



INSPIRATIONAL BUSINESS STORIES  
FROM THE NETHERLANDS

JAAP JAN BROUWER | GIEDO VAN DER ZWAN

# DUTCH INDUSTRY



PHOTO: NIA PALLI

A wise man once said: *“The mechanics of industry is easy. The real engine is the people: their motivation and direction”*. During my time as prime minister I have had regular contact with the ‘engine’ of Dutch industry, visiting companies, speaking with entrepreneurs and accompanying them on foreign trade missions. In all those meetings and conversations I was struck time and again by certain shared character traits: an innovative and creative mindset and a focus on cooperation, continuity and sustainability. Of course, this is nothing new. It’s an approach that goes back decades in the Netherlands. This book gives entrepreneurs a platform: in it they talk about Dutch industry and how their various companies have developed over the past decades and centuries. It also describes the way they continue to operate at the forefront of the global market today, each in their own sector or niche.

What makes Dutch businesses so attractive at global level? Their innovative nature and focus on continuity makes them reliable, and they deliver high-quality products and services. They value their knowledge base and expand it year after year by building on their own R&D activities and the input received from the first-class universities and institutes with which they form networks. Partnership between businesses, research institutes and government bodies is firmly anchored in Dutch culture, and it is crucial to success.

It is that linking of social issues, commercial revenue models and research that creates the greatest opportunities.

Dutch businesses are popular with partners all over the globe. Wherever I go in the world, I find Dutch businesses active there. Whether they are working to prevent flooding in India or developing the water infrastructure for the Olympic Games in Rio de Janeiro, they are always helping to tackle the major challenges of our time. Challenges like producing enough food to feed the planet’s growing population, or anticipating the impact of climate change on water management. Dutch industry fulfils its role as a partner in this mission by sharing its knowledge of how to increase crop yields, combat flooding or optimise communications, safety and infrastructure, to name but a few examples.

This book offers a wide-angle perspective of Dutch industry. The individuals featured talk about the competition abroad, about innovation and about the challenges they encounter in day-to-day business. I am confident this book will give you a clearer picture of how Dutch companies operate and work towards a better, more sustainable world. It will give you a better understanding of the engine behind our unique and thriving industry.

Mark Rutte  
Prime Minister of the Netherlands





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# DUTCH INDUSTRY

Dutch industry is of great importance for Dutch society. It employs 13 % (close to 1,000,000 working years) of the Dutch labour force and generates almost 20% of the Dutch Gross National Product. As a whole the industrial sector performs as an engine for the Dutch economy by generating 75% of its exports. Being part of a broad and deeply-rooted knowledge infrastructure, of which small and medium-sized enterprises are an integral part, Dutch industry is also the main hotspot for innovation. Dutch society greatly appreciates the value-adding capacity of these industrial activities and the role that Dutch industry has played in the remarkable economic recovery of recent years.

Dutch industry also plays a significant international role. In many sectors Dutch firms, large and small, have dominated certain industrial sectors for decades. Apart from the behind-the-scene stories of the

more than 60 participating companies, this volume also seeks to explore the reasons for their successes. How is it that the Dutch have managed to maintain a strong and successful industrial base, which has moved from the domestic into the wider world market? Is it a native resilience that has come from generations of battles against the sea coupled with a lack of natural resources, or the early growth of a merchant middle-class that needed trade and exploration to create prosperity? We found some answers from the companies that tell their story in this book.

### A tough entrepreneurial climate

There are many reasons that explain the international success of Dutch industry. To start with, most companies have a long history; even start-ups often have their roots in older businesses and the collective





Dutch knowledge base. The Netherlands as a whole has unique and intimate knowledge of technologies and markets that have grown over the last centuries and in which companies, knowledge networks and the government continuously invest. This gives the companies involved a competitive edge. This competitiveness is also stimulated by the high costs of labour in the Netherlands, the high demands of the domestic market and both legal and quality standards. These compel companies to make only the best products in the most efficient way against the most competitive prices. As a participant said: 'You are either the best, or not a player at all on the global market'. This tough entrepreneurial climate gets the best out of companies.

**Privately owned**

Another important reason for the success is the fact that most companies are privately owned, this also having an effect on other reasons for success. Without the constant pressure of shareholders, private companies have time to invest in innovation, market development, knowledge and their employees. Private ownership also seems to stimulate companies to develop their own legacy and their own 'DNA'. This is very important for the corporate culture and cohesion within the company, especially when a proportion of the workforce operates abroad in network-style organisations that sometimes span the whole globe. Many participants in this book feel that the preservation of the company DNA, or identity, is of greater importance than fast growth and higher turnover. Last but not least, private



ownership makes companies resilient: a few bad years won't scare the owners. They have been there before and survived.

**Incremental innovation**

Innovation in most Dutch industrial companies is incremental, although as one participant remarked 'Incremental innovations lead to disruptive innovation': and this is precisely what is happening. Many companies in this volume are working on, or already have developed, next-step technologies. These shed a different light on all the sectors involved: they are the result of years or even decades of incremental innovation and have led to very refined technologies such as in agriculture, chemistry or infrastructure. These innovations are always part of a greater development in which knowledge networks play an important role. Together they broaden the Dutch knowledge base and make it fit for the future. The concept of the so-called 'Sustainable Urban Delta', which is described in detail later in this book, is a good example in which many of these new technologies come together.

And innovation is not only to be found in the classic R&D department. The account manager and the technician operating 'up front' are often the first to signal trends in demands and technical possibilities that can be used as input for innovations. With the typical Dutch management style in which there is room for everyone's input, ideas quickly find their way toward the various innovative pathways.

**Keen entrepreneurship**

Another reason for success is the incremental way in which markets are being developed. Operating from a strong and critical home market, Dutch manufacturers and service providers dare to make next steps, firstly in neighbouring European countries and then frequently followed by newer markets in, for example, the United States, Asia or South America. In this phase the focus is on finding the right counterpart abroad, be it a manufacturer or an agent. But once settled, Dutch companies seem to be capable of acquiring a solid market position in a relatively short period, with the quality of Dutch industrial products and the companies' pre- and after-sales activities key features. Furthermore the Dutch are also renowned for their linguistic skills, their open minds regarding different cultures, as well as good and fair trading. These all contribute to the strong position of Dutch companies abroad.

**Investing in knowledge**

Dutch companies dare to invest in knowledge because they know that their future depends on 'top of the bill' facts, information and learning. They are supported in this by the various sector-related knowledge networks that are focussed on giving an edge to Dutch science and industry. The contemporary level of technological knowledge has its basis in the past which, in some cases, can be traced back for centuries. This knowledge has become part of Dutch DNA and is, in many respects, unique. The same applies to

the companies involved: their success can be explained by their knowledge basis which, for them, requires constant expansion as part of the 'going concern'.

**Investing in people**

Investing in knowledge is a corollary of investing in people as, in many ways, employees are the embodiment of knowledge. Dutch employers go a long way to engrain company knowledge in their employees and, by return, collect knowledge from them. This all contributes to the employees' professionalism and craftsmanship. Many participating companies have in-company academies complemented by internet-based knowledge networks, as well as special expert or innovation centres where employees, clients and suppliers can contribute to the knowledge base of not only the company but themselves individually as well. In the short run the client is provided with the most up to date knowledge on, for example, how to optimize production while, in the long run, possibly obtaining new insights and development of new products. The contact between employee and client is the key to this mutually beneficial knowledge transfer. However, this is not the only reason why investing in people is worthwhile: employees will feel more connected to the company. Such connection can create higher working satisfaction and lead to long employment relationships, thereby contributing to optimal growth and use of the collective knowledge base within the company. This knowledge base has proved to be one of the decisive factors for success.



**Focus on cooperation and co design/co creation/co production**

One of the unique selling points of our industrial companies is the typical ‘Dutch approach’’: companies from the Netherlands are very keen on cooperation resulting in co-design and co-creation with clients. They are also willing to share knowledge, an attitude that is, in a way, unique in the world and gives companies a competitive edge. Dutch companies acknowledge that, in the overwhelming large global market, cooperation with suppliers, competitors or clients is the only way to stay successful and contribute to the strategic position of the company. Besides this, cooperation often leads to advisory and service activities thus broadening the portfolio of the company involved.

**Dutch management style**

The Dutch style of management is part of the larger European style of management that has created many successful companies. The Dutch style is characterized by a free flow of horizontal and vertical communication and employee freedom within certain boundaries, by which the latter have the possibility to act without interference from their superiors. The better the DNA, or company identity, is defined, the less the boundaries have to be described, hence our earlier emphasis of this important feature. With this strong corporate culture the companies have, on the one hand, the necessary agility and, on the other, the necessary resilience by which they can move

quickly and flexibly from a solid operating base. This freedom to act is especially important as many companies run complex projects abroad where important decisions have to be taken on a daily basis. Employee professionalism and the craftsmanship guarantee that the decision-making is in the right hands.

**Knowledge networks**

An important facilitating phenomenon is the so-called ‘Knowledge networks’ which significantly contribute to the competitive power of Dutch industry. This intricate fabric comprises universities, research institutes, centres of excellence, government agencies and other public authorities. Every branch has its own specific type of network and its own historical basis. The networks have broadened and deepened in past centuries so that the knowledge basis of the various branches can guarantee, and will continue to guarantee, a strong technological push. The challenge is to keep combining this push with market demand, thereby reducing the time-to-market for innovations. For this purpose every branch has its own so called ‘Top Institute’, a public/private initiative that has the sole purpose to function as a matchmaker between the innovative ideas of researchers and the companies that might be interested in marketing them.

These knowledge networks are described in the next chapters in the descriptions of what are termed ‘Top Sectors’.

**Geographical position**

Traditionally, the geographical position of companies explains a lot about their history. Shipyards for example are to be found along the rivers in the west and north of the Netherlands while the country’s location close to the sea and the European hinterland explain its logistical position. The precision mechanics industry is located where the old textile industries used to be and the automotive industry is found in the southern part of the country where the first cars were produced. Engineering works are often sited where iron ore was available, energy-related industry where gas is to be found, with water management-related industries in the wetlands of the west and north. Agri & Food industry and horticulture can be found anywhere in the country, but often with a region-specific profile. Knowledge networks can be found clustered around all of these industries. In this way the geographical location of a company says a lot about its history and the knowledge network to which it belongs.

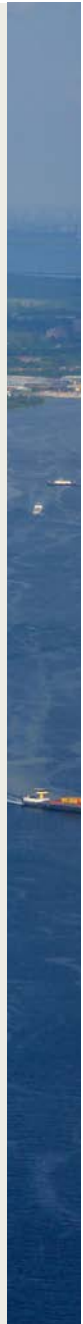
The above mentioned reasons for success can be found in each business case; each company has its own unique combination of reasons for that success. This illustrates the dynamics of Dutch industry in the past, present and future.



**DUTCH DREAMS: THE SUSTAINABLE URBAN DELTA**

Most of the ambitions of Dutch industrial companies come together in an integrated concept that is called ‘The Sustainable Urban Delta’. The starting point for this concept is that the Netherlands is geographically located in a delta environment with sea, rivers and water enabling food production, transport and trade. Historically, Dutch industries have played a major role in this and, more recently, this role has evolved to make the urban delta more sustainable as, without design, engineering and manufacturing skills, it would be impossible to live, work, feed and transport people in such an area. This concept of an integrated vision and role for industries has huge potential on a global scale in the light of many international trends and developments.

Every day, about 180,000 people worldwide move from the countryside to the city. It is estimated that within 15 years over 60% of the world’s population will be living in metropolitan areas. Many of these areas are located in a delta such as the Netherlands and, just like the Netherlands, the presence of water in these foreign deltas enables food production, trade and transportation. Furthermore, these cities will need efficient energy and water flows, sustainable food production, green and clean neighbourhoods, decentralized and short supply chains, clever transportation systems and much more. Without all these conditions a certain quality of life will be unattainable for their inhabitants. The Netherlands itself is like a city in a river delta, based on a single area of conurbation from north of Alkmaar to south of Eindhoven. With that image in mind, the Netherlands and its industry can play an important role in the development of sustainable urban deltas all over the world. In many business cases elements can be discerned that greatly contribute to this development, for example by enhancing the yield of groceries, combining energy networks, introducing organic chemistry and smart urban transport systems. Together they sketch the conceptual outlines of the future in the form of the Sustainable Urban Delta.







With work environments becoming increasingly global and dynamic, the smart, safe entry has become the centre of activity in and around many buildings.

With 140 years of experience in engineering quality, Royal Boon Edam has gained extensive expertise in managing the transit of people through office buildings, airports, healthcare facilities, hotels and many other types of buildings.

## The best entrance solution anywhere

Boon Edam has existed for over 140 years. Gerrit Boon started a small carpentry shop in 1873. Thirty years later, the company produced its first revolving door, a product that has been the basis of the company's success. In the 1940s, as the third generation of the Boon family no longer wished to continue the business, the company was taken over by the Huber family, but kept its trading name, Boon. Two decades later Boon searched for a way to stand out in the highly competitive contracting market and the company's focus on the revolving door proved to be a strategically sensible decision as the company grew steadily in size. Because the location in Amsterdam was too small, the company moved to Edam in 1970 where it traded under the name of Boon Edam. The business continued to grow and in the 1980s the company released its first secure access solution on the market. At the end of this decade Boon Edam started

setting up a global distribution network; firstly in collaboration with local companies and later by the establishment of various subsidiaries. Great Britain and the United States were the first foreign branches. From 2003 onwards, Boon Edam also carried the designation Royal. In the same period the company took over a major player in the field of access security and thus reinforced its position in this niche. From here, Boon Edam has steadily expanded its business and currently the company operates worldwide with a broad portfolio of access and security solutions in large public buildings such as offices, airports, health centres and hotels.

### Slow growth strategy

There are several reasons for the success of Boon Edam, but perhaps the most important one is its adaptability: the company

has constantly moved with world-wide developments in the industry. This also reflects the nature of the family business that shows strong attention to the longer term as well as a "step-by-step" approach to central themes. Other important reasons for the success of Boon Edam are its global presence, the focus on access and security, the quality of the delivered products and the fact that the company directly confronts any problem.

*"If it does not work as the customer expects it, we always ensure that it is resolved."* - Niels Huber, CEO of Royal Boon Edam

This commitment and loyalty to the client generates a lot of repeat orders and long-term relationships, that have resulted in a solid customer base for the company. All this has contributed to the sustainable growth of







THE MAURITSHUIS IN THE HAGUE.

the company over the past few decades. A structured slow growth approach is also at the core of Boon Edam's internationalization strategy: in this way the company's DNA can be preserved.

At the same time as maintaining steady growth as a local manufacturer, the company has become a global leader in the niche of access and security solutions. Through this approach the company has not only retained its identity, but also has kept all steps of the value chain in-house: from design, production and installation, to software and service activities.

This helps Boon Edam to keep a solid grip on the quality of the final product and respond quickly to customer needs and innovation capabilities. Another effect of this strategy is that the company has a broad knowledge profile. A basic principle at Boon Edam is that every employee should have knowledge about his or her own activities as well as continually expanding his or her knowledge profile, the company's employees having a wide range of tasks. The benefit for the employee is that the work is varied and there are interesting growth opportunities. The Boon Edam University (see

text box) ensures that employees' knowledge is always up-to-date.

### Philosophy about entrances

Boon Edam sees the entrance as more than just an entrance to a building: it is the primary focus for every visitor and the busiest point of a building. The entrance is the logistic hub where the different streams of visitors come together and find access to their destination. The entrance is therefore of crucial importance for the proper functioning of a building and also influences the reputation of the company or organization that is located there. According to Boon Edam a solid entrance solution is important, because it helps a company to distinguish itself, it can regulate visitor flows and it can control access and security. Over the past 140 years Boon Edam has developed its expertise and built a broad portfolio on the area of access and security solutions that meet the needs of different customers.

*"A revolving door is always open and closed at the same time."* - Niels Huber, CEO of Royal Boon Edam

### Entrance Solutions

In the area of access solutions Boon Edam offers a wide range of doors, the classic revolving door to the NRG + Tourniket, the first revolving door in the world which not only saves energy but also generates energy. For years, engineers from Boon Edam played with the idea of developing a revolving door that could use the energy produced by people using the door. After some initial research the first NRG + Tourniket was installed in 2008. In addition, Boon Edam markets a full glass revolving door. It is a product line that matches trends in the design of buildings and is suitable for use not only in a modern glass facade, but can also be a focal point in a classic architectural style. These are not the only entrance solutions offered by the company; there are many more. There are doors, for example, that can handle large streams of visitors or solutions that combine a revolving door with automatic sliding doors. Boon Edam provides customers with revolving doors in very different markets; including airports, hospitals and schools, data centres, public buildings, retail, recreation, leisure, hotels and restaurants. Each of these

markets has its own rules and requires a specific approach. For that reason, Boon Edam works in these different markets with partners to achieve tailored solutions that combine the standard Boon Edam products with an innovative approach to the specific situation. Throughout the process, Boon Edam works closely with the client so that every solution is well adapted to the specific requirements.

Sometimes customers are looking for a system that limits access to certain areas to authorized persons only, such as in data centres and R & D areas. Boon Edam's security systems make it possible to determine the identity of the visitor and ensure that only authorized people have access to secure areas. The solutions range from security revolving doors that prevent piggybacking and tailgating, to security locks, which include a complete security entrance. The security solutions always form part of larger security systems; they can be integrated into virtually any access control system currently available. These systems will be increasingly important in the future. Boon Edam's security solutions provide for comfort, energy savings and efficient use of available space.

Service is an important component of the company's access solutions. As the entrance is the busiest point of a building, it is important that access is properly functioning throughout the building's life cycle. Boon Edam's worldwide service network ensures appropriate service delivery times. This contributes to the long-term relationships the company has with its customers.



### BOON EDAM UNIVERSITY

**Boon Edam employs a growing number of people around the world. It is of utmost importance that this human capital always has the same up-to-date knowledge. Boon Edam University is an initiative which will ensure that this knowledge is safeguarded.**

**The commissioning of the employee's own knowledge platform encourages multifunctional working and Boon Edam can live up to its name as a supplier of premium entry solutions. Recently, the organization has created a digital platform: a place where information is presented by means of movies and in other didactic ways. A smart system keeps track of how people and knowledge are connected. For example, everyone is able to keep up-to-date with technological developments. The university is also a learning platform: employees can continue to develop within the broad knowledge profile of the organization.**





**Incremental innovation**

One of the dangers for companies such as Boon Edam that become leaders in a niche market is that less may happen in the field of innovation. This is why Boon Edam puts a lot of energy in collaboration with customers and users; for example, through continuous dialogue about experiences with the materials used, with the production process and with the various solutions offered. The company's R & D department has developed an extensive network that constantly generates ideas that have to be studied and evolved correctly in order to get the most from them. Like the growth strategy, innovation is applied step by step. With this incremental approach, the revolving door manufacturer can quickly adapt to any new development.

Incremental innovations are also often a sheer necessity because large or abrupt wider changes may not go together with the integrated position of Boon Edam solutions in large security systems. Innovations cannot be seen in isolation from developments in this field and system integration will become increasingly important for Boon Edam.

**Co-creation**

A clever innovative example is the collaboration with a Dutch organization that operates a new toilet concept for gas stations and other busy public buildings. Together, they developed a solution that quickly gained international appeal by its interconnectivity:

the use of the gates is registered online and there is immediate insight into and understanding of logistics flows. The business information generated is relevant to all parties involved.

*"The role of information in our entrance solutions is becoming increasingly important."* - Niels Huber, CEO of Royal Boon Edam.

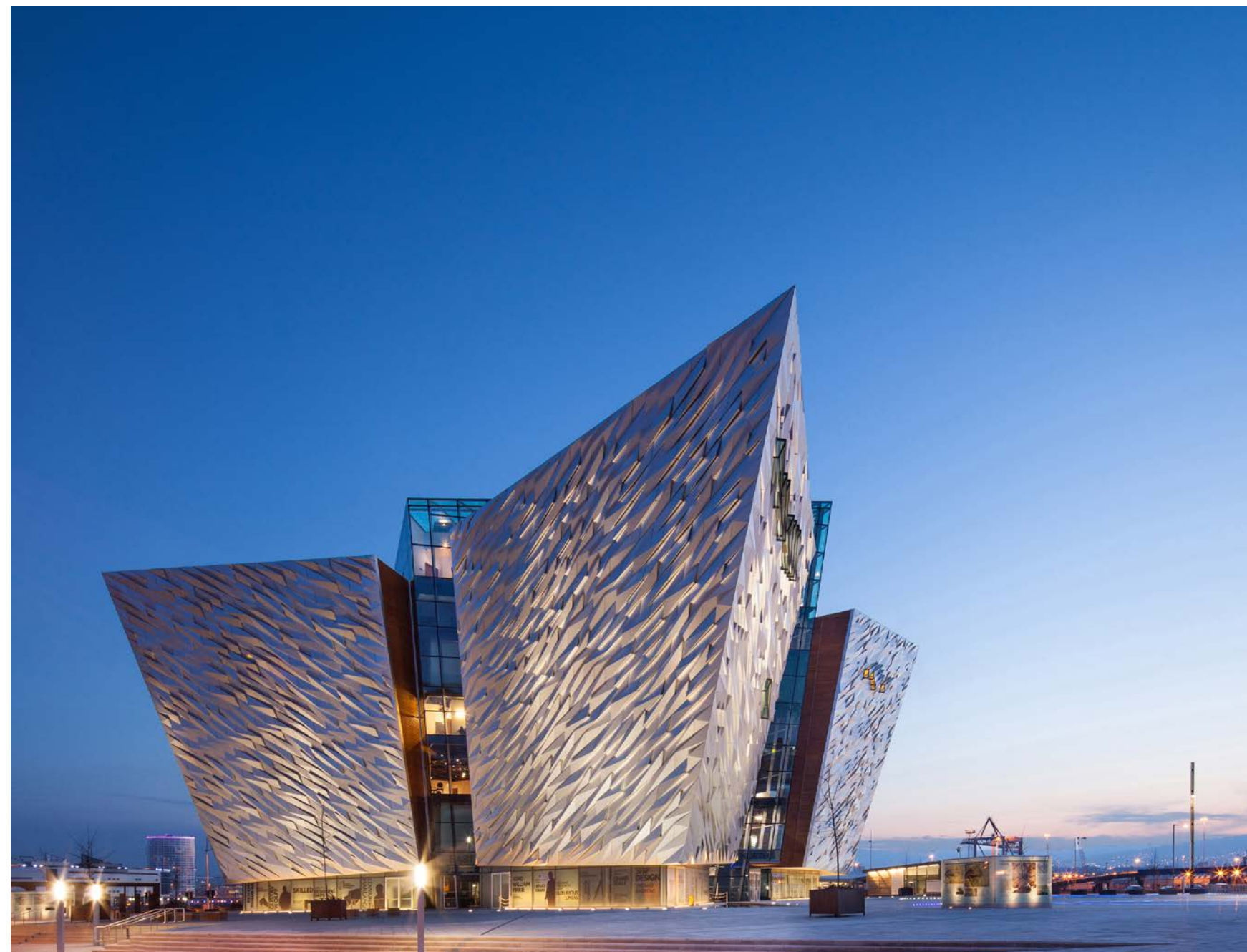
For example, this kind of business information may demonstrate that a particular appearance of a building or an advertising campaign in the retail sector, leads to an increase or decrease of visitors. Also visitor flows at large trade fairs can be monitored in this way, resulting in relevant information on which business decisions can be based. Another form of co-creation is the introduction of so-called BIM (Building Information Modelling) for Boon Edam products. This makes it possible to include the design of a revolving door or security gate as part of the total design process. The design and information is stored, managed and used in a digital (3D) model.

**THE IDEAL DOOR!**

**The revolving door offers several advantages over a traditional door. For example it provides building comfort because the revolving door effectively separates indoor and outdoor climates. This instantly recognizable impact is also economically attractive for potential customers because space can be used more effectively. For example, tables or outlets can be placed close to the entrance. This separation into two climate and noise zones also results in energy savings and reduces CO<sub>2</sub> emissions. Additionally, the aesthetic features that the revolving door is the calling card for the company.**

**THE FUTURE IS SYSTEM INTEGRATION**

In coming years Boon Edam will focus on further development of innovative concepts for their entrance solutions. Special attention will be paid to matching entrance solutions to the information and security systems of customers and partners. In the future, system integration will be increasingly powerful: generating relevant business information for the customer about visitor flows and facilitating the client's business decisions.



TITANIC BELFAST.







JAKARTA PORT EXTENSION NORTH KALIBARU, INDONESIA

As an independent international engineering and project management consultancy, Royal HaskoningDHV is leading in sustainable development and innovation. Working on major global challenges in more than 150 countries, the company has been making a world of difference in people's lives since 1881.

## Making a difference in people's lives

*"We foster long-term client relationships. International brewery Heineken has been a client since 1884 and the Royal National Lifeboat Institution (RNLI) in the United Kingdom since 1887; Schiphol Airport and the Environment Agency in the United Kingdom have been with us for more than half a century."*

Royal HaskoningDHV is the oldest engineering and project management consultancy firm in the Netherlands, with a track record dating back 135 years. The company's first project in the Netherlands was a steam pumping station in Nijkerk, which safeguarded the inhabitants of the polder against high water. More than a hundred years later the design still proves its worth when the pumps are switched on to assist the modern electric pumping station in times of extreme water levels. It is not just projects but also client relationships which go back centuries. The firm is proud to have long-

standing associations with clients that are almost as old as the company itself.

### The world of Royal HaskoningDHV

With its ambitious mission, 'Enhancing Society Together', the engineering company has a broad reach. It combines global expertise with local knowledge to deliver multidisciplinary solutions for the entire living environment.

Proof of this are the many projects the company was involved with in the past that are still in use today. Examples are the Embabeh bridge in Egypt and restoration of several Unesco heritage grounds such as Borobudur in Indonesia, Kew Gardens in the UK and the Wadden area in the Netherlands. Projects raising the quality of people's lives include flood defences in the Netherlands, Saint Petersburg, New Orleans and Bangladesh, improving



*"One of the most rewarding aspects of my role is seeing the results of our work in so many places around the world. For 135 years we have successfully been delivering projects which contribute to improving living circumstances." - Erik Oostwegel, CEO*







■ □ FIRST ROYAL HASKONINGDHV CHARTERED ENGINEERS IN THE NETHERLANDS.

□ ■ FLOOD FORECASTING AND WARNING SYSTEM, SAVA RIVER BASIN, CENTRAL EUROPE.



■ □ THE NEREDA WASTE WATER TREATMENT PLANT IN RIO DE JANEIRO, BRAZIL, OPEN IN TIME FOR THE OLYMPICS.

□ ■ MANILA BAY COASTAL DEFENSE, FLOOD CONTROL AND EXPRESSWAY PROJECT, PHILIPPINES.

transport in Europe, Africa and India, unique bridge/tunnel combinations, and its Nereda wastewater treatment technology which, among others, was deployed in Rio de Janeiro as part of the Olympic legacy for better living conditions.

*“Without the perseverance of pioneering engineers we would not enjoy all the things we now take for granted and barely even think about in our daily activities.”*

Royal HaskoningDHV’s clients are private companies which range from major multinationals servicing a variety of sectors to small and medium-sized enterprises, government bodies, international semi-governmental organisations, and not-for-profit organisations. It frequently works in partnership with clients, associated organisations, architects, consultants and academic and research institutions. The company delivers engineering, environmental and project management consultancy services within the following markets:

**Aviation:** Increased air traffic and larger aircraft are driving the creation of new airports, as well as upgrades and expansion of existing sites.

*“We are involved in the design, upgrade and project management of many of the world’s best-known airports. We aim to improve passenger experience with fewer queues, great connections and easier navigation, while raising returns for retailers and operators and reducing environmental impacts.”*

**Buildings:** The impact of the built environment extends beyond the functional and into the ‘joy of living’. In hospitals, building design can aid recovery; in schools it can assist learning and in offices, promote communication and innovation.

*“We value our built heritage and have proved highly successful in bringing new life to old buildings. We work at the forefront of innovation in new-build technology which boosts performance, functionality and profitability.”*

**Energy:** An effective energy supply is vital for societies as it supports the economic growth

and development that will raise the quality of life across the population.

*“We have been a leading consultancy in the renewable energy industry for nearly 30 years. Our engineers provide solutions to meet the long-term interests of our clients and the societies in which they operate, while accommodating social, environmental, cultural and economic realities.”*

**Industry:** A holistic approach to engineering increases the long-term success of industrial projects. The company is supporting a transformation of industry so it continues to bring health, prosperity, food and goods to society without also creating permanent damage to the environment or exhausting finite resources.

*“Our practical innovations include resource efficiency, future-proof design, waste reduction and steps towards a circular economy.”*

**Infrastructure:** Whether it is in modernising historic structures, creating new systems to cope with growing populations, addressing the special challenges posed by megacities, or tackling the basic infrastructure needs

which are still not being met in many parts of the world, sustainability is becoming critical. *“We use novel technologies, construction materials and methods in conjunction with high-level engineering approaches to realise multiple goals and wider societal benefit.”*

**Maritime:** The maritime industry plays an important role in economic success and is increasingly contributing to sustainable energy solutions. The drive to improve performance, energy efficiency, environmental standards and safety are ever-present within the sector. *“Our maritime consultants use a genuinely multidisciplinary approach to innovate, succeed and push forward the boundaries in this environment.”*

**Mining:** This sector operates in a complex setting whereby the importance of mitigating negative impacts on the environment is growing. Additionally there are technical challenges like having to dig deeper to find the raw materials and issues like managing the risks that can impact return of investment of capital expenditure.

*“With our wealth of experience in the mining industry, we are able to offer integrated and sustainable solutions that can contribute to a liveable environment while at the same time drive results for the mining companies – even in the most competitive markets.”*

**Urban development:** By 2050, seven billion people are expected to be living in cities; almost double the urban population today. Spatial master plans for new towns, urban renewal and industrial zones are needed that fit with local culture to cater developments in a sustainable and viable way. *“We provide the comprehensive integrated master planning that is more needed than ever.”*

**Water:** Due to the growing demand for water and flood protection it is crucial to improve the management of the water cycle, from capture, storage, abstraction and treatment, to flood risk management and coastal protection. *“Our innovations use technology and the power of natural forces to create solutions that safeguard the quality and security of our water, reduce risks and resolve scarcity.”*

Royal HaskoningDHV is a global player. Its head office is in the Netherlands, with other principal offices in the United Kingdom and South Africa. There are also established offices in Indonesia, Thailand, India and the Americas; and a long-standing presence in Africa and the Middle East.

Globally the company is recognised for excellence in a range of services irrespective of geography. This has led to many new major projects further strengthening the company’s leading position, examples include the Mexico City New International Airport, the extension of the main port of Jakarta in Indonesia, the Shenzhen-Zongshan Bridge Tunnel Crossing in China, the Aalborg University Hospital in Denmark and the Nereda technology which is being used for sustainable and cost-effective treatment of industrial and domestic wastewater globally.

**A firm knowledge base**  
Royal HaskoningDHV is characterised by its high percentage of academically educated employees. It is a magnet for





young professionals who want to make a contribution to society. The high educational levels contribute to a different way of looking at issues and at society as a whole. The company has warm relations with a number of universities including the Technical University of Delft, Imperial College at the University of London and the Universities of Cape Town and Bandoeng. Such relationships serve more than one purpose. The cross fertilisation offers students an exceptional experience working in a professional company, while Royal HaskoningDHV extends its recruitment pool and has first pick of the best PhD students who offer state-of-the-art collaborative knowledge. There is mutual benefit not only for the university and the company but it also strengthens the knowledge base in the country concerned.

*"The younger generation is very engaged and wants to make a difference for society."*

Lifelong learning is essential both for the stability and continuity of the company and key to the development of employees. Lifelong learning has three dimensions: training on the job; coaching and mentoring; and courses and training. In the eyes of Royal HaskoningDHV, coaching and mentoring are of particular importance. To reinforce this, the company follows the concept of engineer development in Great Britain and South Africa, countries that encourage the status of Chartered Engineer. Royal HaskoningDHV also initiated the implementation of this certificate in the Netherlands with the Royal

Netherlands Society of Engineers (KIVI). Five Royal HaskoningDHV engineers were the first to be awarded this prestigious international qualification in the Netherlands in 2015; four obtained the Chartered Engineer certificate and one received the Incorporated Engineer certificate. A second group will finish the certification process in 2016 and other Dutch companies have joined this initiative.

### Enhancing Society Together

Societies everywhere are faced with pressing problems as a result of population growth, increasing urbanisation, scarcity of raw materials and climate change. At the same time, new technologies, engineering innovations and sheer strength of human spirit provide an inspiring image of a bright future.

*"We are enhancing society together. By working closely in partnership with our clients and other stakeholders, we want to make a powerful contribution to society through our projects."*

The company's mission provides a clear view on the way it positions itself in global markets, taking the impact of its activities on society into account. This view will become all the more important as Royal HaskoningDHV aims to play a major role in the design of the sustainable urban delta of the future, for which it can offer solutions using all its multidisciplinary dimensions. In many ways a company such as Royal HaskoningDHV holds

### FOUR QUESTIONS

As Royal HaskoningDHV aims to implement sustainable and innovative solutions, four questions are asked by the company's engineers for every project they work on. These are:

1. Does the output meet the requirements of most stakeholders involved?
2. Does the output create additional added value for the client and society as a whole?
3. Is the result long-lasting and future proof?
4. Can the company meet the client's demand while using a minimum of natural resources and energy?

This broad check on environmental and societal impact creates a clear direction for the individual engineer and the organisation as a whole and challenges the client to think of these aspects as well.

the key to the future of cities. In every single case, whether this is a new city integrally designed from scratch as in Saudi Arabia, or an old city like Jakarta, new solutions need to be developed.

*"Thanks to our history in the Netherlands and our international track record we know all the aspects of a vulnerable urbanised delta. We can use this knowledge all over the world where dense cities need to be made future proof."*



CLOCKWISE: VINA KRAFT PAPER FACTORY, BINH DUONG, VIETNAM; AALBORG UNIVERSITY HOSPITAL, DENMARK; MEXICO CITY AIRPORT; CONCEPTUAL DESIGN TUNNEL AND ISLAND SHENZHEN-ZHONGSHAN BRIDGE TUNNEL CROSSING, CHINA.





As a company that develops vegetable varieties and sells the seeds produced from them, Rijk Zwaan is right at the start of the food chain. The independent, family-run, company makes a significant contribution to the health and well-being of people all over the world.

## Sharing a healthy future

Rijk Zwaan is a specialist horticultural company, based in De Lier. It focuses on the development and sales of high-quality vegetable seed varieties for professional growers for food-production, be that in glasshouses or outdoors. Rijk Zwaan, the founder of the company, started selling seeds in a Rotterdam shop in the 1920s and by the next decade was an early adopter of laws developed and promoted by Gregor Mendel, the pioneer of the new science of genetics. Mendel had already demonstrated that the inheritance of particular traits in plants followed particular laws. These laws formed, and still form, the basis for the methods of plant breeding practised by Rijk Zwaan. By the early 21st century the company had become one of the top five largest vegetable breeders in the world with a broad product base of more than 1,000 varieties in approximately 25 different vegetable crops.

### Developing new varieties

Rijk Zwaan's varieties stem from market demands and wishes. These may come from consumers, for example based on tastes and appearance, from growers seeking high yields and disease resistance, and from supermarkets looking for long shelf life and attractive presentation. The perfect variety does not exist, but the horticultural company strives for the best possible combination of traits. The genetic diversity that is needed to develop new varieties comes both from the many varieties that have been developed over the years by human selection and the wild plant material that nature still has to offer.

With the characteristics in this genetic material, Rijk Zwaan can continuously develop improved varieties. These are the result of crossings between two parents: the descendants have characteristics of

both. As breeding new varieties is a long process, it takes several generations before a commercial variety can emerge. However, highly technical laboratory research makes the process increasingly efficient; for example biochemical substance research can influence taste, and via marker breeding, the breeding process is becoming increasingly targeted.

*"We invests 30% of our annual revenue in research and development, although varieties can only be assessed ultimately in the field: that is why we perform selection trials at breeding locations around the world."*

Varieties are also tested at growers and only if they succeed in practice can a variety can be sold.





### High quality seeds

Naturally, before selling a variety, seeds have to be produced. Seeds form the basis for the world's food supply: without seeds there would be no plants and therefore no vegetal food. Seed production takes place at facilities that provide optimal conditions for both production and ripening. No matter where in the world the seeds are harvested, they are all transported to the logistics centre in De Lier. Samples are subjected to very close inspection for quality and diseases. The aim is to obtain a uniform batch of only the very best quality. Extra processing is sometimes necessary before dispatch. For example the seeds may be turned into pellets to make them easier to sow, or coated to protect them against soil-borne diseases. Growers often don't choose a variety until the very last moment, yet seed production has a very long lead-time. Thus it's all a matter of planning. Rijk Zwaan's goal is to supply the right amount of top-quality seeds at the right time.

### Close to the consumer

At all times Rijk Zwaan is in very close contact with the market. The company not only sell seeds, but also services. Only then can it develop the right varieties and ensure that these achieve their full potential. The company visits the growers of its varieties throughout the year and its crop specialists advise and suggest improvements about crop production and marketing strategy.

*"We are not only in close contact with direct customers, but also with the rest of the vegetable chain such as supermarkets, processors and restaurants."*

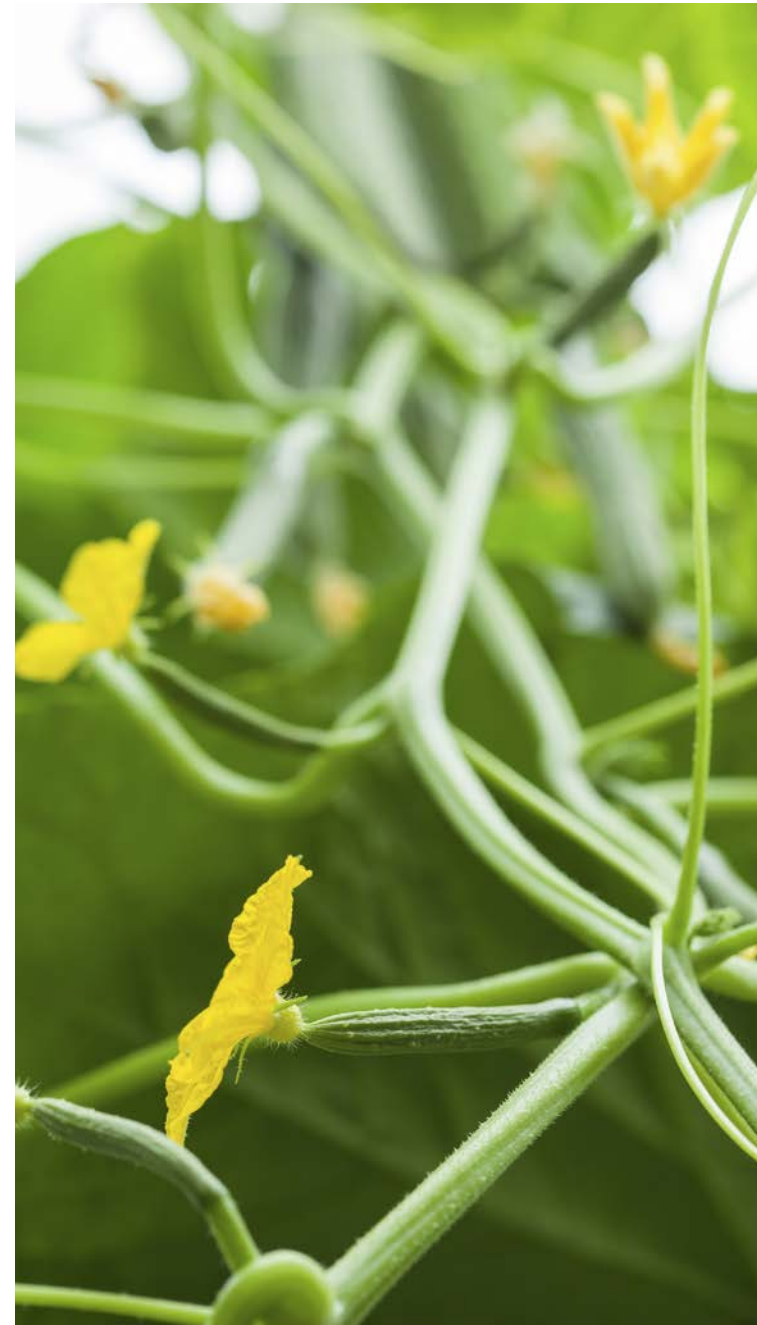
By striving to bring these partners into contact with growers from various production regions Rijk Zwaan can ensure that uniform products become available to consumers all year round. Finally, the company collaborates to develop innovative products and unique packaging concepts, which enable the industry to increase overall vegetable consumption as well as to develop vegetable varieties for the consumer.

### Working together

As a vegetable breeding company, Rijk Zwaan has the opportunity to make vegetables tastier, more appealing, easier to prepare and even healthier, whether this is an extra-sweet melon, a handy snack cucumber or a carrot that has been optimally developed for use in baby food. The new varieties may also have better traits from a grower's perspective, such as a higher yield or resistances to plant diseases.

*"Our work brings with it a considerable social responsibility because the world's population is expanding at a rapid pace and a growing number of people must be fed using a finite number of natural resources."*

Furthermore, obesity is becoming an ever-bigger global problem. Vegetables in new shapes and colours can create extra 'consumption moments' and preparation opportunities. For example, Rijk Zwaan has developed a 'convenience lettuce' and a snack cucumber, two products that can make a valuable contribution to increased vegetable consumption and a healthier lifestyle.



### CHINA: 'FEEDING TOMORROW'S CITIES'

The agricultural sector in China is undergoing major modernisation. This is necessary not only to produce enough food for future populations, but also to increase the quality of the produce. Rijk Zwaan wishes to play a role in both of these aspects. The large-scale process of upgrading China's traditional agriculture methods into a modern and efficient cultivation industry involves hundreds of millions of farmers and millions of hectares of land. Seeds play an important part in this transition as breeding companies are able to continuously introduce plant varieties with ever-better combinations of desired characteristics such as improved flavour, shelf life or appearance and better traits from a grower's perspective. A higher crop yield per m<sup>2</sup> and new and improved disease resistances enable agricultural land to be utilised more efficiently and reduce the amount of crop protection agents needed.

Rijk Zwaan started its first activities in China in 1998. Today, the company employs 140 people at its subsidiary in Qingdao, Shangdong Province, and works with about 30 demonstration stations across China. In cooperation with many local partners and government bodies, institutions, other vegetable seed companies and partners throughout the entire Chinese vegetable chain, Rijk Zwaan introduces new varieties and transfers knowledge about cultivation and marketing to help growers to create extra value. Furthermore, each year, Rijk Zwaan invites hundreds of Chinese agriculture professionals to the Netherlands so they can see modern agriculture techniques for themselves and put their new knowledge to good use on their return to China. China's growing middle class and rising interest in the topics of health and food safety are increasing the demand for high-quality, reliable and varied food products.







**A 'People Company'**

'Achieving autonomous growth by capitalising on opportunities': this has been the company's motto since 1924. Having initially owned a store selling vegetable seeds, Mr Rijk Zwaan soon switched to personally developing new varieties. Ever since, his work has been continued internationally by several generations, each having demonstrated entrepreneurialism and a keen eye for market opportunities. Rijk Zwaan employs around 2,600 people and they are the company's most important asset. The company culture is centred on involvement, teamwork and loyalty.

Rijk Zwaan is a relatively 'flat' organization and employees are expected to act independently. Creativity and the use of initiative are encouraged, with decisions arrived at by a process of debate and analysis rather than unquestioning response to hierarchical orders. The company believes that its market dynamics demand such a creative working method and, therefore, there is plenty of scope for individual input and innovation. As a result, Rijk Zwaan's employees are highly motivated to provide all customers with top-quality seeds and a high level of service.

Collaborative working and open communication are very important, not only between employees, but also within the numerous external collaborative relationships. Rijk Zwaan purposefully focuses on sustainable partnerships; with research institutes and non-governmental organizations (NGOs) as well as with commercial partners.

**Food for thought**

Rijk Zwaan has more than 1,000 varieties in its range, across 25 different vegetable crops. These are sold in more than 100 countries through 30 local sales subsidiaries and numerous distributors. The company is no longer merely at the heart of the vegetable sector, but is also at the heart of society. Rijk Zwaan is growing rapidly, but so too is the world's population. And that growth presents both opportunities and challenges. With the extensive experience of its highly motivated employees as well as its numerous long-term collaborative partnerships, Rijk Zwaan is keen to make its contribution to everyone's healthier future.



**AFRICA: 'FOCUS ON THE LONG TERM'**

Rijk Zwaan is active in the whole African continent, either directly or indirectly. The newest subsidiary established there was 'Rijk Zwaan South Africa' in the summer of 2015. In northern Africa there is also an enormous potential, but the situation is very different. Countries like Algeria and Egypt face other challenges. For instance, they frequently have to grow crops in saline soils, for which Rijk Zwaan develops specific varieties. In western Africa, growing conditions are in the main excellent, but the quality of cultivation varies considerably. They need the right varieties, which are being developed in eastern Africa by Rijk Zwaan Afrisem, the fourth distinct region on the continent.

Although Rijk Zwaan pursues a segmented approach, in all regions it very consciously elects to develop only hybrid varieties, which have a higher quality than the standard 'OP' ('Open-Pollinated') varieties. This means that serious investments from growers are necessary, although this high quality seed brings added value through higher yields and better quality vegetables. The company focuses on growers who can and want to create their markets. This professional approach also explains why Rijk Zwaan demands the same high standards of seed quality as anywhere else in the world. Choosing hybrids does not mean that the company emphasis is only towards large nurseries. Rijk Zwaan's intention is that small farmers too will see the advantages of hybrids and that they will grow vegetables of a higher standard. This is why the company pays a lot of attention to the transfer of knowledge, by travelling from grower to grower, organising commercial demonstrations and using SMS to spread crop tips and success stories. While this is a lengthy process, Rijk Zwaan is convinced that this is the best way to make use of the potential of this special continent.





Continuous expansion in global trade has fuelled the growth of freight transport. Located at the entrance of the largest European hub for container transport, ECT is accommodating the demands of the transport sector. The Container Terminal Operator is continuously looking for new and better ways to efficiently handle and distribute containers. And with a full range of tailor-made services, ECT offers flexible and sustainable transport solutions to its clients.

## At the cross roads of freight transport

Since the time, 50 years ago, when the very first container ship visited Europe, the world of freight transport has experienced revolutionary changes. However, during that time, one factor has remained the same: Europe Container Terminals (ECT) has been leading the way in container handling. Since 1966, ECT has seized the opportunities presented by containerisation and transformed the port of Rotterdam into the central hub of container handling in Europe.

### Drive for innovation

According to Leo Ruijs, CEO of Europe Container Terminals, his company has always strived to be in the vanguard of new developments that further improve service and performance. ECT, one of the world's first dedicated container terminal operators, is well known for its pioneering

work to automate container terminals by using Automated Guided Vehicles (AGVs) to transport containers between the ship and the container stack where Automated Stacking Cranes (ASCs) take over. Both ECT's deep-sea terminals, the ECT Delta Terminal and the Euromax Terminal Rotterdam, at the Maasvlakte operate according to this efficient, automated principle, whereby the Euromax Terminal Rotterdam also boasts remotely controlled cranes at the landside. The next step will be the introduction of remotely controlled cranes at the seaside.

Automation in the world of container handling started in 1993 with the opening of the automated ECT Delta Terminal. Since then ECT has continuously developed and invested in its terminals to remain state-of-the-art and the end is not in sight.

### Strategic position enables new role in logistics chain

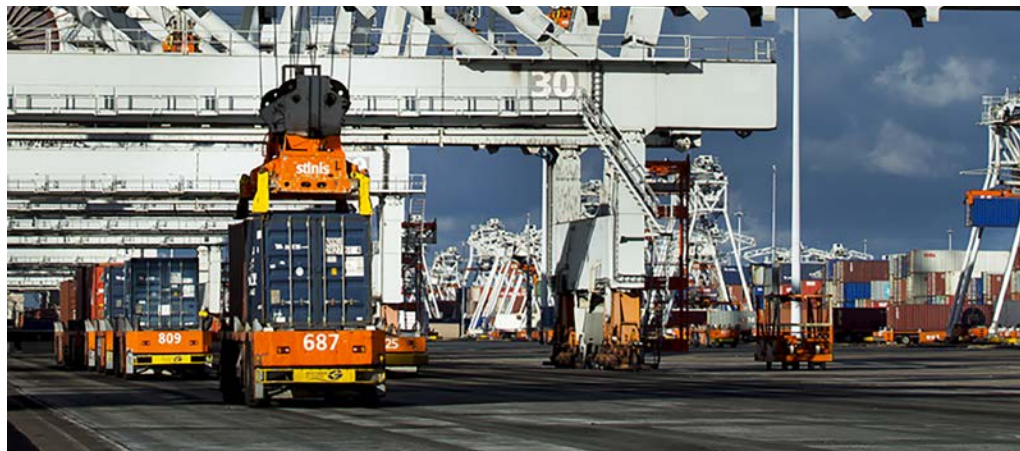
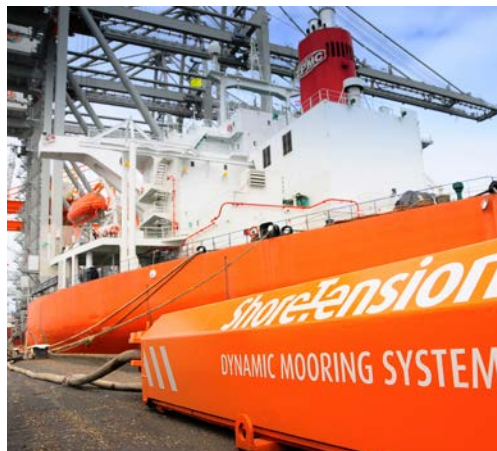
Location is of great importance for the company's strategic position. ECT's two deep-sea terminals in the port of Rotterdam offer its deep-sea customers 24/7 access without draft limitations. This gives Rotterdam the edge in comparison with competitors such as Hamburg and Antwerp, which are essentially river ports. It also enables ECT to handle ever-larger ships, a trend that has led to the doubling of the capacity of container ships in the last ten years.

This increase in capacity and up-scaling, which is mainly visible by the growing number of so-called Ultra Large Container Vessels (ULCS), has led to some other major developments in the container sector. On the seaside there is a strong tendency for more alliances between the various shipping lines in an attempt to



## SHORE TENSION

One of the latest innovations is 'ShoreTension' which was invented and further developed by the Royal Boatmen Association, Eendracht. In a joint venture with ECT the ShoreTension was brought on the market. ShoreTension is a dynamic mooring system comprising a flexible stand-alone system that guarantees a permanent tension of mooring lines without the need for external energy. It reduces the movements of a moored vessel caused by strong winds, currents or passing vessels up to 50% in comparison with conventional mooring systems. In this way ShoreTension promotes the safety of vessels, shortens turnaround times and improves the efficiency of quayside operations. ShoreTension is sold and used worldwide.



EUROMAX TERMINAL ROTTERDAM.

LEO RUIJS (CEO).

better utilize the available capacity, to avoid overcapacity and to minimize risks. On the landside the demand for more efficient hinterland transport is growing whereby volumes are bundled and transported to and from the hinterland by increasingly reliable and frequent rail and barge connections.

ECT finds itself at the crossroads of these merging worlds. From this position the company witnesses just how unbalanced the distributions of containers can be between various modes of transport. ECT is however well positioned to better manage the various container flows in the logistics systems, both in terms of volume and bundling of containers. To this end ECT has founded 'European Gateway Services' (EGS). This affiliate of ECT focuses on transporting containers from and to the hinterland efficient and sustainable. EGS has developed an extensive network of inland terminals and fast and reliable barge and/or rail connections between these terminals and the deepsea terminals in Rotterdam. In this way the whole logistics chain becomes more efficient and sustainable, benefitting all involved.

*"We have the ambition to become a trusted third party that combines the various flows of goods."* - Leo Ruijs, CEO of Europe Container Terminals

### Connected

Arguably, ECT's core strength has to be its connections. ECT is the main European hub for incoming and outgoing global container flows and thus, in effect, connects the world with Europe and vice versa. In the other direction the company is connected to the European hinterland by its continuously expanding network of inland terminals. ECT owns and operates several inland terminals in the European hinterland: MCT Moerdijk, TCT Venlo, DeCeTe Duisburg and TCT Belgium (Willebroek) and is through EGS connected with yet many more inland terminals. All boast frequent rail and/or barge connections with the deep-sea terminals to make sure the customer can optimize its logistics chain. Every week, ECT's deep-sea terminals constitute the starting point and terminus for hundreds of rail shuttles, barge and feeder connections to and from destinations all over Europe. In the same time span, some 20,000

trucks call at these deep-sea terminals. And for all modes of transport round-the-clock, state-of-the-art facilities are offered.

*"We are ideally situated to serve the European market."*

Outside Europe, ECT is also well connected as member of Hutchison Port Holdings (HPH), the world's leading port investor, developer and operator. In 2015, the HPH port network handled a combined throughput of 83,8 million twenty-foot equivalent units (TEU) worldwide. The HPH network of port operations comprises berths in 48 ports, spanning 25 countries throughout Asia, the Middle East, Africa, Europe, the Americas and Australasia.

### Full service

ECT and EGS offer numerous reliable services aimed at handling and sustainable transport of containers to and from the hinterland. Most inland terminals within the European Gateway Services network offer customers



a highly comprehensive range of services, including full container storage, empty depot and local transportation.

ECT and EGS also offer a broad range of E-services, simplifying the operations of its customers. On a secure part of the ECT website, authorised companies can view detailed (track & trace) information about the operation, request numerous reports and issue various orders. E-services via the EGS E-Gate app and the ECT app to come are available for the deep-sea sector, road transport companies and feeder, barge and rail operators.

Other parts of the full service offered by ECT are:

- **Reefer Care:** On arriving at the terminal, reefer containers are connected to the power supply in the stack where the status of the container is monitored 24/7. Any irregularities are immediately dealt with by technicians who will carry out repairs if necessary.
- **Special Cargo:** At its deep-sea terminals in Rotterdam, ECT's Special Cargo division ensures that non-containerized cargo travelling aboard container ships, such as yachts, machine parts and steel constructions, is handled safely and professionally.

These, and other tailor-made services, all strengthen ECT's current position and its ambitions to stay ahead of its competitors by continuously innovating all elements of container handling.

*"In the end our employees make the real difference in terms of service and performance."*

### Innovating beyond technology

In the vision of ECT, innovation goes way beyond technology alone. The company has developed a concept called "sychromodal transport" (see also textbox) which is based on the conviction that we have to redefine hinterland transport and make it more reliable, efficient and sustainable. This belief is driven by developments within the sector such as the scaling-up of deep-sea container vessels and by more general developments, such as the demand for better utilization of existing infrastructure and a lower carbon footprint.

*"We ask our customers to give us the freedom to choose the transport route and modality within a certain lead-time. With this flexibility we can offer our customers more reliable, sustainable and tailor-made transport."*

At ECT innovation also has a social dimension. ECT is well aware that properly trained and motivated employees are the most important asset of a company. Social innovation has been a constant factor within ECT since the establishment of the company. A current example is an age-sensitive personnel policy. The aim is to keep employees motivated, productive, healthy and involved throughout their entire career at the company.

The strategic position of ECT, the connections with the hinterland and the broad vision on innovation, provides ECT with a solid base as the gateway to Europe and the world.

### SERIOUS GAMING IN CONTAINER LOGISTICS

ECT, together with Danser, an intermodal transport operator, and TNO, a Dutch research organization, have developed 'SynchroMania': a serious game to provide insight into the benefits of synchronomodal transport planning.

The concept of synchronomodality aims to combine several means of transport (road, rail, waterways) when planning a container shipment to a given destination. In the case of a synchronomodal transport consignment, modalities may be switched at any given moment according to local conditions (especially transport capacity availability, routes and time restriction on the consignment). This makes synchronomodal transport more complex than regular intermodal operations, but the flexibility can lead to a higher utilization and better load factors of barges and trains, which helps to deliver higher efficiencies as well as environmental benefits.

Delivering a Synchronomodal transport solution demands much more from the various stakeholders in the network than is customary in intermodal transport, in terms of understanding, cooperation and planning. And it demands from shippers to give the synchronomodal operator the freedom to choose the route and modality within a certain lead-time. This requires above all a mind-shift. The game 'SynchroMania' is developed to facilitate such a mind shift in the Netherlands and can lead to lower transport costs, better meeting the needs of the customer and a smaller ecological footprint.



ECT'S AUTOMATED DELTA TERMINAL





The global trend towards a more sustainable world demands new natural ways of growing food that are both safe and healthy at the same time. Koppert Biological Systems is changing the way we think about agriculture. The company has proven to be successful in making classical methods and products obsolete and replacing chemistry with biology. It brings nature back into agriculture in a very innovative way.

## Bringing nature back to agriculture

The story of Koppert Biological Systems started in 1967 when Jan Koppert, a dedicated cucumber grower from a small Dutch town, became allergic and ill from the chemicals he used to optimize his crops. In those days it was common to control pests and diseases with chemicals, but the efficacy of the chemical crop protection products decreased each year, a trend Mr. Koppert had already recognized. With an enormous dedication, he started the search for alternatives and immersed himself in the world of natural protection. He was the first to introduce a natural enemy to combat spider mite infestation in his own nursery. The results and effects were so positive that he decided to produce this solution, not only for his own company, but to sell to his fellow growers. Koppert Biological Systems was born; the start of a ground-breaking new approach.

### Replacing chemistry with biology

Today, Koppert offers an integrated system of specialist knowledge and natural, safe, solutions that improve crop health, resilience and production. The company's extensive knowledge of microorganisms, biostimulants and pheromones has led to countless solutions that have improved plant resilience to the point that diseases hardly stand a chance. Using a holistic approach, solutions are developed for all the relevant elements of plant production and protection. With these Koppert is at the absolute forefront of a whole new way of thinking about agriculture, where classic methods and products are no longer relevant and where chemistry is replaced by biology. In doing so, the company wants to contribute to better health of people and a better planet.





**HARNESSING THE POWER OF THE BUMBLEBEE**

When in the 1980s it became known that bumblebees could be an excellent alternative for the pollination of tomato-flowers, Koppert decided to enter this market and started producing *Bombus terrestris* (the Earth Bumblebee) for Europe and Asia, and *Bombus impatiens* for North and South America. Today, bumblebees are used worldwide for the pollination of tomato crops. The revolutionary development of a device for 'regulated traffic' attached to bumblebee hives by Koppert Biological Systems called 'Wireless Beehome' improves the performance of natural pollination in crops under artificial light. The benefits of using bumble bees by the grower for natural pollination are manifold, such as labour cost savings, improved fruit quality, increased production, decreased dependence on weather conditions or native pollinators and better working environment due to reduced pollen levels in glasshouses.

In recent years the use of bumblebees for pollination has expanded to a range of other crops, for example fruit crops, both indoors and outdoors. Bumblebees have also proven to be useful in the domain of pollen transfer for seed selection and seed production.



*"With nature as partner in the form of, for example, a bumblebee, beneficial mite or fungus, we bring nature back to agriculture."* – Henri Oosthoek, Managing Director

Safety, convenience and reliability are important characteristics of state-of-the-art crop protection. Koppert has developed a reliable biological approach with a wide range of products that meet international quality standards. A blueprint approach prevents nasty surprises during the growing period, and forms the basis for minimal use of pesticides. In this way pests are not likely to develop resistance. Koppert Biological Systems helps the grower to meet the client's food safety requirements as well as the rigid laws to protect the environment.

**Stimulating growth**

With a broad biological portfolio Koppert Biological Systems not only fights diseases but also stimulates growth, as well as optimizes pollination. This is in line with the vision of the company that believes that developing products in partnership with



nature is the basis for healthy and safe food that can be also be produced in a sustainable way. This leads to healthy people.

Apart from the bumblebee, Koppert uses flies for the pollination of seed-producing crops. To supplement its pollination program, the company has been marketing the *Lucilia caesar* fly since early 2010. These flies can be used effectively in combination with bumblebees and honeybees.

**Protecting crops**

Biological crop protection and natural pollination methods are one side of the answer; the other is the importance of healthy soil. Koppert Biological Systems helps growers to simulate soil life and bring it into balance. An increasing number of bacterial and viral infections occur in crops in addition to the usual pests and fungal diseases. In response to this, growers have been increasingly investing in far-reaching hygiene and use of disinfectants. However the disadvantage of disinfectants and chemical pesticides is that, in many cases, they are

effective for only a short period. Often, only part of the population of the pathogen is killed, or the pathogen develops resistance.

*"We are always impulsive, that is the only way to find real alternatives."*

Continuous research by Koppert has brought new insights and the company is convinced that having maximum disease suppression in the soil forms the key to a healthy and vigorous plant. This is something that can be influenced by the right products. By stimulating beneficial bacteria and fungi in the soil or substrate, and ensuring a good balance, disease-resistant substances become available to the plant and nutrients become more accessible for the plant to absorb. This has a positive effect on the plant's vitality and resistance level. *NatuGro* is a natural growth system developed by Koppert Biological Systems that starts with the soil and which will help to achieve this goal. Using a selection of products, soil analyses and advice, a total approach is offered, for a wide range of crops. At a later stage, other crops will also be able to benefit from the expertise gained. With this the chemical pesticides can remain on the shelf and this reduction in chemical use is, in turn, beneficial for productivity and the end product, particularly as supermarkets and consumers are increasingly demanding healthy products with minimal residue levels. For growers, this means that their harvest is more secure, as production losses are more limited due to the lower incidence of diseases and pests. When they do occur, they are easier to control.

*"Just like people, plants also depend on their food to survive and perform well."*

**Seed treatments**

Although during recent decades huge steps have been made when it comes to seed processing, it is becoming increasingly difficult to make further advances with genetic improvements. It is also a costly and long-term process to develop varieties with built-in resistance and new attributes. The use of chemical substances to treat seeds occurs on a large scale worldwide, but treating seeds with biological substances is still in its infancy. Koppert has developed its own biological seed treatment, *Panoramix*, which is applied as a coating in an even layer covering the whole seed and consists of a combination of plant growth promoting microorganisms and additives. These microorganisms colonize the roots and protect the crop during the entire growing season. The balanced mix of growth-promoting microorganisms and additives ensure that *Panoramix* predictably performs well in various climatic circumstances.

The microorganisms ensure that nutrients such as nitrogen and phosphorus are much more readily available for the plant. This means that *Panoramix* can make a significant contribution to a reduction in the use of fertilizers. In addition, better-developed root systems also make soil moisture more available for the plant. Eventually the soil becomes healthier thanks to the presence of the beneficial microorganisms.





**Fungal disease**

Fungal diseases are a problem in many crops. They can be recognized by several damage symptoms and a single fungal infection is often able to cause a combination of damage symptoms that can differ per crop. For example, rotting and wilting are often caused by soil pathogens, infecting plants via the roots. Plant strengtheners offered by Koppert Biological Systems reduce the chance of infection by soil pathogens. These products do not control fungi, but form a protective layer around the roots and increase the resistance of plants to stress caused by diseases, sub-optimal feeding and watering regimes or climatic conditions, as well as increasing nutrient uptake. This can enhance the growth and development of roots as well as the parts of plants above-ground.

**A knowledge company**

Although Koppert Biological Systems is primarily known for its products, the company is essentially a knowledge company. With its strong R&D base, the company believes that sharing knowledge and training staff are important steps towards achieving sustainable agriculture and horticulture. More than 300 professional consultants ensure that dealers and growers are supported. Besides operational advice, they devote much time and effort towards communicating their basic knowledge concerning nature and its solutions. Koppert offers a variety of courses and works closely with universities around the world to make knowledge available to a wider target group.

*"We are different from companies that are controlled by shareholders and we are freer when it comes to managing our research projects."*

Innovation processes at Koppert are focused on the discovery and utilization of the principles of nature. The strength of the company lies in its ability to turn this knowledge into practical applications, which contribute to finding solutions to prevailing problems. In-house Research and Development has frequently been the source of biological solutions that, subsequently, have been adopted worldwide. It is thanks to the company's great perseverance that a variety of specific mites can now be introduced to combat a large number of infestations. Similar ground-breaking discoveries with regard to pollination solutions have provided the basis for enormous production efficiency and quality improvement in many crops. These innovations are only applicable and useful if they can be effectively reproduced and distributed. Koppert Biological Systems and its partners have been able to perfect this upscaling process from innovation to production during the past few years.

*"The best ideas come from the staff themselves."*

**Leading the transition to sustainable growth**

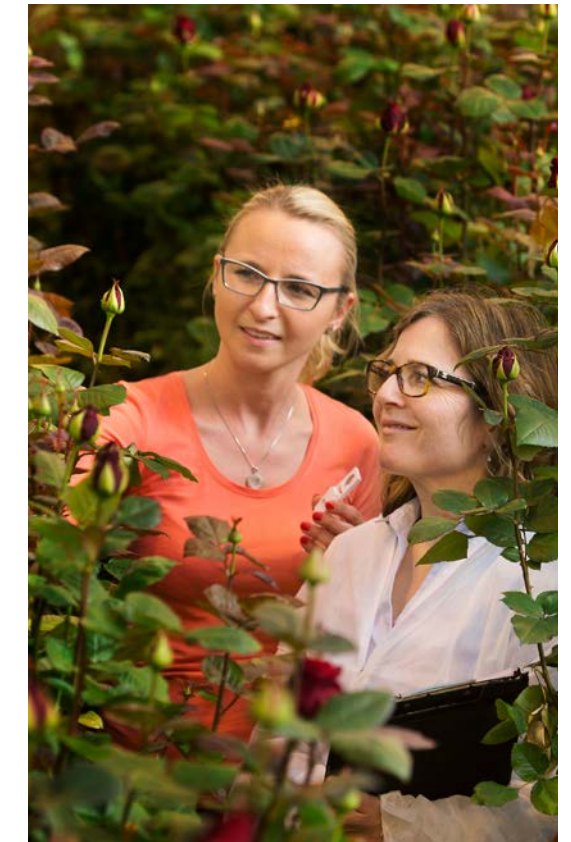
The company is constantly investing in knowledge and people that form an integral part of the knowledge base; eager to share



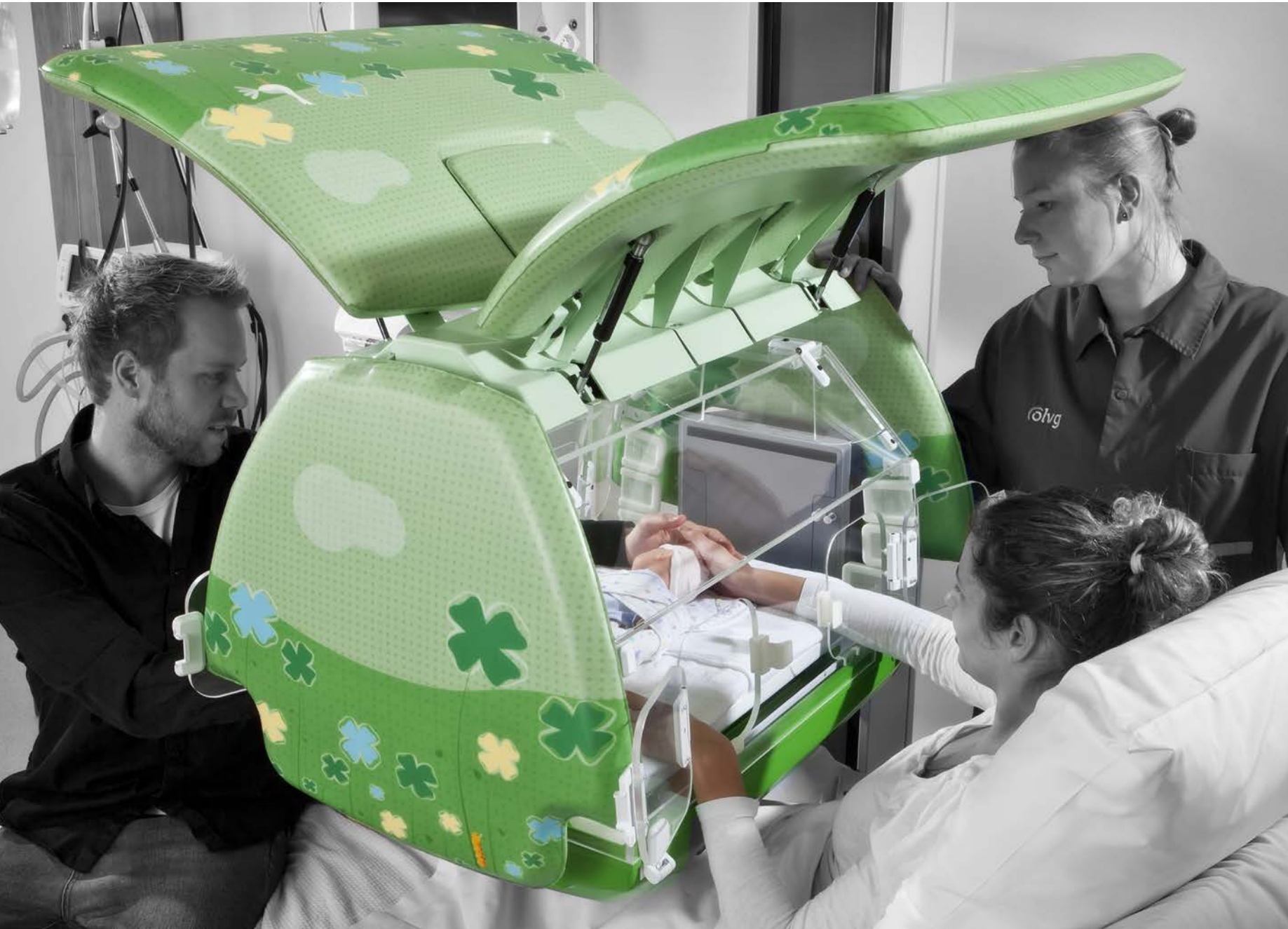
its knowledge with growers and to spread its ideas on being partners with nature. The different perspective with which the company started is now part of its DNA and has led to a completely different paradigm on how to protect crops and stimulate their growth. The only way that this different perspective came into full bloom was through the persistence of the people who believed in it and the long-term vision of the company. It is this persistence and vision that still characterize Koppert Biological Systems.

Koppert firmly believes that the world around us will grow in partnership with nature and the need will still increase for a more sustainable way of growing food that is both safe and healthy at the same time. The company's activities are leading in the overall transition from chemical to biological ways of treating diseases and stimulating growth. Koppert Biological Systems is one of the instigators of this transition and will undoubtedly keep the lead in this transition as it has done in the past decades.

*"We don't live in a time of change but in a change of times."*







In our fast changing world the 'old' business model that counts on endless resources cannot survive. Humanity needs to act with respect to our most important resources: energy, human power and raw materials. Promolding's vision is that there exists a great potential in realising unique societally-relevant products by smart design and by innovative integration of new and existing materials and processes in novel product combinations.

## Creating polymer solutions

### Optimal value for resource

Promolding is a global player in the design, engineering and manufacturing of high-tech plastic parts and components. The fact that resources such as raw materials and energy are becoming more scarce, and that this phenomenon will only increase in the years ahead, encourages the company to focus on designing and developing products that bring optimal 'value for resource' i.e. creating as much functionality as possible, whilst consuming as few materials and as little energy as possible. Promolding's clients broadly recognize the company's awareness for the environment and its customer-driven value and, for that reason, some of the biggest original equipment manufacturers (OEMs) are partnering them.

Since its foundation in The Hague in 1997, Promolding has had only one focus: creating and producing novel and distinctive parts and

products by smart design and through applying innovative (high-performance polymer) materials and processes. Expertise and an innovative spirit have made the company a trusted partner and provider for polymer-based solutions in the medical, aerospace and high-tech industries.

*"By combining our unique polymer expertise and strong research and development capabilities, we have become one of the top providers in the market. The highest levels of professionalism from materials research and product development through manufacturing, together with a passion for the unlimited potential of polymers, are the foundations of our success", - Jac. Gofers, founder and MD*

In this creative and industrial process, Promolding keeps track on its societal responsibility and will strive for maximum functional usage of materials, a low CO<sub>2</sub> footprint and recyclability. Controlling the chain during

products lifetime becomes more important every day. Additionally, Promolding wants to provide an attractive environment for its employees and offer chances for individual growth.

### From high performance polymer to industrialised products

Promolding has always worked with the same clear vision: translating high performance polymer technology into industrialised products.

*"We transfer problem solutions into new functional products that can be produced in (high volume) series."*

The thinking behind this is that end users, who tend to become yet more demanding, start looking for unique products with higher performance. Therefore the company operates





pragmatically and systematically, through the use of its own extensive expertise and creativity, as well as closely seeking to meet the expectation of the client.

However, because Promolding's experts do not make any concessions to quality, often difficult challenges need to be handled. In able to do this successfully, there are some necessary 'ingredients' that Promolding claims to possess:

- Well trained, very experienced and always dedicated employees: industrial designers, polymer scientists, tool makers, injection moulders, production technologists and project managers.
- Good tools and instruments: modern CAD-systems, CAM-driven tool making machines, very modern injection moulding machines and handling robots and well equipped laboratories.
- Enormous enjoyment of the work.

*"Doing a job unmotivated will kill any company. We do not have that. We are enjoying our job and show it."*

### One-stop development and production

Promolding's core expertise is the production of polymer-based solutions for the medical, aviation, aerospace and high-tech systems, by plastics injection moulding.

*"We look for challenges to realise the tiniest of dimensions, narrowest of tolerances and highest functional demands that we are able to master, due to our experience gathered over many years."*

Of course, this is not something that comes easily; many years of research have been invested by skilled and experienced engineers and scientists who work to expand the company's capabilities and knowledge. Designing and engineering a complex part or product that needs to be constructed and produced in large quantities also need to take account of manufacturability. Regarding the latter, Promolding is highly distinctive by intensively interacting on all in-house capabilities from Research to Shipping.

*"We have everything that is necessary to do the job quickly and adequately."*

### Partnerships and research

Custom-made products ask for differentiated approaches and customized advices. When working on a design for moulded parts, Promolding takes into consideration everything that is appropriate for the injection moulding technology and to achieve the optimum cost-effectiveness from the manufacturing method. Their experienced design engineers, product designers and process engineers work closely with customers to meet the latter's specific challenges. Because of this interaction with in-house research, design, engineering and manufacturing capability, the manufacturer can produce the desired part or product in its entirety.

Promolding is continually carrying out extensive polymer research in order to broaden its own expertise. As part of this, the company is always searching for materials,

### REAL POLYMER SOLUTIONS

Some recent and inspiring examples of Promolding's research and product development demonstrate the scope and markets it serves:

**BabyBloom.** Promolding provided the mechanical development of a child and parent-friendly incubator, which reduces light and sound dramatically, is comfortable to work with and easily fits over the mother's bed. The demands of safety, rules, regulations, hygiene and user-friendliness were high. Promolding industrialized the BabyBloom from rough idea to a working product, also involving the specific expertise (climate system, electronics and visual design) of several partners from its network.

**SPICE:** This research project (SPace Innovative Catering Equipment) is based on the 'Modulair' (airline trolley) box system together with FoldingSevice Carts. Promolding developed the Modulair box system for AIRBUS and several airlines. The new system's key benefits for airlines include weight savings of 600kg as well as space savings, thereby enabling two or three extra economy seats to be installed.

**FUGRO:** Promolding developed and manufactures fiber optic sensors for FUGRO to enable collection and analysis of data about the earth's surface and the layers below. The company's fibre-optic sensors are part of the best available sensors in the world and are broadly used for machine health monitoring, road- and traffic monitoring and asset management.



formulations and products that may improve custom developments. It cooperates with independent institutes and universities on a national and international level and is also a member of the Smart Industry, European Converters and Dutch Technology communities.

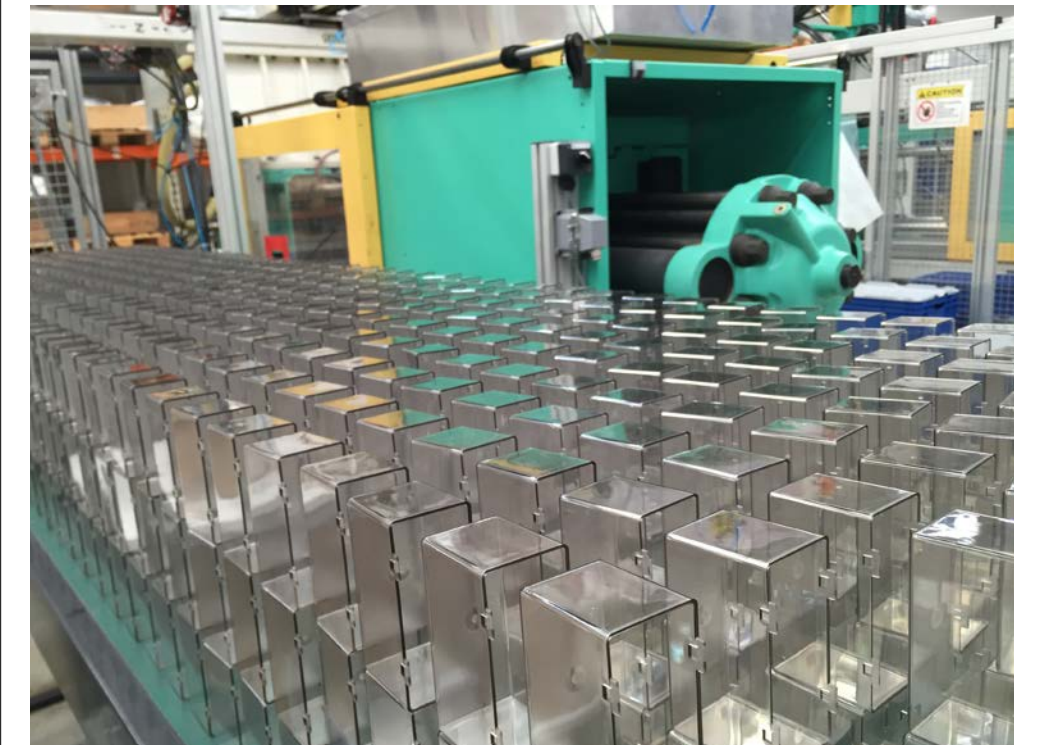
The total number of different polymer materials is heading towards 100,000. Promolding holds the considerable knowledge necessary to make the right polymer choice for a new part or product. On the basis of the requirements of the product and the chosen production technique, a pre-selection can be made from existing materials. The data sheets from the material manufacturers often contain a large amount of information and Promolding has the necessary experience and expertise to analyse and understand the material characteristics and rank them, dependent on conditions.

If necessary, pilot injections and material property tests and prototypes can be used to further select a material and ensure that it is feasible for its intended use. And in case there are no existing materials that meet the requirements of a product, Promolding has the technology and expertise to develop and produce a completely new dedicated material.

*"Our product designers and engineers accompany the development process from concept to production. They are concerned with functional and geometric design options of individual parts and product assemblies, static and dynamic stress analysis as well as with the construction itself and the simulation of tools."*







**Prototyping and speeding up time to market**

Implementation of a speedy and efficient construction of a prototype can lead to a considerable reduction in terms of time and money. Through prototyping, Promolding offers the possibility of speedy and economical manufacturing of designs and small batches. Concept models, design prototypes and functional prototypes can be produced for the individual steps of development.

*"It is essential that a concept is being converted into a real prototype. The idea and the vision will be tangible and can be tested to see if they fit the client's requirements and expectations."*

A good prototype helps to test new ideas in real life so that possible risks can be minimized. Through its European research projects, Promolding has gained high-value knowledge in the field of the newest and state-of-the-art prototype techniques. With this knowledge, Promolding can help customers build a prototype that matches reality and therefore makes the concept tangible.

**Manufacturing as core business**

Promolding's engineers can apply the necessary knowledge, and have the means available, from innovative and research projects and proven manufacturing technology in the company's own production facilities. From the very beginning of a development process, the product design and manufacturing concept is viewed as one and the same. Production under the strictest hygienic conditions is as important as economic soundness, environmental compatibility, quality philosophy or resource efficiency.

Production activities vary from very small up to high volumes in the company's target markets of medical, aviation, aerospace and high-tech systems industries. Because of this diversity, Promolding has a lot of experience in processing a wide range of polymeric materials ranging from bioplastics to high-performance polymers.

*"Manufacturing parts and products out of high value technical polymers is what we are best at."*

**PRIM: THE ULTIMATE SYNERGY BETWEEN 3D PRINTING AND TRADITIONAL INJECTION MOULDING**

**Promolding is able to produce short-runs of end-use parts to test a concept, or for direct use, in just 3 days.**  
*"We developed a unique 3D service called PRIM (PReinted Injection Mould) where we 3D print the mould and use this in our injection moulding machines which makes it possible for companies to bring a product to market faster than the competition."*

**With PRIM, every organisation is capable of testing a prototype or even delivering complete high-quality products within days. The manufacturer does not only have the best available expertise and knowledge in the field of product development and material research, but also has the latest 'state of the art' technology of layer based manufacturing to deliver high quality products in days.**

**DESIGN. ENGINEER. PROTOTYPE. PRODUCE!**

Promolding has a unique mix of knowledge and expertise with regard to materials, processes and manufacturing, which enables its designers to design and develop successful and high quality products in four distinct steps:

**Design:** Firstly, the client's ideas are combined with the company's knowledge and expertise, resulting in a creative and unique concept. The company listens carefully to every requirement and wish regarding the product and, together with the client, creates the new solution.

**Engineer:** With the available knowledge and the means from innovative research projects and proven manufacturing technology, Promolding engineers define the manufacturing and industrialization requirements of the concept.

**Prototype:** Then, the virtual computer model is converted into a real prototype or a 'proof of concept' model. A customer's idea and vision become tangible and can be tested to see if they fit requirements and wishes.

**Produce:** Finally, when concepts are validated and prototypes are signed off, Promolding puts all efforts together to realize a smooth and profitable series production.





Today, around nine billion devices are connected to the Internet. Within the next few years, that number will grow to upwards of 50 billion. That's 50 billion things that will soon be streaming, talking, updating, sensing, triggering, and enriching our ability to connect with the world around us. NXP creates the microchip solutions that enable secure connections for this smarter world.

## Secure connections for a smarter world

Before NXP became an independent company in 2006, the microchip manufacturer was part of the Philips group. Philips decided to divest the microchip business due to high investment costs and the volatility of the market in which this part of its business operated. However the enterprise that later became NXP saw market opportunities and implementations that were far bigger than just supplying Philips with microchips.

*"Today, we spend 14% of our revenue on R&D and are proud to count over 11,000 R&D engineers (mostly in Northern Europe) among our 44,000 employees. Our innovations are used in a wide range of automotive, identification/security, infrastructure and mobile phone applications."* - Guido Dierick, General Counsel

NXP's technology is secured by 9,800 patent families. The 10 largest customers are Apple, Bosch, Continental, Ericsson, Gemalto, Giesecke

& Devrient, Huawei, Hyundai, Kona, Nokia Networks, Panasonic, Samsung and ZTE.

*"We talk about this development as the 'Internet of Things' (IoT), but what this really means is a smarter way of living."*

The technology that underpins our hyper-connected world is often invisible to us – but it's what's behind the scenes that really matter. Without companies like NXP continually working to expand the capabilities of the IoT, these connections wouldn't be possible. Whether those connections are being made at home, on the move or in the car, our mission is to enable people to securely access and control their environment wherever they are. NXP solutions are at the heart of:

- **Security** – making sure that data is protected and that devices and people can connect securely and safely.

- **Connectivity** – ensuring that devices operating across multiple standards can talk to each other seamlessly.
- **Power** – making the connected world as energy efficient as possible.

In many sectors this connected world is already a reality: the connected car is designed to improve the driving experience and make cars smarter. NXP car-to-X communications solutions are helping to create a more intelligent transport system by wirelessly connecting in-vehicle networks to the traffic infrastructure.

*"We are working to make homes smarter with intelligent home network solutions, connecting and securing multiple home devices."*

These and many more applications show that NXP is integral to enabling secure connections for a smarter world!



**Located in smart ecosystems**

NXP has its base in the Eindhoven region, known for its high tech profile and innovative production programs. R & D, marketing and other support facilities for NXP activities are available at the High Tech Campus, Eindhoven, the leading technology cluster in the Netherlands, and also known as the 'smartest square kilometer in the world'. This unique ecosystem has emerged from Philips and has partners such as TNO, ASML, NXP and many start-up businesses. The endless possibilities at the High Tech Campus enable NXP to easily attract talent from abroad, encouraged by the informal setting, the many opportunities to facilitate knowledge by sharing and the possibility to create new knowledge combinations.

*"Our production centre in Nijmegen is the benchmark for other production sites all over the world, such as in Singapore and the United States."*

Nijmegen leads the way in several areas, such as a high degree of flexibility and low costs, crucial factors when it comes to being able to compete continuously.

**Cars: Connected and Secure**

NXP's main markets are automotive and security. Developments in the automotive market are characterized by the incorporation of increasing amounts of electronics into cars. As cars become smarter and even learn to communicate with other cars, security becomes a major item. The strong position of NXP in this market shows

just how much the microchip manufacturer is interconnected with both the automotive and the security market.

Self-driving cars are just at the start of their development. NXP microchips play a crucial role in the development of these vehicles and the way they are securely connected with each other, with the infrastructure and with the outside world. In the car, sensors can be found in radar systems, tyre pressure sensors, airbags and ABS: all applications aimed at safety. But the chips are also found in the 'infotainment system' i.e. tuners, telephone and internet access, as well as in the keys to the car. It is clear from these examples just how important it is to combine excellent connections with the highest possible security. This is core business for NXP.

**Near Field Communication Revolution**

Near Field Communication (NFC), or the 'tap-and-go technology', is a hot topic. In today's increasingly connected world, this simple, intuitive technology lets you interact securely with the world around you with a simple touch. Near Field Communication was co-invented by NXP more than ten years ago and has now shifted into high gear. This simple, intuitive technology, allows the user to initiate interactions with a simple touch and is now present in millions of smartphones, tablets, and other consumer electronics, with new devices arriving almost daily. The benefits of NFC have become very visible in daily life. For example, it enables consumers to make easy and quick payments without needing a pin code or to use public transport without needing to buy a ticket. A famous example is the Blue Oyster Card used in public transport in London.



**NFC FOR PAYMENTS**

**Today's Point-of-Sale (POS) systems are mounted on a counter, or embedded in a piece of equipment such as a fuel pump or vending machine. Mobile versions (mPOS) are light enough and small enough to be carried by salespeople or connected to a smartphone, tablet, or laptop. These systems let small businesses and individuals support cashless transactions with minimal investment, while larger retailers use mPOS to enhance their retail and payment processes.**

**NFC also can collect data from the customer's smartcard or smartphone, for use with direct marketing campaigns and loyalty programs. For example, the POS system can send a paperless receipt to the customer's email account, push a personalized text message to his or her smartphone, add points to a loyalty account, or send exclusive coupons. The POS system becomes an integral part of customer service and some eighty percent of all POS terminals use NXP technology.**

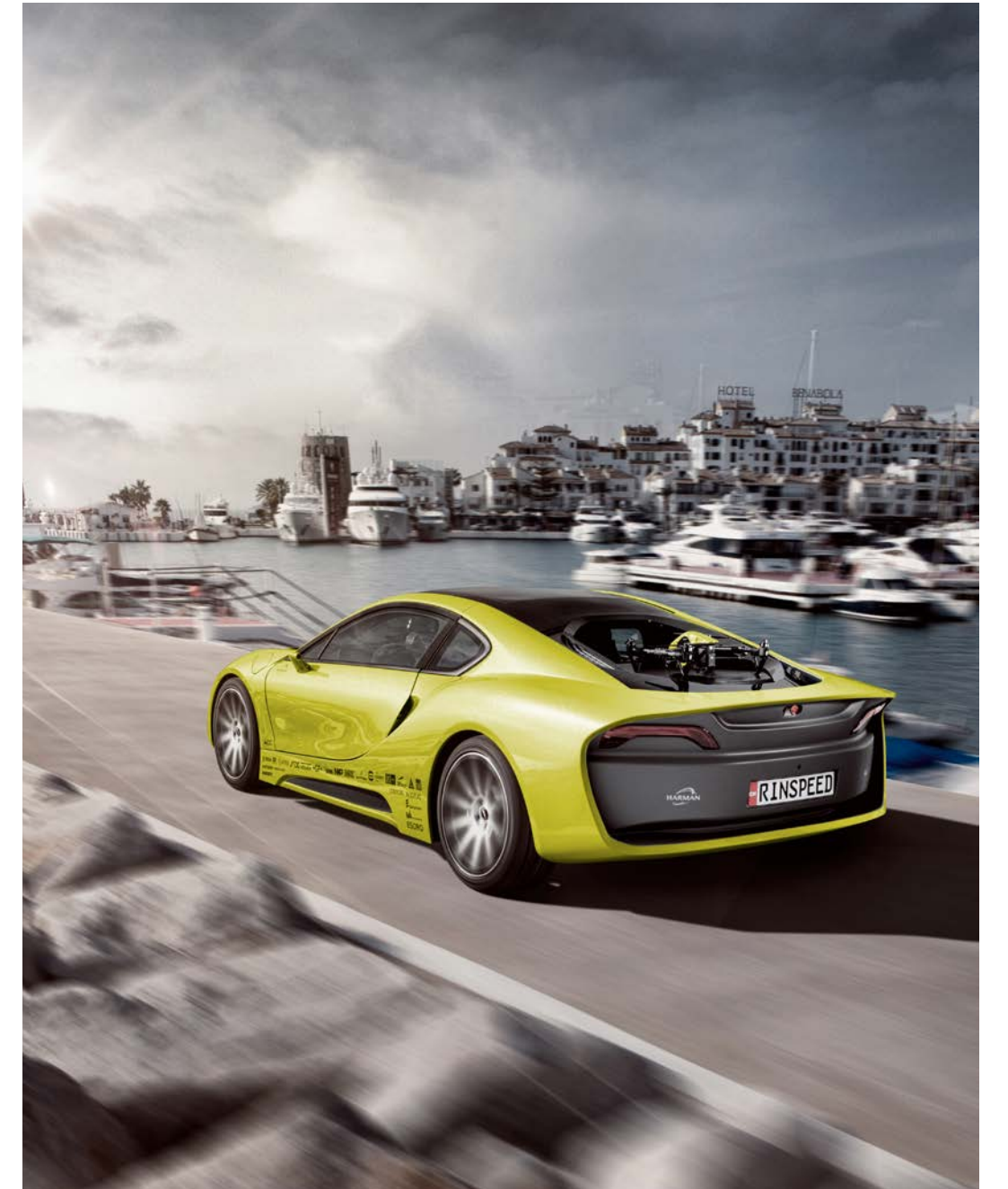
*"In NFC technology our two main topics are very clear: connectivity and security."*

Soon NFC will play a significant role in business-to-business environments. NFC tags give products a smart memory and can contain all the relevant information needed as a product passes through the factory, warehouse, and beyond. They enable late customization, allowing the manufacturer to set the language or configure other settings before shipping the product to a particular region. NFC tags can also be used to verify the authenticity of individual components or tools. Once a product reaches the store, NFC tags can improve logistics in retail outlets by enabling automatic inventory control, smart advertising and theft protection.

And this is just the beginning: NXP has over one thousand applications developed for NFC, mainly in the field of identification and authentication processes. This combination provides an exclusive range from a simple bank transaction through to applications that require more security such as the Blue Oyster Card. Applications that demand the highest official security standards, such as passports, drivers' licences or visa documents, are also using microchips made by NXP.

**A smarter world**

Smart connections are entering all kinds of businesses. Besides smart cars, we'll all have soon smart homes and smart buildings. An example of the latter is the smart health care institution, not only using this technology for its information flows and medical devices, but also in all kinds





**SMART CITIES POWERED BY NXP**

The United Nations predicts that by 2050 almost 70% of the world's population will live in city environments, all requiring stable and sustainable public services as well as safety. Smart Cities must be prepared to meet this reality, and NXP technology is already paving the way for secure, connected, solutions that can make urban life easier, better and safer in key areas of Smart City architecture. Examples of how this can be achieved include:

- Smart mobility: Navigating in cities becomes easier with NXP solutions for public transport and secure, connected, cars.
- Smart buildings: improving energy efficiency, lower maintenance costs and providing better technology access through integrated NXP systems.
- Smart homes: NXP's robust product portfolio makes homes more connected, convenient and secure.
- Smart life: NXP is supporting the creation of a secure connected world that lets consumers fully benefit from innovations in connected devices and technologies.

of wearable medical devices that provide accurate and immediate information about the patient.

The data from all these smart designs can be centrally stored, analyzed and fine-tuned for connection to a wide range of other devices. All these devices are therefore becoming much smarter because they learn from each other and become more individualized. All these innovative data machines help the development of the Internet of Things by indicating the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data.

**Keeping up with Moore's law**

Within this challenging development, NXP microchips have acquired a central position. However keeping this position is a challenge. Studies of data since the beginning of microchip production has shown that microchip output doubles approximately every two years. This way of measuring statistics i.e. the observation that the number of transistors in a dense integrated circuit doubles approximately every two years, is named Moore's Law: This prediction has proved to be accurate for several decades and the law has been used in the semiconductor industry to guide long-term planning and to set targets for research and development. Advancements in digital electronics are strongly linked to Moore's Law and the development of devices needing a microchip grew likewise within the same period.

Although the rate was steady from 1975 until around 2012, there was a faster increase during

the first decade and a reduction in the later years. However NXP must move with Moore's Law to maintain its position and thus re-invent itself as a company about every two years or less, in order to keep up with these autonomous developments.

*"Everyone owns an item that contains a microchip from NXP!"*

**Diversity in craftsmanship**

NXP's employees come from many different backgrounds and sites of learning; from vocational education to PhDs. What they have in common is their craftsmanship and technical background. Within NXP Netherlands, the emphasis is clearly on manufacturing and R & D, with the direct or indirect involvement of approximately 1,300 employees and with the ecosystem of the High Tech Campus Eindhoven of great importance for the company's R & D. Many of the staff come from abroad, and the Eindhoven Campus provides the right atmosphere and environment for meetings. NXP is careful to nurture the knowledge and talents of its staff and craftsmanship is deeply embedded in the company, partly because many employees have a long-term work relationship. This also applies to expat workers who are well represented from about 65 nationalities. NXP also offers a very interesting employment package for students and, as a result, there are many trainees from domestic and foreign universities.

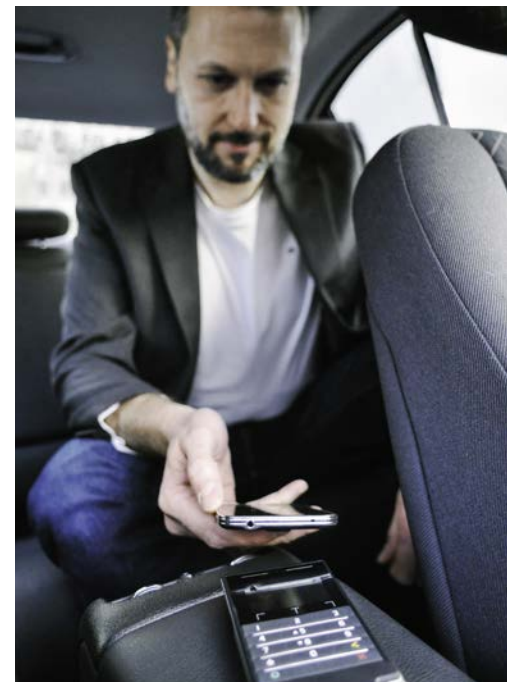
NXP's ambitions will continue to focus on innovation and it will maintain its leadership in further developments for the automotive and security industries. Additionally, NXP aims to grow twice as fast as its competitors and continue to spend 15% of its turnover on R & D.



**FROM SAND TO MICROCHIP IN 6 WEEKS**

NXP microchips create some interesting statistics. NXP produces no less than 80 billion microchips per year, which equates to 2,500 per second! Microchips are made of sand although, strictly speaking, they are made of silicon, which is a semiconductor. In order to make the most efficient use of the raw material, manufacturers use sand that contains as much silicon as possible. The whole process, from sand to microchip, takes about six weeks.

1,700 people are employed in NXP Nijmegen and 700 in Eindhoven. The microchip manufacturer also works closely with more than 1,000 partners and the total number of people working with NXP, worldwide, is in excess of 40,000.



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INSPIRATIONAL BUSINESS STORIES  
FROM THE NETHERLANDS

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# DUTCH INDUSTRY

A wide-angle perspective of Dutch industry, such as this book aims to offer, should also include a look at the future. What are the main challenges that these companies have to deal with?

The *Agri & Food* sector will improve its international leadership position with tailor-made system solutions for international food issues. It will innovate in sustainable food systems and develop more added value with a focus on health, sustainability, taste and convenience.

*Horticulture* companies from the Netherlands will focus on global societal challenges, such as the provision of food, control of climate change and problems of liveable urban societies. New and innovative revenue models using 'green growth' will be developed with a focus on added value, product renewal, sustainability and a new market approach.

Water has many faces: it is both a life necessity as well as a threat to populations. Population and economic growth, urbanisation and changes in living patterns are causing demand for water to rise sharply all over the world, further exacerbating pollution. The Dutch water sector possesses crucial knowledge and skills to help solve these problems.

With a growing world population, *Logistics* will become increasingly important. Dutch

harbours are the gateway to Europe and Dutch logistical companies, whose networks span the globe, are among the best in the world. This sector has the challenge of accommodating the expected global growth in the flow of goods in a sustainable manner. The companies in this sector will contribute to solve societal issues such as accessibility and sustainability.

The *High Tech Systems and Materials* sector faces an expanding worldwide demand for high-tech products. On top of this, an increasing proportion of end products involve electronics, software, and new materials. These developments are based on key technologies that are firmly rooted in the Netherlands, such as microelectronics, nanotechnology, advanced materials, photonics and advanced production technology. Dutch breakthrough technologies such as 3D printing, robotics and the 'Internet of Things' are gaining ground globally. This industry is the future.

The main future themes for the *Energy* sector are urban energy (saving energy in built-up areas, smart grids, and sun photovoltaics), wind at sea, saving energy in industry, gas in transition and the bio-based economy. Many innovative Dutch companies will play an active role in areas that can accelerate the transition to an affordable, reliable, and sustainable energy system.

The *Life Sciences and Health* sector will become more focused on personalized medicine: diagnostics and therapies that are tailor made

to the individual patient, thereby enhancing quality and reducing resources. This might be the only way to offer access to health care for everyone, everywhere. Dutch industry offers an interesting range of products and will find a market eager to use them.

The *Chemistry* sector faces the need for a fast transition to sustainable production and the efficient use of raw materials. With knowledge, innovation, and human capital the sector will provide answers to facilitate the transition to more bio-based products and production processes. Dutch chemistry is in the position to become the world's green industry par excellence, with a mix of bio-materials, clean and sustainable production processes, knowledge and products that can be exported worldwide.

The Dutch *Creative Industry* is renewing itself. New subsectors, such as Digital Design or Dance, will develop, as will new innovative types of organisations or partnerships. Major trends are the application of new materials and techniques (such as 3D printing) and new revenue models. The input from the creative industry will offer enormous potential for other sectors.

With their innovative nature, their creative mindset and their focus on cooperation, the Dutch will undoubtedly find new ways to link these social issues with commercial revenue models and research. In this way they will create the greatest business opportunities.