnetise China?

**ELECTRIFYING**
China still has a lot of work to do to cover the entire country with electricity networks. Most of the projects in this field are awarded after public tendering. Kendrion – producer of vital solenoids for circuit breakers in the low, mid and high voltage systems – has shared knowledge, samples and the benefits of its products with the most dominant players in this market. More and more local companies rely on Kendrion as their supplier.

**RAILWAY**
The high-speed train network in China is developing rapidly. Chinese companies working in transport and infrastructure not only serve the home market, but are also seeing an increase in international demand for their products. Kendrion develops and produces solenoids for locking mechanisms used in doors on high-speed and intercity trains and in underground systems. In this segment the company has a 20% share of the Chinese market and continues to grow.
ROBOTS
In China, as in the rest of the world, there is growing pressure on labour costs and efficiency. Automation of industrial production processes is a tempting and serious alternative. Kendrion produces the permanent magnet brakes that go in servomotors which in turn are integrated in robots. In the very near future Kendrion will introduce its new concept for spring-applied brake applications which are more common in the local market.

NANJING
Shufeng Xue is Managing Director of the Kendrion Nanjing location: ‘Though 2015 has been a mixed year, the outlook for 2016 and the future is promising. We have seen a decline in the commercial vehicles business in recent years but we are expecting strong recovery due to the localisation of key products and implementation of our focussed sales strategy in the Chinese market. For Passenger Cars we have some very interesting new projects in the pipeline, for which production will start in 2017/2018. So we foresee further growth in the longer term.’

SUZHOU
Jürgen Weisshaar is Managing Director of the Kendrion plant in Suzhou: ‘We are not yet seeing any slowdown in our market segments. Our main industrial business is in electric power distribution and in transport/infrastructure, two public sectors the government is still investing in heavily. We are also seeing an increase in local Chinese customers who we serve almost independently with development, engineering and production. We employ 85 people and can boast very satisfying results with growth rates of 20-30% a year. But, putting this into perspective, our turnover is still at a relatively modest level which means there are worlds yet to conquer!’

PASSenger Car Market
Though the passenger car market shows a more stable development after 15 years of unbelievable growth, there is more and more demand for green technology in terms of emission control and fuel saving. This creates huge potential for Kendrion’s electromagnetic valves in applications such as diesel common rail injection systems and engine cooling systems. The introduction of hybrid cars is also creating a new market for Kendrion where it can provide valves for cooling systems which manage the cooling for both engine and batteries.
THE ESSENTIAL INGREDIENTS FOR COOPERATION

What do the Allianz Arena in Munich, the White House in Washington and the Burj Arab hotel in Dubai have in common? In their state-of-the-art kitchens you will find RATIONAL, the global market leader in cooking systems for thermal food preparation. The sophisticated RATIONAL systems include Kendrion’s high-tech solutions for controlling ventilation in the oven interior. Bon appétit!

All the ingredients in a good dish should be of irreproachable quality. Every single component contributes to a great meal in the end. It’s exactly the same with the equipment used to prepare the dish. Here too, the chain is as only as strong as its weakest link. For Kendrion, RATIONAL is one of the customers with whom the company has built up a strong partnership, based on mutual confidence in each other’s idea for the best possible product with the best performances.

SMART SYSTEMS
RATIONAL offers highly advanced technology for large-scale catering and commercial kitchens. It is a major player with a share of more than 50% in this particular market. The cooking systems it produces work with a combination of heat and moisture. Smart software enables users to cook different dishes simultaneously. The system tells them exactly when each dish is ready for consumption. It is also possible to have all the dishes prepared at the same time. The software can even adapt the system to national or cultural cooking habits and preferences.

PREMIUM SUPPLIER
The Kendrion plant in Donaueschingen, Germany, supplies the solenoid valve systems which control the ventilation for the combi-steamer interior. A noise-optimised magnetic assembly, which is also very cost effective due to the continuous improvement of production processes, is the result of thorough research and development. In 2015 RATIONAL awarded Kendrion the title Premium Supplier and stressed the importance of highly qualified suppliers for the RATIONAL business model.

INNOVATIVE CAPABILITIES
Kendrion has supplied RATIONAL since 2011, during which time it has achieved a considerable sales volume that continues to rise. This business model is based on a single-source-strategy and order-driven production. Kendrion’s performance is distinguished by strict adherence to delivery deadlines and the highest quality. RATIONAL also acknowledged Kendrion’s innovative capabilities. At the award ceremony, RATIONAL said, ‘We can’t be a specialist in everything we do. Technical advancements require suppliers with a high level of know-how. Kendrion has proven to be a real partner for us.’
FEELING AND COMMITMENT
Jan Rieger, Kendrion Key Account Manager for RATIONAL in Donaueschingen, is very happy with the customer’s esteem and appreciation: ‘RATIONAL really lives by its philosophy and challenges us to go out of our way to help it create top-level products. Its staff really practice what they preach, because in order to involve our people in their company, products and markets, they invited us all for a full day of presentations, introductions and even cooking together! A great way of creating a feeling for and commitment to this customer.’

OUTSTANDING PERFORMANCE
RATIONAL’s Premium Supplier Award – given to all Kendrion employees responsible for the production of modules which control ventilation in the combi-steamer interior – is based on a combination of different factors including, among others, supplier and quality performance, quality and audit indicators, and risk management. The Quality Seal was given to only 12 RATIONAL suppliers which makes the achievement even more outstanding. Jan Rieger: ‘This kind of performance can only be achieved as a team. I am proud of our achievement and the excellent cooperation in all areas.’
Kendrion’s main driver for growth and development is its own assets and key resources and their interaction with external trends and developments. From our origins and basic heritage in the South of Germany, we have developed into a global player, high-tech solution provider and world market leader.

We have built up a leading position in a number of business-to-business niche markets and we assist our customers to realise their ambitions in meeting the needs of their demanding markets. Our knowledge, products and geography are at the heart of our business approach. We call this ‘The Kendrion way’.

GEOGRAPHY

Kendrion’s global presence enables customers to penetrate and serve new markets all over the world. With strong footholds in the USA and China, operational companies on nearly all continents Australia, and our German facilities providing strong quality endorsement, we hold a key position in the world’s major economies. We offer the benefits of a global presence but take pride in local commitment and dedication to our customers’ objectives.
WE MAGNETISE THE WORLD

PRODUCTS
The vast majority of products manufactured by Kendrion are the result of close co-creation relationships with our customers and partners. The products, components and (sub)systems we supply are key to our value propositions and market distinctiveness. Our research and development departments worldwide apply this knowledge to the benefit of our customers and their market position. Interaction between our R&D specialists on a global scale accelerates the development processes.

KNOWLEDGE
The core activities and key resources of our company all revolve around our profound knowledge and extensive experience in electromagnetics and mechatronics. Our understanding of this fundamental physical principle enables us to support our customers in developing, improving, simplifying and innovating their applications. Our claim ‘Engineered in Germany’ is an important driver for our success.

UPGRADING AMERICA’S POWER GRID
Kendrion Mishawaka is making its mark on the US energy market. With its small magnetic solenoid for capacitor switches, Kendrion is instrumental in tackling one of America’s most economically crippling dilemmas: power outages.

According to the U.S. Energy Information Administration, American power outages are up 285% since 1984. American energy players are calling for an enormous ‘technology leap’. That’s why Kendrion has introduced innovative smart tech solutions. Kendrion has extensive knowledge of energy markets in Europe, which explains why Kendrion Mishawaka has made energy a strategic focus for growth.

SAFEGUARDING AGAINST POWER OUTAGES
Kendrion was retained to design and manufacture a permanent magnetic latching solenoid for a major US-based power distribution company. Martin Ahlers of Kendrion Mishawaka: ‘The innovation was that we were able to provide the customer with a design that is significantly more efficient magnetically and that we were able to save the customer overall system and assembly costs by integrating additional features in our design. We combined a holding magnet, a permanent magnet and a linear actuator in one to meet the requirements of this challenging operation. Kendrion’s dual coil solenoid automatically opens and closes during major power fluctuations and therefore offers a faster, more efficient safeguard against power outages during extreme power fluctuations or environmental interruptions. Using the initial German designs, our American team worked closely with the customer to adapt the solenoid to fit their product and comply with US manufacturing specifications.’

ATTRACTING NEW PARTNERSHIPS
After this first success, Kendrion Mishawaka is now in the process of adapting its solenoid to attract new partnerships and tap into other promising energy applications in the USA, such as reclosers and medium and high-voltage circuit breakers.
MagHyst® is Kendrion’s own innovative measurement and testing device for analysing the quality of all kinds of solenoid valves or magnets. A unique instrument which helps minimise scrap, optimise production processes and save time and money. ‘If we claim to be the innovation leader in electromagnetics, then MagHyst® provides the evidence.’

The Kendrion Mechatronics Center (KMC), which started developing MagHyst® five years ago, is providing the world with an innovative solution for analysing electromagnets and detecting failures during production and use of the application. The MagHyst® principle utilises the internal sensing functions of the actuators. Simply plug the actuator into the MagHyst® device: MagHyst® is actively exciting the measuring object, and you can see how it responds. This enables us to draw conclusions about the state of the actuator itself and about the overall system it is part of.

The Speed of Measuring
Testing new and complex valves is very difficult if not impossible by the classic method which uses mechanical or hydraulic measuring instruments. Applying magnetic measuring technology offers many benefits, the most important one being the speed of measuring (in a split second!). MagHyst® enables the user to determine the quality status of a solenoid magnet or valve, preventing disturbances in production and underpinning zero-failure delivery. Faulty parts are detected before welding or finishing and can be re-used.
**GOAL**
As a number of different failure-modes can be included, test results quickly indicate at what single mounting station in the production line issues occur and should be fixed. KMC has developed three different devices: a modular version for development purposes; a dedicated production device for in-line or end-of-line testing; and MagHyst® Mobile for use in applications. Once programmed and installed in the correct way, MagHyst® will quickly prove its value in production and application environments for engineers who have acquired some knowledge and experience.

**SMOOTH PRODUCTION**
The Kendrion site in Villingen has integrated MagHyst® in its high-pressure valve production line. This automated version is the most advanced member of the MagHyst® product family. The smooth ramp-up of the line can be attributed at least partly to the applied MagHyst® technology. The failure rate has gone down to below 0.6% since the start of production. Alexander Merz (Head of Operations, Passenger Cars, Villingen in Germany): ‘We will certainly install MagHyst® in our new lines in the future. It’s proving to be a very cost-effective investment.’

**THE FAILURE RATE HAS GONE DOWN TO BELOW 0.6%**

**ANNUAL MAGAZINE 2015**
They are on display now at international trade fairs. Countless robot arms grip, hold, lift, stack, weld, mill and assemble with breathtaking precision at speeds no human can reach. The Smart Factory stopped being a dream long ago – it is today’s reality.
**INTEGRAL PART OF THE INTERNET OF THINGS**

Fully robotised Smart Factories are now an integral part of the Internet of Things. As a result, the factory of tomorrow is a network centric production system in which comprehensive integration with clients and business partners results in shared value chain participation with great added value. This is feasible because UPPS, Ultra Personalized Product and Service, is available for each client and business partner. This is Industry 4.0. Data are then shared in secured connected data gardens, while crowdsourcing takes knowledge to a higher level.

**MARKET OPPORTUNITIES**

Kendrion sees good opportunities for growth in the market of Smart Factories and is already speeding up response times, optimising output and increasing productivity. Kendrion focuses on modular systems, software and tool standardisation (for example CAD and FEM software), magnetic measurement systems (for instance MagHyst®), lean production management and risk management modules, and has already implemented a Manufacturing Execution System (MES) which connects machines to IT infrastructures. This makes it possible to have an industrial manufacturing network totally controlled by computers and robots. The Smart Factory is already here!
The combustion engine is facing growing competition, forcing OEMs to invest heavily in its continued development. Hybrid and fully electric cars are ready to play their part and claim their share of the market. All car producers have successfully launched new e-drive models. Hydrogen cars are a relatively new phenomenon; car manufacturers inside and outside Europe are working meticulously on their development and market introduction. Hydrogen could turn out to be a very interesting alternative: filling up in five minutes, a travelling distance of more than 500 kilometres on one full tank, zero emissions. The only emission is water in the form of vapour. Electricity is generated as a result of the chemical reaction between hydrogen and oxygen from ambient air. The absence of an adequate distribution network of hydrogen filling stations is a problem but many countries are already working on this. Hyundai and Toyota are the trendsetters but all the major European brands are investing in the development of hydrogen cars.

Kendrion is involved in the development of the hydrogen technology for two big car OEMs. This opens up opportunities for combining high-end technology development and engineering with a wide product range and a number of very interesting application possibilities, such as pneumatic valves, hydraulic valves and more. The integration of mechatronics and variable valve lifting, engine and thermal management will offer new growth options in the future.