

GERMANY 

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**Cover Picture:** A Siemens ship receives the Offshore Support Journal Award 2017: At the Offshore Support Journal (OSJ) conference in February 2017 in London the blue wind power service ship WINDEA La Cour was recognised for its unique design concept. The Service Operation Vessel (SOV) started its service campaign at the 600 MW Gemini offshore wind farm in September 2016. According to the jury, it made "a significant contribution to the development of the offshore renewables market during 2016".

Photo: ©www.siemens.com/presse

# The German Economy Is in very Good Shape at the Start of 2017



When it published the 2017 Annual Economic Report in January the Federal government forecast a 1.4 per cent increase in the price-adjusted gross domestic product, thus continuing the country's growth trend. In his address at the report's presentation, the then Federal Minister for Economic Affairs and Energy, Sigmar Gabriel, emphasised that this growth is "growth for all", "inclusive growth".

Gabriel referred among other things to the participation of more and more people in the labour market. In 2016, a total of 43.5 million people were in gainful employment, approximately 1.5 million more than in 2013. The unemployment rate of 6.1% in 2016 is the lowest since reunification. At the same time, real net wages and salaries per employee have increased by more than 1.5 % a year in real terms since 2013.

A sustainable and forward-looking economic and fiscal policy must keep its focus on laying the foundations for tomorrow's prosperity. With a forecast debt-to-GDP ratio of 68% in 2016, Germany remains on track to meet the Maastricht criterion of 60% for the total national debt towards the end of the decade. At the same time, the

Federal Government is taking advantage of the scope available to it to undertake additional investment. In total, federal investment has risen by well over a third since the beginning of the legislative term to 36.1 billion in the 2017 federal budget. By comparison, the federal budget only rose by just under 7% in the same period. In addition, the Federal Government has launched a large amount of relief for the states and municipalities.

## The Aim is to Fully Utilise the Potential of Digitalisation

In addition, the Federal Government is putting in place the preconditions to enable companies to survive unaided in an environment shaped by globalisation and digital transformation and to develop new fields of

business. Measures include the adaptation of competition rules to reflect the demands of advancing digitalisation, a reform of procurement law to reduce the costs of bureaucracy, action to substantially expand the availability of venture capital to assist the growth of innovative young companies and support for SMEs so that they take full advantage of the potential of digitalisation.

In order to ensure that Germany remains in the top tier of economies in terms of intensity of research and development, the aim is to continue to provide stimuli for such activity. Small and medium-sized enterprises (SMEs) play a key role in terms of Germany's capacity for innovation. Accordingly, the Federal Government is making particular efforts to boost their powers of innovation. The digitalisation of industry (Industry 4.0) offers enormous potential for innovation and business in Germany. The best possible use should be made of this potential in order to safeguard and build further on Germany's industrial strengths. In order to ensure that as many people as possible profit from the opportunities of digitalisation,

the Federal Government is pressing ahead with the expansion of digital infrastructure.

### Leading the Way in Industrie 4.0

At the Digital Summit, the Federal Government unveiled numerous initiatives which are successfully fostering digitalisation: Since the launch of the Digital Hub Initiative in 2016, selected hubs in 12 towns and cities have started work. They are focused on priorities from chemicals to health-care and artificial intelligence and are giving a further boost to Germany as a centre for entrepreneurship. Over the next few years start-ups will have two billion euros of new public funding available. And 13 new 4.0 centres of excellence for SMEs are scheduled to be launched this year. Together with the 11 existing centres of excellence, they ensure that companies can obtain practical information about digitalisation across the country. The Plattform Industrie 4.0 also presented a 10-point plan at the summit, offering specific recommendations for how business can be given further support on the road to Industrie 4.0. Speaking at the opening of this year's Hannover Messe on 23 April, Germany's new Federal Minister for Economic Affairs, Brigitte Zypries, stated: "Germany is the global leader when it comes to Industrie 4.0. The Plattform Industrie 4.0 is one of the world's largest and most successful networks for supporting the digital transformation of manufacturing enterprises. Our numerous international partnerships illustrate that we are well on the way to achieving our goal of establishing Germany as a leading supplier and market by 2025."

### The Federal Government is Working Towards a Fair Regime for International Economic Relations

The Federal Government expects investment activity by companies to grow in

©Deutsche Messe / Rainer Jensen



Under the motto "Digitalisation is the driver of growth – experience Industrie 4.0", the Federal Ministry for Economic Affairs and Energy shone a light on energy efficiency, electric mobility and innovations alongside Industrie 4.0 at the Hannover Messe 2017.

The Federal Government is working towards a fair regime for international economic relations. Under the German Presidency, the G20 in 2017 will initiate a debate on the opportunities and risks of globalisation. CETA, the Comprehensive Economic and Trade Agreement between the EU, the EU Member States and Canada, sets standards in terms of shaping globalisation in a fair and sustainable manner. The Federal Government continues to support the goal

Development at all levels and in all policy fields. The German Sustainability Strategy places the focus even more strongly on the long-term and global repercussions of national economic and fiscal policy.

■ <http://www.bmi.de/Redaktion/EN/Publikationen/jahreswirtschaftsbericht-2017.html>

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*"Germany is the global leader when it comes to Industrie 4.0. The Plattform Industrie 4.0 is one of the world's largest and most successful networks for supporting the digital transformation of manufacturing enterprises."*

Brigitte Zypries,  
Federal Minister for Economic Affairs and Energy

2017, but in view of the potential pitfalls, in particular the numerous external economic risks, the increase will be restrained.

World trade could be hampered by protectionist tendencies. This hampers the prospects for exports and thus also the propensity for companies to invest in equipment and buildings.

of an ambitious and balanced trade and investment agreement between the EU and the USA and aims to ensure that high standards of protection can be maintained or put in place, and that the precautionary principle is retained. The Federal Government is committed to an ambitious implementation of the UN's 2030 Agenda for Sustainable



©Nordex SE

The new Renewable Energy Act fosters competition in the renewable energy sector. The goals are to use energy more efficiently and to save energy.

# Developing the City of Tomorrow in International Partnership



©Jennifer Neumann

Today, more people live in cities than in rural areas. In a few years, two out of three people in the world will have taken up residence in cities, consuming far more energy and resources than cities can provide. How do we respond to this development? How can we make our cities attractive and sustainable places to live in? Answering these questions is not a task for one nation alone; it requires international cooperation.

In this way Germany is reaching out internationally to invite cooperations and innovations for CO<sub>2</sub>-neutral, energy-efficient and climate-adapted cities, a goal set in the German government's High-Tech Strategy 2020.

Under the international campaign "Shaping the Future - Building the City of Tomorrow"

of Germany's Federal Ministry of Education and Research (BMBF) in 2017 and 2018, ten top-ranking research networks specializing in smart city solutions are touring the world to forge international bonds with strong partners engaged in urban development. They are inviting researchers, urban planners, architects, decision makers, municipal authorities and representatives from the private sector worldwide to share and reflect their ideas and innovative technologies. The focus countries of the campaign are China, India, Vietnam, Colombia and the USA.

## Ten Campaign Networks Focus on Four Priority Topics

The research projects of the ten campaign networks are dedicated to different urban problems, with which these countries are confronted. They range from self-supplying, floating houses for flooded coastal regions in Asia, to intelligent traffic planning in big cities in Columbia and China, to tools to prepare cities against extreme events like hurricanes and terror attacks, right up to satellite-based management tools for recycling contaminated brownfield sites in North American metropolises. All the campaign's research projects fall under four current priority topics of urban transformation.

### Energy Resources and Infrastructure Systems

Whether looking at a single building, a city block, a district, or the city itself, urban developers need a wide perspective to consider all the interlinked infrastructure sys-

tems. In addition to this, there is an urgent need for innovative solutions regarding urban resilience and security that increase the robustness of urban infrastructures against multiple hazards.

### Mobility and Movement of Goods

To be fit for the future, the urban concepts of mobility and logistics need to go hand in hand with integrated concepts for climate adaptation and the sustainable use of resources. Existing urban mobility and logistics approaches must be redesigned and need to reflect both innovative technologies and tools of governance as well as users' and customers' satisfaction.

### Data, Information Bases and Knowledge Transfer

Identifying the necessary data and solving the issue of data provision represents one of the key challenges for the City of the Future. Consequently, the process of identifying and providing the required data as well as communicating it in an evidence-based and convincing way is crucial for the implementation of smart city solutions.

### Interface Technologies

Innovative digital and technological solutions are needed for smart interfaces between existing infrastructures and urban systems for safety, food supplies, information and communication as well as illumination and public space. In fact, innovative interface technologies and platforms are essential to drive and enable new solutions, operation models and fields of application for the City of Tomorrow.

### The Campaign Networks on Tour

After the inaugural event "Building the City of Tomorrow Together" in February 2017 in Berlin, international networks have already been established at the German Science Day in Ho Chi Minh City in Vietnam, at America's leading trade fair "Smart Cities NYC 17" in New York, USA, and "Smart Cities India" in New Delhi. Further activities are planned in China, India, USA, Vietnam and Columbia.

■ [www.research-in-germany.org/shaping-the-future](http://www.research-in-germany.org/shaping-the-future)

### Further events planned:

- 3<sup>rd</sup> Smart Cities Asia 2017  
2<sup>nd</sup> to 3<sup>rd</sup> October 2017 in Kuala Lumpur, Malaysia
- Smart Cities Week  
3<sup>rd</sup> to 5<sup>th</sup> October 2017 in Washington D.C., USA
- Smart City Expo World Congress  
14<sup>th</sup> to 16<sup>th</sup> November 2017 in Barcelona, Spain



©Ellen Kelson

Expert discussions at the leading trade fairs "Smart Cities India" in New Delhi (Photo above) and "Smart Cities NYC '17" in New York City

# Germany's Federal Government Extends its International Support

Many countries are struggling with the consequences of high levels of unemployment among young people and a lack of qualified personnel. Policies here thus focus on improving vocational training systems.

Throughout the world, the German education system is considered to be a best practice model and thus the demand for collaboration with Germany is consistently on the increase. With this in view, Germany's federal government is now extending its undertakings in the international field of vocational training, an area in which it has already been active for many years. The four intermeshed federal ministries that are mainly responsible for this area will be boosting their individual contributions towards cooperation in the educational sector. For example, the Federal Ministry of Education and Research (BMBWF) plans to enter into further strategic joint ventures with various industrialised and emerging countries with the aim of developing innovative training courses and promoting the systematic projects of the various social partners.

The Federal Ministry for Economic Affairs and Energy (BMWi) is providing support to

chambers of commerce abroad in order to create a platform that will facilitate the introduction of dual education systems based on the German model while the Federal Foreign Office organises numerous round table meetings at its many diplomatic agencies in order to coordinate the various activities, to promote the exchange of information and provide for a uniform approach in the guest countries.

The Federal Ministry for Economic Cooperation and Development (BMZ) is also contributing to the establishment of efficient vocational education systems in developing and emerging countries. State Secretary Dr Friedrich Kitschelt highlights the massive expansion in vocational training that has occurred in the legislative period that is about to terminate, during which an average of €75 million annually has been invested in the training of young people in developing countries.

Although there are still many challenges and problems to be overcome in this field, the international work of the federal government is undoubtedly aiding the partner countries when it comes to the augmentation and improvement of their educational systems and to furthering the employability of young people. At the same time, this input

by the federal government should contribute towards eliminating the causes behind the flight of human capital and migration. In concrete terms, the Federal Ministry of Education and Research intends in future, among other things, to link its international projects in the fields of policy innovation and technology transfer systematically with vocational training concepts. In coming years, the BMBWF will enter into a systematic dialogue with the German export industry in order to assist those sectors with the largest export quotas by subsidising targeted training measures in the countries in question. Particular stress here will be placed on environmental technologies.

The export of commercial German educational services will also receive enhanced backing. Private German training service providers have been undertaking their own projects in 139 countries since 2007.

The strategy followed by the federal government ensures that the activities undertaken by the German players on the vocational training scene take a standardised form. The German Office for International Cooperation in Vocational Education and Training (GOVET), whose services are widely used at home and abroad, also works towards this goal.

■ [www.govet.international](http://www.govet.international)

**Is your company ready?**

Digital transformation is shaping future economic perspectives.

New opportunities and challenges lie ahead.

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[www.imove-germany.de](http://www.imove-germany.de)

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Administrative of the  
**Federal Ministry of Education and Research**  
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 ■ Researching  
 ■ Advising  
 ■ Shaping the Future

# Skilled Worker Development for

By Silvia Niediek (iMOVE)



Dual studies information technology training

In order to remain internationally competitive, all companies must meet this challenge – both in Germany and across the world.

## Skilled Worker Competencies for Industry 4.0

The regional supply of skilled workers could become the greatest challenge facing economies and companies. Experts believe that, by 2020, there will be a global shortage of 40 million employees in production.

In the future, the production organisation will assume an increasingly key role. High-performance hardware components make it possible to handle larger amounts of data from the production processes. The information obtained supports employees far more effectively than previously in medium to long-term decision making with respect to the planning and adaptation of production processes.

Taken as a whole, the stronger interlinking of a large number of occupations using modern technology will result in increased permeability between areas of education and training which were previously separated. Skilled workers of the Industry 4.0 generation will become all-rounders with interfacing expertise. In future, a broad merging of areas of work traditionally classed as either blue collar (production workers) or white collar (knowledge workers) will take place. The age of the grey collar worker is dawning. This also means that, in future, companies will not locate in areas where wages are lowest and subsidies are highest, but instead in areas

The terms Industry 4.0 and Smart Factories signify a profound shift in the economy which will permanently change the world of work. The new technical opportunities provided by the automated control and the networking of work processes are having a far-reaching impact on the qualification requirements of specialists. These requirements in turn alter the methods used in the transfer of expertise; methods for which, in future, there will be worldwide demand from initial and continuing education providers.

The digitalised world of work is changing the development of skilled workers. German companies provide technical solutions for manufacturing industries and are the world's leading equipment suppliers. They are also regarded as pioneers in the intelligent linking of production technologies with information and communication technology and have taken on a leading role internationally in the development, operation and marketing of Industry 4.0.

The technical integration of cyber-physical systems within production and logistics is progressing at an unstoppable rate. The Internet of Things and Services involves "smart devices" with embedded computers and, in-

creasingly, industrial processes will be run by devices such as these which will also communicate with one another. This development has far-reaching consequences for all business areas and company processes. However, this can only function at all if there is a supply of appropriately qualified skilled workers.



Vocational training in China by the German provider FESTO

# Industry 4.0

where they are most likely to find the qualified specialists which are right for them.

## Digital Learning Content and Learning Methods

Exactly how occupational profiles will need to be changed, extended or recreated for Industry 4.0 is currently the subject of much scientific consideration. However, what is clear today is that Smart Factories can only operate on the basis of Smart Education. This means that, for all job profiles, a basic awareness of the importance of digitalisation needs to be generated among all learners. All employees need to be introduced to networked thinking with a much greater focus than ever before.

Advancing digitalisation in companies demands initial and continuing vocational education which is more strongly IT-based. IT competence plays a key role in virtually all areas of employment. Its significance will continue to grow, although not to the same extent in all occupations. Expertise in how to deal with hardware and software will be demanded at a greater number of qualification levels than before.

The learning content required is also changing the way in which expertise is transferred. Learning is increasingly IT-supported. Digital media offers flexible forms of distance learning and an increasing amount of (accessible) education and training materials are available online. Today, learning is no longer dependent on time and location and can take place at virtually any time and in any place.

This results in opportunities for new didactic concepts and pedagogic approaches. The different way we use media and the broad availability of innovative technical options create new opportunities to improve and individualise the design of the learning process. Learning is becoming more collaborative, more mobile, more relaxed, more modular, more experience-oriented, more multi-sensory and more interactive. Education and training sequences must fit within this new learning culture. Online learning, learning using data goggles or in online communities will add to, if not replace, classical learning methods.

The changes in the economy are taking place increasingly quickly as innovation cycles are shortening. The demands on employees over the course of their professional life are changing ever more rapidly. Software knowledge is updated entirely in the space of two to five years. In the future, workers will have to adapt even more flexibly to new requirements. This results in a greater need to



Vocational training in automotive electronics

update qualifications on an ongoing basis. We have to anticipate that the amount of continuing education and training required will increase.

## Digital Up-scaling of Education and Training

Companies are increasingly seeking to take advantage of the young learners' enthusiasm for modern communication technologies. In order to develop and expand an appropriate qualification strategy in their businesses, many companies are seeking initial and continuing education and training partners with a clear competency in the area of IT-supported learning.

Demand exists for practically-oriented learning content presented in a digital form in many of the world's economies. The iMOVE education and training export initiative of the Federal Ministry of Education and Research brings together within their network a large number of German training companies with a range of options for competence development to support Industry 4.0. Many of these providers cooperate with industrial companies operating at a global level who are training their employees around the world using digital teaching tools and methods.

■ [www.imove-germany.de/english](http://www.imove-germany.de/english)



Vocational training in automotive mechanics

# Globalisation is not a Danger, it's an



©BLG Logistics

Container terminal in Wilhelmshaven

Is globalisation in crisis? The reality is that today the concept alone fills many people with anxiety – receptiveness to free trade is diminishing and not just in Germany. But it is also true that German companies have fared extremely well over the last 30 years of globalisation, with the prospect of the next 30 proving equally successful. But for this to occur the country needs the right environment, and in particular free global markets. But open does not mean without rules.

**G**lobalisation doesn't mean laissez-faire; in fact, quite the opposite: it needs to be actively shaped. We are however also aware that this position contrasts with public opinion and to the views of the majority of the population in several western countries at present.

In Germany we are currently experiencing an especially paradoxical situation: in recent decades foreign trade has steadily grown in importance for the German economy as a whole. As a result, the country now has a foreign trade to GDP ratio of 86%. This is

almost double the ratio of 43.5% twenty years ago. In Germany one in two jobs, more than 15 million positions, now depend directly or indirectly on foreign trade. This means that Germany is more firmly embedded than almost any other country in the

count for over half of the trade in goods and services. And this has led to a stronger dependence not just on raw materials but also on intermediate inputs. As a result Germany's import penetration rate currently stands at over 30%. But this was only made



*"Global free trade is by far the most cost-effective measure for improving the living standards of very many people around the world."*

Anton F. Börner, President of the German Wholesale, Foreign Trade and Services Federation (BGA)

global value chains and commodity flows, making it a clear beneficiary of international trade and globalisation.

But the character of international trade has changed too. Over the last two decades a comprehensive fragmentation of global value chains has taken place. Today inputs ac-

possible by the gradual integration of markets and the harmonisation of rules. This process has naturally been accompanied by new dependencies and the need to find supranational solutions for problems that can no longer be resolved at the national level. These include developments erroneously

# Opportunity

©HHLA/Thies Rätzke



ascribed to globalisation such as terrorism, which will not stop but increase, immigration and aggression for example from the Islamic world and Russia.

## Distrust of Globalisation Fails to Recognise the Opportunities

Among the population there is now widespread resistance to further integration into the global economy. And this resistance is largely based on a deep distrust of markets, global enterprises and globalisation itself. Attention is entirely focused on concern about declining standards in employment, products and the environment. And this concern is coupled in particular with anxiety about the supremacy of global companies, which can take legal action against states and in this way undermine democratic structures.

We must take people's concerns seriously. For behind these concerns is anxiety about an uncertain future, that pensions are no longer secure and poverty in old age looms, that we will be swamped by foreign cultures and lose our identity. What is noteworthy here is that no consideration is given to the advantages of free trade and globalisation, such as the availability of goods at low prices.

We face huge challenges. But we must not be afraid of the future because German companies can do many things that others cannot and so will always enjoy demand for their products and services. The world needs us 80 million Germans, for example, in many fields including engineering and technical solutions. The best proof of this is the past: although many threshold countries have become huge industrial nations, Germany's revenues have continued to steadily rise.

So German citizens have no need to fear poverty in old age if this country earns enough to sustain redistribution and its contributions systems. But naturally this money has to be earned first. From this it inevitably follows that if the screw is tightened, and we can no longer be successfully active on global markets, the risk of poverty in old age will increase.

And anyone in this country who rejects free trade not only risks eroding the security and improvement of the living standards of their fellow citizens but is also doing a disservice to millions of people around the globe who are striving to escape poverty.

Global free trade is by far the most cost-effective measure for improving the living standards of very many people around the world. Overall globalisation and free trade

HHLA's intermodal companies connect Hamburg and other ports with Central, Eastern and South-Eastern Europe via a comprehensive connection and terminal network.

have dramatically reduced rather than increased inequality in the world. The most notable impact is the very sharp reduction in the percentage of people living below the international poverty line as defined by the World Bank of USD 1.90 per day. This fell from around 44 per cent in 1981 to approximately 13 per cent in 2012. It needs to be stated clearly and repeatedly: global trade is not a zero-sum game in which one side gains what the other loses. A study published recently by Oxfam revealed that 99 per cent of Germans overestimate the level of global poverty. Only 0.5 per cent of Germans realise that the number of people living in extreme poverty around the world has halved in the last 20 years. The study reveals a profound fear of the future and a deep-rooted pessimism in German society. This is toxic for healthy economic development!

## Free Exchange Requires Accompanying Measures

On balance the free exchange of goods and services worldwide yields more benefits than disadvantages for everyone. But simply to point out these advantages is not enough. Trade liberalisation does not occur of its own accord and requires steady investment and sober economic decisions. The opening of markets should be accompanied by support for those who do not automatically number among the winners. This is why our social market economy and labour market policy in Germany have been so successful for decades, with the social element a meaningful supplement to a free trade policy.

It is not free trade that represents a threat to Germany but isolation and protectionism. But the issue of competitiveness is also crucial for the future of the EU as a whole. Sooner or later a dearth of contacts with the outside world would have a negative impact on the vitality of the economies of Germany's neighbouring countries and then directly affect the labour market. This would provide further impetus to the centrifugal

forces in the EU, ultimately resulting in its collapse, which would in turn pose a huge threat to our future.

We need to have the courage and decisiveness in our country to shape the global environment. If we do not we will eventually have to abide by externally imposed rules. For as long as there is no breakthrough in the WTO Doha Round of trade negotiations, modern free trade agreements such as the EU-Korea FTA and the CETA will continue to play a key role in the further opening up of markets and the dismantling of trade barriers.

Yes, globalisation is in crisis but it's not a danger or a risk for us. It's an opportunity for Germany!

## A Significant Economic Factor

*The Federation of German Wholesale, Foreign Trade and Services (Bundesverband Großhandel, Außenhandel, Dienstleistungen e.V. / BGA) is the most comprehensive representative body for Germany's wholesale, foreign trade and services sector. In terms of turnover volume, wholesale and foreign trade is the second-largest sector of Germany's economy. Annual turnover is around €1,112 billion in the wholesale sector. In foreign trade the annual volume is around €1,207 billion in exports and €955 billion in imports. The turnover in exports and imports amounts up to two thirds of Germany's GDP. Approximately 125,000 companies with 1.9 million employees are active in Germany's wholesale and foreign trade sector – more than in the entire chemicals industry. A full 65 percent, or two thirds, are members of the BGA. They include large and famous companies like Metro, Thyssen-Krupp and MAN-Ferrostaal. However, around 98 percent of the federation's members are medium-scale firms.*

*Import trading companies can be your bridge to the German market. For many foreign companies especially SMEs, it is not easy to get access to the German market. Lack of information, financial risks, and legal constraints may hinder exporters from placing their goods on the German market successfully. At this point, a German importer may help. Exporters can use the diverse and broad services of German import trading companies for marketing, selling and distributing their products on the German market, and even within the EU. German importers act as intermediaries between suppliers abroad and customers in Europe.*

■ [www.bga.de](http://www.bga.de)

# Change Must be Shaped

By Carl Martin Welcker, President of the Mechanical Engineering Industry Association (VDMA)



German companies are in demand in the global power station sector: SGT5-8000H gas turbine for a power station in Hong Kong

©www.siemens.com/press

**D**igitalisation is omnipresent. Smarter, more individual, faster, more efficient, more networked – these are just a few of the promises of the new digital age. And digitalisation is being accompanied by a profound change: Industrie 4.0 will not only make business and production processes more efficient, it will also contribute to a far-reaching transformation of the world of work.

## Industrie 4.0 is not an End in itself

There are no blueprints for the planning and execution of Industrie 4.0, every com-

pany varies in companies. However, studies and practice show that the German mechanical engineering industry is well placed overall. To establish Industrie 4.0 in companies various action levels are combined: the integration of new technologies into production, the upgrading of products for Industrie 4.0 and the associated development of new business models. Horizontal value creation, i.e. networking across company borders, is the supreme discipline and a particularly challenging task. At the same time it is necessary to take employees along on the journey

## The Individual Remains Centre Stage

And the individual remains centre stage not despite but because of Industrie 4.0. In

### German Mechanical Engineering—Figures 2016

Turnover	bn EUR	219.5
Turnover per employee <sup>1</sup>	1,000 EUR	216.4
Production	bn EUR	203.2 e*
Exports	bn EUR	155.9
to EURO-countries	bn EUR	44.0
Imports	bn EUR	64.3
Domestic sales <sup>2</sup>	bn EUR	47.3 e*
Domestic market supply <sup>3</sup>	bn EUR	111.6 e*
Export share <sup>4</sup>	percent	76.7 e*
Import share <sup>5</sup>	percent	57.6 e*
R & D expenditure	bn EUR	5.8 e*

1) Calculated with average number of employees per year  
 2) Production minus exports  
 3) Production minus exports plus imports  
 4) Exports in percent of production  
 5) Imports in percent of domestic market supply

e\*) estimated

Sources: ifo-institut, Statistisches Bundesamt, Stifterverband der deutschen Wissenschaft, VDMA

The VDMA (Verband Deutscher Maschinen- und Anlagenbau, Mechanical Engineering Industry Association) represents more than 3,200 mostly medium-sized companies in the capital goods industry. With over one million employees in Germany and revenue of EUR 220 billion (2016), it is the biggest industrial employer and one of the leading branches of industry in Germany.



*“Horizontal value creation, i.e. networking across company borders, is the supreme discipline and a particularly challenging task.”*

Carl Martin Welcker,  
 President of the Mechanical Engineering Industry Association (VDMA)

pany must develop its own strategy. Moreover, Industrie 4.0 is not an end in itself but stands and falls by its economic benefit. As ever with new technologies, timing is of the essence and the speed of implementation

to the production of tomorrow and to shape change with them. To achieve this it is also essential that company managers are open to changes in their individual management styles.



Highly skilled engineers, technicians and fitters are key to the success of the German engineering industry – Assembly of a Speedmaster XL 106 printing machine.

the future they will continue to develop, control and steer machines. And without qualified employees it will not be possible to successfully sustain Germany's technological leadership of the mechanical engineering industry and its leading position in international markets. A report entitled "Industrie 4.0 – Qualification 2025" by the VDMA illustrates that employees in the German mechanical engineering industry are exceptionally well-qualified and can deal with complexity, which means they are equipped for Industrie 4.0. But what the study also highlights is that qualification will assume even greater importance in the future. New content and methods must be incorporated into continuing education and training, while cyber-physical systems and robotics play a key role in networked production. This means that trainers must be embedded in strategic processes earlier. In addition, needs-based forms of learning must be developed. Offerings in the area of digital advanced training such as the VDMA's involvement in the "University4Industry" online education platform are important contributions. The content of training for professions such as mechatronics engineer and industrial mechanic must also be adapted to the requirements of Industrie 4.0. In addition, it is necessary to recruit for existing special professions such as production technologist and to put greater emphasis on these professions in vocational colleges.

**The General Conditions Need to be Correct**

New forms of cooperation must be developed for cross-company data exchange while issues pertaining to data and legal compliance must also be clarified. The VDMA is

working hard on these themes. At the Hannover Trade Fair the VDMA presented the new guideline for the OPC-UA, a machine to machine communication protocol for industrial automation which makes the Industrie 4.0 communication of tomorrow possible. Other general conditions must also be correct. For example, the appropriate infrastructure for digital networking must be in place in Germany and internationally. For only then will Industrie 4.0 be successful and Germany be the leading market and supplier. And a seamless EU internal market for goods and services will be vital for Industrie 4.0.

**Europeworks – a Strong Pro-Europe Signal**

A strong Europe: the EU and the internal market are the bedrock for the success of European industry. Against this backdrop nationalism and isolationism represent a growing danger to industry and ultimately pose a threat to jobs and the level of prosperity for all. Above all, Europe is a social success story because European collaboration has helped people to enjoy greater freedom, peace and prosperity. So in the face of growing populism it is vital that we adopt a clear pro-European position - even if there

is scope for improvement. The VDMA has sent a strong signal in this regard with the launch of the online #europeworks initiative. It is also important that Europe is further developed. Which also means having the courage to reform the European Union. This involves a strengthening of the parliament, majority votes in the European Council and greater clarity about the decision-making powers of the EU and those of the individual member states. For change must be shaped in Europe too.

■ [www.vdma.org](http://www.vdma.org)

**German Machine Exports by Region 2016**

	bn EUR	%-share
Europe	88.6	56.9
EU-28	72.5	46.5
EURO-19	44.0	28.2
Asia	36.2	23.2
North America	17.8	11.4
Latin America	6.5	4.2
Africa	4.9	3.1
Australia/Oceania	1.8	1.1
<b>Total</b>	<b>155.9</b>	<b>100.0</b>

Sources: Statistisches Bundesamt, DMA



The individual remains centre stage: Pre-assembly of a car production facility.



The state-of-the-art steckel/plate mill for the Shandong Iron & Steel Group Rizhao Corp. Ltd

# Acting with Flexibility in a Changing

By Klaus Gottwald, VDMA Large Industrial Plant Manufacturers' Group



New fertilizer complex in Egypt handed over by ThyssenKrupp

©thyssenkrupp Industrial Solutions

New orders booked in Germany by members of the VDMA Large Industrial Plant Manufacturers' Group (AGAB) totalled EUR 18.9 billion in 2016, down 3% on the previous year and the lowest level since 2004. This decline also had an impact on employee numbers in Germany, which fell by 2% to 57,600 (2015: 58,800). In view of the challenging environment, with low raw material prices, overcapacities, strong price and competitive pressure, complex customer requirements and a range of political and economic risks, it is a mark of the industry's great competitiveness that German large industrial plant manufacturing managed to remain virtually stable in its markets.

There were some glimmers of light in the domestic arena in 2016 – for example, in energy transmission and chemical plant manufacturing. Nonetheless, the order level remained low at EUR 3.7 billion, which is around EUR 1 billion below the long-term average (2007 to 2016: EUR 4.6 billion). There are still virtually no major projects in which VDMA Large Industrial Plant Manufacturers' Group members are involved in Germany, with the collapse of the market for thermal power stations taking a particular toll. Upgrades, service orders and replacement part contracts are to the fore in the market.

### Declining International Orders – Mega-projects Provide Momentum

International orders fell by 10% in 2016 to EUR 15.2 billion (2015: EUR 16.9 billion), with almost all regions affected. Especially noteworthy was the downturn in the Middle East, where plant construction customers put investments on hold due to the low oil price.

However, in emerging countries such as Brazil, India and Mexico the trend in new orders was similarly disappointing. Nonetheless, demand remained stable in the industrialised countries and in the Asia-Pacific region, where China is the most important market. A number of mega-projects also ensured a degree of stability, most notably in Egypt. The North African country was the most important global market in the reporting period with orders worth EUR 3.2 billion (2015: EUR 2.6 billion). Egypt invested heavily in the extension of its power network last year. At the same time, however, the number of major orders worth between EUR 125 and 500 million, typical for large industrial plant manufacturing and important in terms of capacity utilisation, remained at a low level.

### The Focus is Shifting to Digitalisation in Large Industrial Plant Manufacturing

Business cycle analysis shows that the overall conditions for large industrial plant

manufacturing remain tough and global demand has been stagnating for years. The industry is pulling out all the stops to adapt to this new reality in a changing world. The members of the VDMA Large Industrial Plant Manufacturers' Group are scrutinising proven procedures, methods and processes in their companies and are focusing on the development of new business models.

This process is also taking place against the backdrop of digitalisation. The topic of

### Foreign Orders 2016 by Region

in bn EUR	2016	Change 2016/2015
Industrialised states	4.1	-2 %
Asia-Pacific	2.2	9 %
Eastern Europe and CIS	1.8	-18 %
Near and Middle East	1.8	-26 %
Rest of the world	5.4	-12 %
<b>Total</b>	<b>15.2</b>	<b>-10 %</b>

Source: VDMA Arbeitsgemeinschaft Großanlagenbau

# World

©The Linde Group



Linde Engineering, a division of the Linde Group, is a leading technology partner for plant engineering and construction worldwide in the area of HyCO facilities (hydrogen-carbon monoxide plants).

Industrie 4.0 is all-pervasive in the plant manufacturing sector and companies are leveraging the potential of networking to improve efficiency above all in engineering, in logistics and on construction sites. A VDMA study from 2015 demonstrates this in figures. According to this study, two thirds of companies surveyed expect to achieve significant cost reductions from the deployment of Industrie 4.0 technologies in engineering by 2020. And the potential is clearly even greater in logistics and construction site ma-

©SMS group



As a systems provider, SMS group supplied all equipment and process know-how required for the most state-of-the-art steel mill in North America, which opened in March 2017. It also supported Big River Steel in the commissioning phase.

nagement, where around 90% of respondents expect to improve efficiency. On construction sites Industrie 4.0 will improve management and allow for more precise documentation of the current status. With a status report close to real time, plant manufacturers can react to incidents on site immediately and in the best-case scenario they can even be avoided entirely.

To achieve these ambitious goals the introduction of Industrie 4.0 will also require changes in the organisation of companies

and their business processes. Changes are likely above all in engineering and in partnership with customers and suppliers.

## Data Security and Supplier Integration Represent Particular Challenges

The exchange of data between plant manufacturers, suppliers and operators is set to increase significantly over the coming years, putting issues of ownership and rights of use of this data as well as data security and questions of liability centre stage.

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Dieffenbacher manufactures complete turnkey production lines for wood-based panels, including particleboard, MDF, THDF, OSB, OSL and LVL. Just like Kastamonu Entegre in Adana, Turkey, companies around the world rely on Dieffenbacher to plan and equip their new manufacturing plants and to modernize their existing plants to improve productivity.



Automation solutions also enable constant control of the entire process in paper production, thus ensuring consistently high paper quality.

In addition, the digital integration of suppliers will continue. In the view of the companies involved in the study, however, the majority of global suppliers will still not be suitably qualified for digital collaboration by 2020. This could be a competitive advantage for suppliers from industrial countries, which as technological pioneers will be better prepared for the changes on the horizon than suppliers from threshold countries. In the medium term this development could even result in a switch from the current practice of best cost country sourcing in large industrial plant manufacturing to leading technology country sourcing.

**Training and Further Training in the Spotlight**

Training and further training must be adapted to the new environment if Industrie 4.0 is to be successfully implemented in large industrial plant manufacturing. It is essential that business and universities work together to develop concepts for the further training of the existing workforce and for the training of new employees. With these

aims in mind, tailored or new (study) programmes that meet the needs of companies are urgently required. And it will be equally important to find ways of encouraging employees to seek work in plant manufacturing. Models must be developed that can keep pace with the dynamism of other sectors. Examples are venture capital concepts and in-house start-ups which enjoy wide-ranging freedoms compared with traditional plant manufacturing.

**Outlook: Cautious Optimism Thanks to High Technological Know-how**

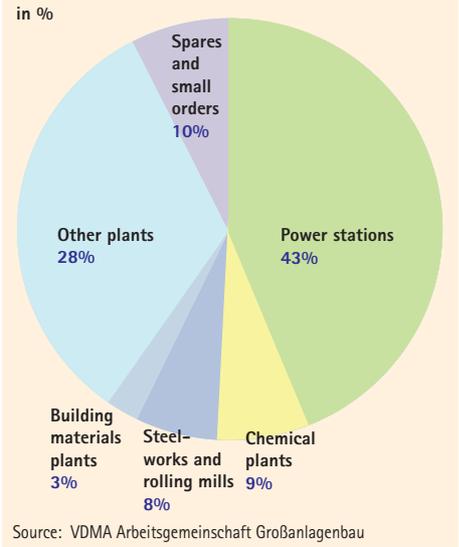
No fundamental change in the trend in large plant manufacturing is expected this year. According to the latest survey of members, the overwhelming majority of companies anticipate sluggish sales at best and a decline in employee numbers. However, a half of respondents are hoping for a modest increase in new orders.

German large industrial plant manufacturers remain innovation and technology leaders in the global market. High service and training expertise and the ability to operate

plants and to equip and retrofit them with digital intelligence are further specific strengths of the industry. In addition, the sector is banking on the high qualifications, motivation and entrepreneurial mindset of its employees. To this extent, companies are upbeat about the future notwithstanding the many difficulties. They are taking advantage of the current phase to cut costs, streamline procedures and develop new business areas.

And German politicians have also recognised the huge economic potential of large

**New Orders 2016 by Plant Type**

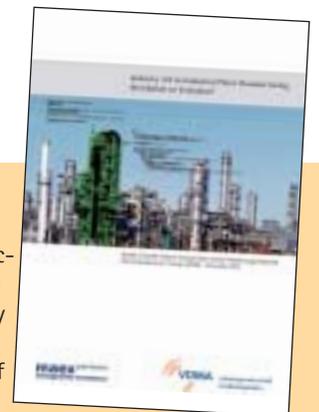


plant manufacturing for forging long-term international business relationships. They are therefore striving to improve the current tools for supporting the sector, in particular for strategic international projects. Likely developments in the large plant manufacturing sector in the coming years and trends in the individual segments are covered in the 2016-2017 status report.

■ [www.vdma.org/large-industrial-plant](http://www.vdma.org/large-industrial-plant)



Together with its local Egyptian partners, Siemens is erecting three turnkey gas-fired combined cycle power plants, each with a capacity of 4.8 gigawatts, for a total combined capacity of 14.4 gigawatts.



The VDMA Large Industrial Manufacturers' Group offers a study entitled "Potentials of Industrie 4.0

in Large Industrial Plant Manufacturing" and the current status report "The World is Changing – Acting with Flexibility". Both can be ordered via email by writing to [klaus.gottwald@vdma.org](mailto:klaus.gottwald@vdma.org)."

# The Progress of Digitalisation Opens up Enormous Potential

The German electrical and electronics industries have seen a prosperous start to 2017. Over the first quarter of this year, the sector reports a 10.2% increase in incoming orders compared with the same period in the previous year – domestic orders rose by 11.1% and overseas orders by 9.3%. And it also registered a turnover of €45.8 billion in the same first three months, outperforming last year's corresponding figures by 8.4%. "The current mood is optimistic," stressed Michael Ziesemer, the president of ZVEI – the German Electrical and Electronic Manufacturers' Association – speaking at the 2017 Hanover Trade Fair.

Re-elected to the post in May, Ziesemer predicts a total increase in 2017 of 1.5% in terms of real production to €185 billion with regard to turnover. This confirms the original forecast issued by the association at the beginning of the year. Although the current general prospects for business appear good, Ziesemer added that ZVEI was remaining cautious particularly in view of the political situation. The factors involved here are the as yet unclear economic course likely to be taken by the USA, the unpredictable consequences of Brexit, the instability in

## Exports of German Electrical and Electronic Manufacturers January – March 2017

	in Mrd. €	Comparison 1 <sup>st</sup> quarter 2016
China	4.4	+18.9 %
USA	4.3	+10.0 %
France	3.0	+7.4 %
Great Britain	2.6	+4.6 %
Netherlands	2.3	+9.2 %
Italy	2.2	+6.1 %
Czech Republic	2.2	+24.6 %
Poland	2.1	+1.7 %
Austria	2.0	+10.1 %
Switzerland	1.7	+6,7 %

Turkey and the economic and political uncertainties in Italy – four countries that are of considerable relevance for the German electrical and electronics industries in terms of exports and direct investments. They took a

©www.siemens.com/presse



With Building Information Modeling (BIM) digitalisation is making inroads in the construction industry: BIM is a digitally supported process for the planning, construction and operation of buildings which significantly boosts the productivity of the construction sector.

fifth of the total exports of the sector last year while a quarter of its direct investments are also located abroad.

## Demand from Emerging Countries Continues to Grow

In 2016, the sector in Germany achieved a price-adjusted increase in profit of 1.2%. The revenue generated rose by 0.2% to €178.5 billion. In the first three months of 2017, domestic earnings grew by 5.6% to €21.8 billion; this can be compared with an increase of almost double that for earnings from abroad, which rose by 10.8% to €24.0 billion. "Although the state of affairs was the opposite for a certain period, the level of export of electrical and electronics products to emerging countries was again higher than the level of exports to industrialised countries in the first quarter of this year," emphasised ZVEI's chief economist, Dr. Andreas Gontermann. The first increased by 12.9% in comparison with last year to €16.6 billion while the latter rose by 11.1% to €31.9 billion. The sector's exports to Asia rocketed by 15.7% to €10.5 billion, to America by 12.8% to €5.8 billion, to Europe by 10.3% to €29.9 billion and to the Eurozone by 8.7% to €14.5 million in the first three months of 2017. The single country taking most of the German exports of these pro-

ducts in the first quarter of 2017 was China (value €4.4 billion, up 18.9 % on last year). Following close behind was the USA (€4.3 billion, up 10.0 %).

## A Clear Focus on Digitalisation

Being given undoubted priority on the agenda of the association is the topic of digitalisation. For the president of ZVEI, the 2017 Hanover Trade Fair provides unmistakable evidence that digitalisation is rapidly taking hold. "A year ago, the spotlight was on concrete Industrie 4.0 applications. This year, we are seeing new digital business models taking centre stage. Industrie 4.0 is gaining increasingly commercial-orientated facets that offer attractive potential for businesses," added Ziesemer. In the view of ZVEI, it is important that everyone can contribute towards the development of Industry 4.0. For example, the shared open source project 'openASS' - ASS stands for "Asset Administration Shell" - showcased by RWTH Aachen University at the fair demonstrates that Industrie 4.0 applications can be employed by a wide range of different businesses. The project represents a major contribution to the realisation of Industrie 4.0.

Another example of the world-beating core skills of those involved in the evolution



©ABB

The ABB Ability™ System 800xA process control system facilitates the efficient and safe operation of industrial processes. It is also a safety system that enables the integration of electrical facilities.

of Industrie 4.0 in Germany is a modular production system also on display in Hannover. Working in collaboration with NAMUR, the User Association of Automation Technology in Process Industries, ProcessNet, the German platform for chemical process engineering in Germany and twelve other organisations, ZVEI has developed a chemicals factory consisting of individual components that can be rapidly and flexibly combined to provide ever new variants. Required for this are robust and at the same time intelligent components, such as pumps, chemical reactors, distillation and extraction modules and the like, that can be controlled by integrated state-of-the-art automation systems. In addition, in order to be used in connection with modular concepts, these components need to be standardised. Since 2015, the ZVEI work group “Modular Automation” and the NAMUR task force “Automation of modular systems” have been collaborating on the design of non-manufacturer-specific modules.

### The Pioneering Role of the Energy Sector in Digitalisation

ZVEI also has ambitious objectives when it comes to Germany’s energy transition. “We would like to see the energy industry become the first fully digitalised sector in

Germany so that the energy transition as a whole can be converted into a successful export,” Ziesemer continued. The “ESCO Forum im ZVEI” – ESCO is an abbreviation for “Energy Service Companies” - represents the interests of the major energy suppliers and contractors in Germany’s energy technology division Fachverband Energietechnik. Its core expertise is in the design and implementation of energy-efficient supply concepts for industry, businesses, local authorities and the housing sector. It has a considerable store of technical and commercial know how that will enable it to further foster the creation of decentralised energy supply solutions with low CO<sub>2</sub> footprints and encourage investment in more energy-efficient technologies.

The launch of the sixth energy research programme of the German Federal Ministry of Economic Affairs and Energy on 1 July 2016 represented the green light for inauguration of the cross-sector direct current research project “DC-INDUSTRIE”. A total of 21 businesses working in the sector, four research institutes and ZVEI are collaborating in this project to implement the requirements of the energy transition in industrial production methods and thus ensure that greater energy efficiency and flexibility are introduced. The aim of DC-INDUSTRIE is to

replace current industrial unit energy supply systems with a smart, open DC network and to digitalise the industrial energy supply architecture. This will put in place the industrial energy system of the future in the form of a direct current-based smart grid. “A direct current-based smart grid will necessarily differ fundamentally from the system currently employed to supply energy. But only by introducing this smart grid will it be possible to achieve increased energy efficiency and flexibility in industrial production,” concludes Gunther Koschnick, head of ZVEI’s automation division.

Production powered in this form provides considerable advantages. Intelligent grid control and integrated storage systems mean that there will be rapid and stable responses to variable supply quality and power availability. Moreover, it will be easier to integrate power supplied from renewable energy into the system and reduce losses arising from the conversion of alternating to direct current. Energy saving will also be achieved, inter alia, thanks to the greater ease of use and buffering provided by “break energy”, also known as regenerative braking energy, in direct current grids. “It is here that the energy transition comes face-to-face with Industrie 4.0”, states Koschnick.

### Digitalisation also Underlies New Mobility

Another focus is on the way digitalisation and the development of networks are paving the way for automated travel - something that will revolutionise transport systems in the coming years. Here, the automotive industry and its suppliers in particular are facing the special challenges of finding ways to master the associated Big Data and developing the required new business models. “It is already the case that more than 80% of the innovations with regard to vehicles take the form of microelectronic and software products. The electronics required for just a mid-market vehicle now constitute 30% of its production value,” clarified Ziesemer at the VDE/ZVEI microelectronics symposium devoted to the topic of autonomous vehicles and held in Berlin in September 2016. Driverless vehicles will require a vast array of microelectronic sensors and activators and the capacity to rapidly process large streams of data.

German manufacturers are currently world leaders in terms of the driver assistance systems - precursors of upcoming automation - installed in their premium models. Ziesemer see this as a favourable starting position: “But is it by no means clear who will be first across the finishing line in the race to future mobility.” What is needed is close collaboration between businesses, politicians, associations and stakeholders if the German team is to gain the chequered flag of New Mobility.

■ [www.zvei.org](http://www.zvei.org)



*“A year ago, the spotlight was on concrete Industrie 4.0 applications. This year, we are seeing new digital business models taking centre stage. Industrie 4.0 is gaining increasingly commercial-orientated facets that offer attractive potential for businesses.”*

Michael Ziesemer, President of the German Electrical and Electronic Manufacturers' Association at the 2017 Hannover Trade Fair

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Schniewindt was originally founded in 1829 in the small town of Altena. Following the patenting of the Schniewindt grid heater in 1902, the diminutive company in Germany's Sauerland region grew into a flourishing internationally active business that is still in family hands and is today managed by its director Dr. Sarah Schniewindt.

## Our Business Sectors

When it comes to heating technology, Schniewindt develops, manufactures and sells devices for heating gases, liquids and solids. Thanks to our expertise, we are able to produce equipment that can even be operated safely in areas subject to explosion or firedamp hazards. We are the one-stop shop for process-orientated and energy-efficient complete solutions incorporating electronic control and pump systems. And we know all about electrical resistivity - we develop and produce according to customer specifications high performance and high-voltage resistors suitable for measuring loads, testing, filtering and damping of vibrations in addition to direct current distributors, combined and calibrated converters and dummy radio transmission systems. In the energy transfer section, we employ



Flow heater

tried-and-tested sensor technologies for the measurement of voltage and current - with digital optical data transmission if required - for use with the latest generation of digital automated transformer stations. Our devices are able to combine and digitize analogue signals from conventional current and voltage converters. They can also be visualized with the help of our SV-Viewer.

## Our Contribution to the Energy Revolution

In view of the rapidly increasing reliance on renewable energies and the resultant fluctuations in power supplies as a result of the variation in weather conditions, energy suppliers are facing new challenges. They are obligated to keep the grid stable and to implement appropriate measures. One possibility could be the provision for extensive switching load. In order to facilitate this, Schniewindt can offer electrically powered flow heaters as complete systems with the corresponding control systems and pumps in the high quality you have come to expect from us. Our 175 qualified personnel, powered by "electrifying ideas", are able to master new problems every day and are one of the main reasons for our many years of success in the marketplace.



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# Indications of Significant Growth

By Sylke Becker, German Machine Tool Builders' Association (VDW)



© Universität Stuttgart, IFF/Fraunhofer, IPA/Rainer Betz

Industrie 4.0: Thanks to "smart system optimisation" using cameras significant errors and their sources can swiftly be established in interlinked plants.

The outlook is bright for the German machine tool industry in 2017 and the sector forecasts a marked increase in production. This prediction is supported by the healthy order book from 2016. Expectations are also buoyed by international machine tool demand. This September the sector and its customers will be gathering at EMO Hannover (from the 18<sup>th</sup> to the 23<sup>rd</sup> of September), the world's premier trade fair for the metalworking sector. This will provide a further opportunity for companies to activate business for the focus will be on digitisation and networking of production operations. The global industry is expecting these developments to provide the next boost for global productivity. Interest and demand are correspondingly strong.

The British business research advisory firm Oxford Economics, the forecasting partner of the German Machine Tool Builders' Association (VDW), expects Gross World Product to rise by 2.6 per cent this year. This compares with growth of 2.3 per cent last year. Industrial production and machine tool consumption are predicted to grow by 3.1 and 3.2 per cent respectively in 2017. This means the global market for machine tools is currently worth almost EUR 70 billion.

Europe is again anticipated to top the consumption ranking with estimated growth of 4 per cent. In Asia machine tool con-

sumption is expected to advance by 3.5 per cent, driven by China, which has emerged from the doldrums and is expected to post growth of 3.9 per cent. In addition, Asian markets are awaited to pick up again. In America, on the other hand, machine tool consumption is expected to level out again. After falling in 2016, 0.5 per cent growth in consumption is forecast this year.

## International Demand is the Main Driver of Growth

The German machine tool industry expects to post a hefty 3 per cent increase in output this year. This forecast is based on

international industrial output and global demand for machine tools. It is also supported by the 7 per cent growth in the order book last year. The main driver of this increase was international demand, with domestic orders remaining at the same healthy level as the previous year. As a whole, the German machine tool industry benefits in particular from the large volume and automotive-driven global project business. Another positive factor is the upward trajectory of the global purchasing managers index, which ticked up to 52.8 last year. This clearly points to growth because any score above 50 is a positive sign.

German machine tools are in demand around the globe and stand for quality, flexibility, productivity and sustainability. The export ratio of 70 per cent is an impressive indication that they represent good value in particular for customers competing in the international marketplace.

## Technological Trends Offer Opportunities

And this September, EMO Hannover 2017 will again provide excellent evidence to support this assertion. Under the motto

“Connecting systems for intelligent production”, the focus will be on digitisation and the networking of production.

Industrie 4.0, as this development is also known, offers great opportunities for machine tool customers to generate new competitive advantages and to further expand their service portfolio. There is significant potential in the general automation of the entire workflow and the elimination of process disruptions. Double-digit improvements in efficiency are comfortably attainable with universally networked solutions and help customers to gain a vital competitive edge. To achieve such improvements the capture and analysis of machine and process data is essential.

It is here, for instance, that big data come into play, one of the topics on everyone’s lips at the moment. For special applications in the production environment, the numerous acquired measurement and sensor data describing the machine’s status have to be liberated from their “data graves”. Detailed analyses extending over large quantities of data help to ensure early detection of imminent failures, e.g. of main spindles or feed axes, and to predict the moment when maintenance will be required more precisely than had previously been possible. These new approaches being used in predictive maintenance, based on teachable algorithms, extend far beyond classical condition monitoring of individual machines. The statuses of all machines in a manufacturing system are acquired, centrally monitored on a continuous basis, and the requisite action taken in response to real status data.

This means that entirely new possibilities are also opening up for performing maintenance or service tasks. So-called augmented reality is superseding the traditional maintenance manual. A service technician establishes what to do using a smartphone or tablet. Here, a software system detects the section of the machine in which the technician is currently located. Online communication with the machine’s control system thus makes it easier to find a fault. Superimposed step-by-step instructions for repair replace elaborate and costly product training courses on the customer’s premises. Even personnel without special training will then be able to take initial measures for remedying a malfunction.

#### Smart Production in a Network of Possibilities

The organisers are confident that EMO Hannover 2017 will generate vital momen-

tum for implementing Industrie 4.0 or the Internet of Things. In the machine tool, digitisation has long since been implemented. Digital images, for example for simulations, have likewise been possible for quite some time. The task now is to network the entire production operation, and indeed the complete added-value chain.

In a consistently networked manufacturing line, flexible production is possible with optimised sequences, so that even rush orders in small batch sizes can be handled. Complete networking of the entire production line with real-time communication and control will create maximum added value for companies when they implement horizontal communication from receipt of the order through to dispatch. Within the added-value chain, moreover, it’s important to network not only the component suppliers, but also the logistical partners and the customers involved, so as to maximise productivity, flexibility and efficiency.

#### EMO Hannover Showcases Examples of Best Practice for Mid-tier Companies

Small and medium-sized firms, in particular, are still struggling to implement a completely automated and networked smart factory, since this entails very substantial investment. It is more realistic to move forward to Industrie 4.0 in small steps. Numerous detailed innovations create an added value for machinery users and enhance the competitiveness of the machinery manufacturer concerned.

At the EMO Hannover, very many of these solutions will be on show. These include:

- New methods for intelligent tool management with direct transfer of tool data to the machine, thus reducing the workload involved in production planning.
- Feedback of offline measured data for a self-regulating optimal process control system for tool grinding.
- Sensor and software systems for simpler, control-system-independent machine monitoring – from the component level to the entire factory.
- Approaches for mastering data transmission and data security.
- Assistance systems for increasing productivity through cooperative networking of machines and ERP systems
- Business platforms for holistic organising of production operations on the basis of real-time data
- Communication environments for transparent, independent, open and simultaneously secure data interchange along the entire added-value chain
- Apps for individually configurable control systems, designed to ensure improved operator-friendliness and expanded connectivity, and much more.

The inventiveness in the production environment is enormous. EMO Hannover 2017 will provide numerous specific stimuli for the practical use of new solutions meeting every need, under widely varying preconditions.

■ [www.vdw.de](http://www.vdw.de)

©Fraunhofer IPA/Rainer Betz



Digitalisation is already a reality in many areas of production.

# A Strategic Offensive with a Faster

By Matthias Wissmann, President of the German Association of the Automotive Industry (VDA)



The AMG GT Concept four-door coupé unveiled by Mercedes-Benz at the 2017 Geneva Motor Show provides a glimpse into the performance of the future.

In a favourable economic environment the German automotive industry is upbeat about both its leading position in the premium segment and its strong market presence in the volume segment in the current financial year. In 2017 the global passenger car market is forecast to expand by three per cent to 85 million units. Europe is expected to grow slightly to 17.6 million cars with Germany remaining stable at a lofty 3.35 million new registrations. At the same time, however, the sector faces a number of considerable challenges.

**M**atthias Wissmann, President of the German Association of the Automotive Industry (VDA), states in this regard: "Digital connectivity and electric mobility are accelerating the worldwide race for innovation in the best technologies. This demands great flexibility and huge investment in research and development. We are setting about tackling these tasks from a position of strength."

## Concern about Increasing Protectionism

Nonetheless Germany's globally-oriented manufacturers are eyeing the increasingly protectionist tendencies in many parts of the world with a degree of concern: "Around the globe, German manufacturers produce 16 million passenger cars, of which over 10 million are made outside Germany. Our facilities in all countries depend on open markets and free trade. We are therefore resolutely pursuing on an open and fair trade policy. International cooperation and accessible markets, free trade and direct invest-

ments are two sides of the same coin. They bring prosperity and jobs – everywhere, including the US", emphasises Matthias Wissmann, who points out that the WTO lists more than 2,200 violations of principles of free trade. "Protectionism is the opposite of a promising economic policy. In the final analysis it only causes damage to all nations, despite apparent short-term advantages.

Europe's response must be to stand together and concentrate on common strengths", says Wissmann. The VDA president welcomes the CETA free trade agreement between the EU and Canada, stating: "CETA is strategically important and proves that Europe can take action." He adds that further agreements with ASEAN states and MERCOSUR countries would now be welcome. The signs from



*"Our facilities in all countries depend on open markets and free trade. We are therefore resolutely pursuing on an open and fair trade policy."*

Matthias Wissmann, President of the German Association of the Automotive Industry (VDA)

# Pace of Innovation

China concerning free trade are encouraging, he says, but there is still a lot of work to do.

In light of the current turbulence, the German automotive industry is seeking to maintain its position by going on the offensive with a comprehensive strategy which the VDA President summarises in ten points. "By 2020 Germany's automotive industry will treble the number of electric models it offers, from 30 at present to around 100. By as soon as 2019 electric drive will be present in virtually all series, in the form of plug-in hybrids or purely battery-driven vehicles. Second, in the period up to 2020, the German automotive industry will invest over EUR 40 billion in alternative powertrains. This represents a huge show of strength. For this outlay of billions must be generated from the current business, i.e. from the sale of vehicles with a combustion engine. We cannot - as some outside the industry think - simply exit a type of drive. Third, traditional drivetrains will continue to be developed alongside electric mobility. Reductions of ten to fifteen per cent in consumption are included. We are certain that petrol and diesel engine vehicles will continue to be used. The global passenger car market will increase to 91 million new cars by 2020. This means that the sale of combustion engine cars will increase even though there will be stronger growth in the proportion of electric vehicles.

## Efforts to Reduce the Environmental Burden

German manufacturers are also sending out a signal in respect of electric charging infrastructure: BMW, Daimler and Volkswagen with Audi & Porsche are planning a joint venture for an ultra-fast, high-power charging network along major motorways in Europe. Initially about 400 ultra-fast charging sites are planned.

Fifth, we are putting the finishing touches to the final "projects" in exhaust emissions: From 2017, more and more passenger cars with a direct-injection petrol engine will be equipped with a particulate filter. This will resolve the problem of particulates from petrol cars, which was eliminated in the case of diesel vehicles many years ago, with filters now fitted as standard. On the diesel front we are also forging ahead with the introduction of state-of-the-art SCR exhaust technology. By the end of 2019, 80 percent of newly-registered diesel passenger cars will already operate with SCR, and by the beginning of the next decade it will be in almost all newly registered diesel cars. This

means that the nitrogen oxide issue will finally be resolved. Seventh, we are backing petroleum-independent synthetic fuels. These can ensure CO<sub>2</sub>-neutral mobility even with combustion-powered vehicles, because these fuels bind just as much CO<sub>2</sub> during their production as they release when they are burned. While the costs of such fuels are still high, a "renaissance" for combustion engine vehicles is certainly still possible.

## Digitalisation Increases Apace

Eighth, we are investing 16 to 18 billion euros in digitalisation - which alongside electric mobility is the second major innovation trend - over the next three to four years. Ninth, the German automotive industry is already the world champion in patents for connected and automated driving. It holds 58 percent of all patents issued worldwide in this field since 2010 and we are seeking to build further on this position. And finally, we are developing innovative concepts for urban mobility to make it cleaner, safer, more reliable and more efficient. The German automotive industry is collaborating with selected towns and cities in this sphere. In addition, German manufacturers are expanding their car-sharing schemes both nationally and internationally.

However, the offensive strategy will only be successful if politicians smooth the way rather than block it and Germany works even harder to hone its competitive edge. There is an urgent need to strike a balance



Combination fluid filling during production of the Audi A3 at the company's Ingolstadt site.

between climate protection and industrial policy. "Germany is an industrial nation and envied worldwide for its prowess. If we are to maintain this position, climate policy must not remain the sole objective of policy-making. And it should certainly not be tackled by one country going it alone; the only solution is to pursue an international approach", emphasises VDA President Matthias Wissmann, adding: "What we require is a reasonable trade-off between climate policy and industrial policy, a policy with moderation, and with a view to creating employment."

■ [www.vda.de](http://www.vda.de)



Assembly finish of the BMW M2 Coupé at the Leipzig plant



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Inspiro trains from Siemens for two driverless underground lines in Riyadh (Saudi Arabia)

■ Railway 4.0:

# Digitalisation is Creating the Best ever Rail Mobility

Technology serves people. This claim applies in particular to the digitalisation of "made in Germany" rail technology. There is a demand for sustainable mobility worldwide: for better environmental protection, greater social participation, emission-free transport in mega cities, better quality in everyday life and efficient logistics. And the rail industry in Germany is delivering solutions. For it is blazing a trail globally in terms of technology and sees itself as a sustainable global partner. Large rail systems companies and numerous world-leading SMEs are working hand in hand. And the results of their endeavours are diversity, excellence, cost effectiveness, quality, open standards and sustainable global partnerships.

**R**ailway 4.0, as the concept is known in Germany, is a quantum leap. More climate-friendly, safer, more economical, quieter, and more comfortable - digitalisation is creating the best ever rail mobility.

And some of the technologies are "hidden champions." For example, predictive maintenance is revolutionising rail mobility: it is

©Alstom / Kasper Dudzic



Alstom Coradia's Nordic X60B train is operated on the Swedish capital's commuter network by the Storstockholms Lokaltrafik (SL) company.

now possible to anticipate faults digitally and rectify them before they occur. This wave of innovation is underpinned by data security and data analysis.

Every industrial nation is dependent on efficient, intermodal logistics. Digitalisation along the complete supply chain is based on harmonised data platforms. For example, geolocation can be used to precisely locate containers and constantly monitor their status. Arrival and departure times can be co-

ordinated intermodally and waiting times and costs avoided. Thanks to automation shunting services in particular will be more efficient in future. And digital technologies are also helping to make freight transport exceptionally quiet.

## Digitalisation is Facilitating Huge Increases in Capacity

Railway 4.0 requires Infrastructure 4.0. The goals are smarter traffic control, seam-



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The Trainguard MT Communications-Based Train Control (CBTC) rail automation technology installed on the New York Metro enables trains to run at intervals of 85 seconds.

less cross-border mobility, increased safety, predictive and energy-efficient driving. In short: the creation of a digital, interoperable rail system. And this will be achieved by the state of the art European Train Control System (ETCS), which has already been successfully deployed worldwide. This system enables the capacity of the existing infrastructure to be increased by around 40%.

The potential of digital control and safety technology can only be fully unlocked if electronic interlockings are integrated into the system. These are digital switching centres which electronically manage and monitor signals and points. Computers calculate who can drive where and when and communicate this information to rail vehicles. For example, electronic interlockings automatically regulate arrival and departure in railway stations and the timely closure of railway crossings.

The benefit of digitalisation for passengers is very clear. They can look forward to an enjoyable, swift, safe and affordable journey. State-of-the-art high-speed trains provide increasingly attractive and exceptionally reliable connections between metropolises. And whilst travelling passengers will enjoy infotainment, bespoke travel information and interruption-free internet connections. And these benefits will be available on short-distance services as well as on intercity trains. For such services to be offered the appropriate broadband infrastructure and on-board technology are required. Thanks to intermodal connection data the best routes are always available.

One of the biggest challenges we face is mobility in urban environments, and especially in the rapidly expanding megacities around the globe. The United Nations estimates that around 60 per cent of the world's population will be living in cities by 2030, rising to around 70 per cent by 2050. This means that more and more people will be moving within a more densely inhabited



©Bombardier Inc.

The TRAXX F140 multi-system (MS) / Re 486 locomotive is used by the Swiss firm BLS Cargo to provide freight services between Germany and Switzerland.

space in future. Without political intervention there is a risk of total gridlock in the world's metropolises. In all too many cities at present the focus on motorised private transport is resulting in a frustrating search for parking spaces, intolerable smog and horrendous congestion.

#### Energy and Cost Savings Thanks to Automation

There is a demand for entirely new mobility concepts around the globe. And these can be delivered by "engineered and made in Germany" digital railway technology. For example, fully-automated driving. This is already showcasing its potential on the railways today, from Nuremberg and Munich via Vancouver to London and Paris. Automation enables a significantly larger number of trains to be run, making local public rail transport more attractive. Furthermore, fully-automated, predictive operation can reduce the energy required hitherto by up to 30 per cent. For example, the electricity costs of metro line one in Paris were cut by 15 per cent thanks to Automatic Train Operation (ATO), while London's Dockland Light Railway uses roughly 30% less energy. That's 30 per cent more climate protection.

The German rail industry is the most innovative in the world, providing numerous benefits for operators, passengers and local residents and in terms of logistics. And because the German rail industry has an export ratio of more than 50%, it can build on sustainable partnerships around the globe. It is a matter of taking advantage of experiences in the world-leading market of Germany in other countries. Of defining best solutions together, be these bespoke or "good enough". And of generating, in a sustainable and fair manner, mutual benefit over the entire life cycle: through safe year-round maintenance, world-leading energy efficiency, low life-cycle costs, open standards and stable cooperation, for example by building skills locally based on the example of the dual training system.

More and more people around the world want sustainable mobility in their daily lives: more efficient, more reliable, more resource-efficient and more comfortable. With "Railway 4.0" the German rail industry is delivering the pioneering solutions that will make sustainable mobility a reality. And is implementing them worldwide in sustainable partnerships.

■ [www.bahnindustrie.info](http://www.bahnindustrie.info)



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The Velaro TR, and a contract from the Turkish state rail operator for the line between Ankara and Konya.

# A Proven Value Chain to Meet the



©Meyer Werft, Papenburg

The "Genting Dream" – another supreme example of shipbuilding expertise from the Meyer Werft Papenburg shipyard

The importance of a smoothly functioning value chain is demonstrated most clearly by the supreme shipbuilding disciplines, the construction of cruise liners and sophisticated naval vessels. The complexity of

these densely-built floating cities means clarification of the interfaces between the involved parties is especially important. And there are many involved parties for the proportion of third-party deliveries and services

can reach 80% in the case of a specialised ship compared with around 30% for a simple freight vessel. Therefore careful planning is essential from the outset and any change arising from the customer's requirements, regulations or technical knowledge triggers a chain reaction through half the ship. To meet this challenge whilst satisfying deadlines and budgetary requirements, the involved parties such as shipyard, suppliers, design firm and classification society must work systematically in close partnership in order to fully leverage expertise.

Foreign inventors have recognised that location Germany, with its uninterrupted value chain, possesses the ideal infrastructure and know-how for a long-term commitment and future development. The German maritime value chain, most of the players in which are SMEs, has a unique offer of more than 2800 companies, some of which specialise exclusively in the maritime field. A number even specialise exclusively in certain ship types such as yachts and cruise vessels. Others, on the other hand, leverage their technical expertise from equally sophisticated sectors such as the mining, wind power, green technology and oil and gas industries and have tailored their products to the specific conditions at sea and for the off-shore oil industry.

## A Clear Focus on Export Orders

With the exception of ships for German authorities and the German navy and individual vessels for German shipping companies, most ships in German shipyards are built for foreign customers. Furthermore, with an export ratio of around 75% most suppliers deliver to shipyards in Europe and the Far East. Most domestic orders are supplies for yachts, ferries, cruise vessels and naval vessels for foreign customers in German shipyards, and so ultimately are destined for export too. The German maritime industry therefore makes a significant contribution to Germany's status as export world champion.

According to the Federal Statistical Office, Germany had around 60 shipyards with over 50 employees last year, a number that has remained fairly steady in recent years. With their approximately 17,700 employees these shipyards generated a turnover of more than EUR 5.4 billion, with exports accounting for 67%. In addition there are around 200,000 employees in the supplier industry. German shipyards have diversified from the construction of standard ship types and have for some time been concentrating on the



©Lloyd Werft Bremerhaven

Cutting and lengthening ships is nothing new for Lloyd Werft Bremerhaven. The length of the DFDS ro-ro ferry "Primula Seaways" has been extended by inserting a 30-metre section in the middle.

# Highest Standards

manufacture of high-tech passenger ships, ferries, yachts and other special vessels.

German shipbuilding companies lead the way in the development of green technologies and offer pioneering solutions for projects with the highest quality standards. The intake in 2016 included orders for cruise liners and mega yachts as well as ferries and roll-on, roll-off vessels. Contracts were also awarded for service and government vessels and research ships. Most orders in 2016 were from foreign customers. In addition to ships, the order books of German shipyards also include offshore platforms.

## Successful Specialisation in the Global Marketplace

While volume shipbuilding is mired in crisis worldwide and the major shipbuilding nations struggle due to waning demand, German shipbuilders were able to report a further rise in order intake in 2016 thanks to

©Fassmer-Werft, Berne



Sea rescue vessels built in various German shipyards for use in the Baltic and North Seas have proven their mettle in extreme conditions in all areas.

their specialisation in sophisticated niche markets and accounted for almost 18% of the global order value. At the end of 2016 German order books were worth a new record high of EUR 18.5 billion.

Despite the sluggishness of orders worldwide, the German shipbuilding industry is constantly developing its expertise thanks to its endeavours in the fields of research, development and innovation. As a result German companies are in a position to deliver the bespoke solutions required by demanding customers for specific purposes. New, retrofitted and rebuilt vessels with innovative solutions ensure the efficiency, safety and sustainability of maritime transport.

■ [www.vsm.de](http://www.vsm.de)

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In 2016 Lürssen delivered the superyacht Dilbar, the world's largest yacht by volume.

©Nobiskrug



With the "Sailing Yacht A" Nobiskrug delivered the most advanced sail-assisted superyacht ever built, leading the way with her revolutionary engineering and design.

©Flensburger Schiffbau-Gesellschaft, mbH & Co. KG



The ro-ro vessel "Gardenia Seaways" built in Flensburg has capacity for 262 trailers.

# Lighter, Safer and Driverless Vehicles



An electric concept car at the world-leading K 2016 Fair in Düsseldorf highlighted the massive scope for the use of plastics in automotive construction.

For more and more companies, sustainability is far from being simply a buzzword. It has long been embedded in product strategy and forms part of everyday practice. This for good reason: The expectations, ideals and needs of consumers have changed hugely. Customers are increasingly sensitive to the consumption of resources. Ethical criteria are coming to play a key role in purchase decisions. For the plastics industry, the challenge is to come up with the right answers to these developments.

And it is working well, as plastics are significantly contributing to sustainability around the globe: in state-of-the-art insulation for construction, in shatterproof, protecting OLED displays for top-quality tablets, in heavy-duty rotor blades for wind turbines and in solar cells for the generation of renewable energy, as well as in under-the-hood and chassis components for innovative lightweight construction in the automotive sector. In the mobility sector, such components are essential for the automotive and aviation industry as they strive to meet sustainability targets. Every gramme of weight gain achieved saves energy and material and reduces emissions of CO<sub>2</sub>. In addition, the new dream of the self-driving car can only be achieved with plastics. This is because such vehicles need to be equipped with sensors, cameras and radar systems, which can wipe out painstakingly achieved weight advantages. As with battery-operated vehicles, lightweight materials have a key role to play in increasing range. „Made in Germany“ plastics are to the fore in these lightweight construction applications.

The mobility of the future requires high levels of safety and comfort, wide-ranging

energy efficiency and environment-friendly processes and products. At present the ever more stringent emission requirements around the globe are a key driver of research and development activities. Irrespective of whether a drive system is conventional or electric, lightweight construction plays a pivotal role in modern mobility – and plastics are essential as both mono and composite materials. Today the challenge in lightweight construction no longer lies in simply replacing a material with another lighter material in the same installation space but in finding the best possible material with the best characteristics for the desired function. Here hybrid materials such as combined plastics and metal components are playing an ever more vital role thanks to new adhesive-free joining technologies. These hybrid components are used to build lightweight and heavy-duty structures with a high functional density which perfectly combine the completely different material characteristics. Plastics make chassis elements lighter, enabling an innovative integration of functions in the exterior skin and improving the aerodynamics of many individual components.

In addition to meeting such technical re-

quirements, new materials must also offer attractive and varied surfaces in design-relevant components. Visible components of a vehicle are increasingly being evaluated by designers using stringent criteria in order to incorporate the character of the brand. Designer engine covers today, for example, are sometimes manufactured from glass fibre reinforced plastics, achieving huge savings in weight.

## Personalised Mobility

Vehicle interiors are changing, too. Traditional steering wheels are about to disappear while new control and display concepts are the consequence of electro-mobility, autonomous driving and connected cars. These are developments from which the plastics industry is benefiting too. Electric vehicles with adequate range are almost unimaginable without lightweight plastics components. In driverless cars the entire interior including surfaces and component design is coming to the fore. A merging of design and function is taking place. The car of the future will be a living room, a meeting room and a private space. And the interior of the vehicle must be adapted to these needs. Digital networking will be achieved using large-scale display, control and design elements such as those offered by functionalised plastic films. These allow lightweight

## Plastics Production in Germany

Within Europe, Germany remains the most significant location for plastic production. About a third of European plastic production comes from here. Worldwide too, Germany is one of the most important producer countries for plastic, with a share in global production of about seven percent. At the same time, Germany is also the largest plastics market in Europe, accounting for around a quarter of European demand. This also applies to 2016. Production grew by 4.3 percent compared with 2015. It stood at 19.2 million tonnes in 2016.

The most important customer for plastic in Germany is the packaging industry, accounting for about a third of demand. It is followed by the construction sector with 23 percent, the automotive sector with 11 percent and the electrical/electronics industry with about six percent. When it comes to export and import, the EU member states are of outstanding importance. They account for over 70 percent of exports and almost 80 percent of imports.

# Thanks to Plastics

premium-quality surfaces with built-in electronic components to be produced in the smallest space.

There is also a complete new level of freedom opening up in chassis design since electric vehicles require neither air cooling systems with radiator grill nor an exhaust system. This paves the way for large-scale seamless bodywork components manufactured from plastics into which many features can be integrated. It is a field in which German plastics researchers are working in close partnership with international scientists. For instance last year in Düsseldorf at the world's most important plastics fair K 2016, an electric concept car was unveiled which features a seamless design with homogeneous surfaces. This seamless design integrates the transparent A-pillars while the wrap-around glazing rewards passengers with a great panorama view. The front and back ends, which are also manufactured from plastics, feature not only integrated spots but also other film and LED-source lighting functions. In the future displays could provide pedestrians and other drivers with safety-relevant signals, and also the sensors required in autonomous vehicles for distance and speed measurement could be integrated.

## Boundless Diversity of Form

Another important development is the combination of lightweight design and additive manufacturing to become one of the

key technologies of the future. There are numerous fields of application to which 3D printing with plastics already contributes significant added value. One example in the medical sector is the printing of prosthetics, which in combination with a 3D measurement of the corresponding body part can be fully customised to the patient. 3D printing also offers manufacturers of mobility solutions the opportunity to produce custom manufactured parts even in combination with classic production methods.

Since last year, for example, a large manufacturer from the southern German region Baden-Wuerttemberg has been producing replacement parts at its truck division using 3D printers. The components produced by the printer such as spacers, mountings and cable conduits are of the same quality as those produced by conventional facilities but can be manufactured on a just-in-time basis and sometimes even directly where they are required. Other German carmakers are also constantly researching new attractive fields of application for 3D printing.

And it's a trend that is also reflected in the aviation industry. Today the widebody aircraft of leading suppliers consist of between 50% to 80% composite materials. And with the advent of 3D printing this percentage could increase still further. Thanks to the rapid development of 3D printing lightweight structures made from fibre-reinforced plastics can be increasingly complex and intricate, opening up completely new

©DLR Fotomedien



3D printing also increases the potential uses of plastic composites in the aviation industry.

opportunities for the sector. As part of its Additive Composite Structures (AddComS) research activities, the German Aerospace Center (DLR) in Cologne is looking at how 3D printing can be integrated into existing product technologies. And these investigations are already bearing fruit: in the form, for example, of plastics and plastics composite printed wing ribs for a solar HALE aircraft, a flying platform whose low weight enables it to be powered solely by solar energy from photovoltaic cells. And also of shape-changing structures in the control and landing flaps of aircraft wings, reducing fuel consumption.

It is already apparent that innovative additive manufacturing with plastics is facilitating the production of completely new components with complex geometries and a wide range of functions. Germany has the expertise and the networks between academia and the business sector to take full advantage of all the exciting possibilities that new and new combinations of materials for lightweight design offer. And the diversified German plastics value chain offers the ideal conditions in shaping this future: It has a high density of manufacturers, a large number of processors, a variety of user industries, the appropriate university landscape and regional centres of excellence with highly qualified materials specialists.

©University of Michigan Health System



Groundbreaking 3D printed plastics devices like this custom-designed splints help to keep babies' airways open.

**PlasticsEurope**  
Association of Plastics Manufacturers

PlasticsEurope Deutschland e.V. is the trade association of the plastics manufacturing industry in Germany and part of the pan-European PlasticsEurope association, which is based in Brussels. The association's headquarters for Central Europe, one of its five territorial regions, is located in Frankfurt am Main in Germany. In addition to Germany this region includes Austria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia and Switzerland. [www.plasticseurope.org](http://www.plasticseurope.org)



© Messe Berlin GmbH / Hans Scherhau

The German food industry offers customers a huge variety of high-quality products.

■ The German Food Industry

# A Valued International Trading Partner

With a 580,000-strong workforce employed by a total of 5,940 businesses and revenue of EUR 171 billion in 2016, the food and beverage industry is the third largest in Germany and a leading player in Europe. Germany's food and beverage industry is renowned for the quality and safety of its products, competitive prices and incomparable diversity, with its approximately 81 million customers in the country able to choose from over 170,000 products every day.

These characteristics mean demand for "made in Germany" food products is stronger than ever before in international markets, too. In the EU, good taste, provenance and price are seen as the chief strengths of German food, while in non-EU countries the German food industry has built its reputation above all on provenance. The sector is also appreciated overseas for its reliability and customer focus.

**The Food Industry - Centre of the Food Chain**  
As the country's third largest sector the food industry provides employment, stability and wealth in Germany. The sector which consists of 90 percent SME's is an especially important employer in rural areas. At the same time, it serves as a link between the

countryside and urban conurbations. The industry processes around 80 percent of Germany's agricultural products, thereby ensuring comprehensive security of supply. The incredible range of food products offered also enables the country's urban residents to enjoy an unlimited number of personal lifestyles.

As the centre of the food chain the food industry offers a diverse range of employment opportunities to the over five million

employees and almost 240,000 trainees in the sector. At the same time, it is closely interlinked with its partners in agriculture, trade, commerce and catering. In 2015 the approximately 705,000 businesses in the German food sector generated revenue of EUR 193 billion and accounted for around seven percent of total economic value added in Germany. The value of exports in 2015 reached a record level of more than EUR 69 billion.

© Kölnmesse



Numerous awards at international trade fairs attest to the innovative character and exceptional quality of the products.

## The German Food Market, Leading the Way Globally

The German food market is not just the largest in Europe but also one of the most sophisticated in the entire world. In addition to dealing with strong competitive pressure, stringent legal requirements and the very highest safety standards, the businesses in the sector must also cope with the growing expectations of German consumers with regard to food products. For most food is expected to do far more than simply fill their stomachs: products must taste good, be affordable and be available in the widest possible range – but above all they must also reflect individual eating habits and lifestyles. Germans are increasingly employed, mobile, flexible, international, interconnected and pressed for time. Whilst home coo-



Meat and meat-processing is one of the strongest segments of the German food industry in terms of exports.

very individual measures in their understanding of the quality of food products. According to a recent PwC survey consumers on certain product groups such as fruit and vegetables are increasingly opting for organic products. Nevertheless most of them choose a conventional product if they are offered better value for money and a wider selection. Half of Germans put mainly conventionally produced products in their shopping baskets and just one in seven consumers buys more organic than conventional products. One in five consumers buy no organic food products at all.

### Product Innovations are Constantly Creating New Market Segments

For food producers, these societal developments offer both challenges and opportunities: On the one hand the task of remaining competitive in the marketplace by mee-

ting the needs of consumers is becoming ever more complex. On the other, the changes in eating and consumption behaviour offer companies great scope for value creation. This has resulted in new products being brought to market at ever shorter intervals. The range of German food products increases by at least 40,000 every year and new market segments are constantly emerging: functional food, vegetarian, vegan, gluten-free, lactose-free, light and convenience products and also products with unique characteristics such as regional, seasonal, sustainable, fair trade and organic are widely available today. This product portfolio is becoming ever more specialised and complex. In this way, the food industry is able to offer all-round products tailored to the needs of every individual which are available at all times and in every price segment.

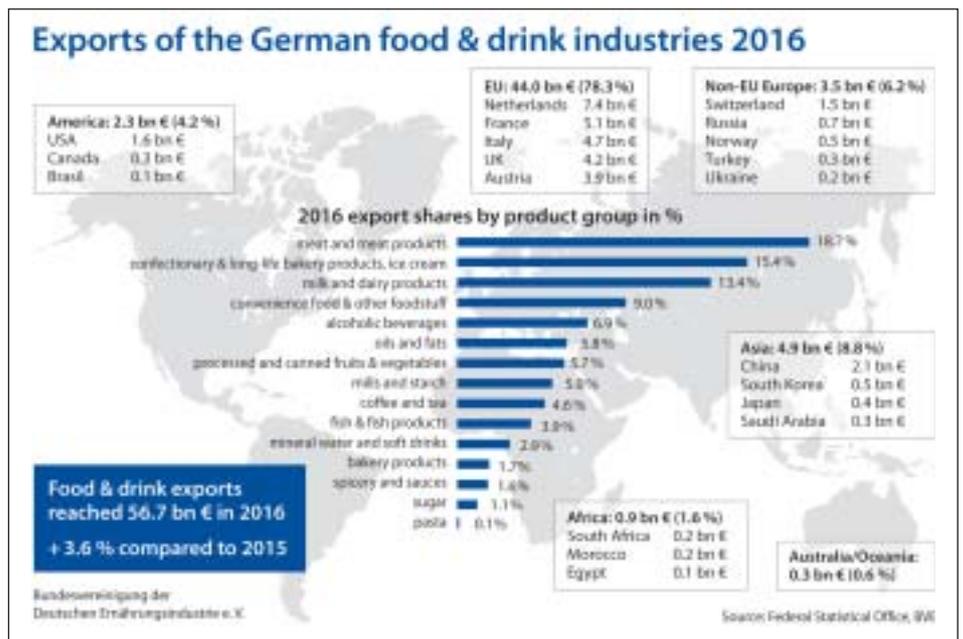
For although quality is coming to the fore



Milk and dairy products are much in demand in the German food and drink industry

king is becoming increasingly popular among consumers who are especially conscious of what they eat and sustainability-oriented, most people simply lack the time, the expertise or the desire to prepare their own meals. As a result, expenditure outside of the home accounts for a quarter of consumer spending on food today. In recent years, there has also been a rise in demand for convenience products.

And this change in cooking and eating habits has also been accompanied by a change in the consumption awareness of Germans: there is an increasing focus on the social purpose of food and nutrition, with individual lifestyles and views being expressed through eating behaviour. The proportion of consumers displaying greater awareness in their consumption has increased to 27 percent. Today quality ranks slightly higher than price as a purchase criterion, with Germans increasingly prepared to spend more money on high-quality food products. For 52 percent of consumers today quality is the key criterion ahead of price when buying food products. However, consumers employ





©Verband Deutscher Mineralbrunnen e.V. (VDM)

A huge selection of top quality mineral water offers healthy drinking pleasure.

as a purchase criterion, German consumers in general remain very price conscious. Only 25 percent of consumers are prepared to spend even 16 percent more for better quality. A one-person household spends an average of EUR 159 per month on food, while a four-person household spends EUR 500. This represents 10.5 percent of their disposable income. The food price level is slightly above the EU average.

**Consumers Seek More Information**

The increasing expectations of food products and their manufacturers are also reflected in a greater need for information among consumers. The interest in the provenance of food and how it is produced is burgeoning. And consumers get this information not just from packaging and product tests but increasingly from the producers themselves. A survey by the Federation of German Food and Drink Industries (BVE) and the AFC Consulting Group AG shows that 90 percent of companies have noted an increase in enquiries from consumers. Furthermore, a large majority of the firms consulted (88 percent) are finding that they are spending significantly more time dealing with these queries. Per day 51 percent of the companies received between one and ten enquiries, while 14 percent received more than 50. Almost 40 percent of food producers respond to customer enquiries within 24 hours while 56 percent do so within three days. Most queries concern differences in quality, labelling and packaging. In the future companies are also anticipating more queries regarding "sustainability".

The change in consumer behaviour, but also growing production costs, greater competitive pressure, the strong concentration in the food retail market and increasing internationalisation, have ramped up the pressure on German food producers, prompting them to concentrate on value creation. Through the scientific use of machinery and state-of-the-art technologies they have succeeded in steadily increasing food safety and quality, extending the range of products available

and improving their own capacity for innovation. With the help of technology and optimised production processes they have also achieved widespread security of supply and competitive prices in Germany. Targeted processing techniques, internal and external quality management, systematic controls, the use of specialist staff and the stringent regulation of products and production have also helped the German food industry to become established as an international market leader. Over the last 20 years the efficiency and output of the sector have risen by over a third.

**Exports are Driving Growth**

Owing to the tough domestic business environment - with rising production costs, fierce competition and a strong concentration in the food retail market - the companies in the German food sector have put exports at the heart of their sales strategies. For while increases in domestic turnover are determined only by prices, the international marketplace offers food producers huge scope for growth. In the long term, exports will ensure the survival of the mostly small and medium-sized enterprises in the sector, delivering wealth and employment. Today the sector earns one in three euros overseas. In 2016 the value of the German food industry's ex-

ports totalled a new record of EUR 56.7 billion, a year-on-year increase of 3.6 percent. The strongest export sectors of the German food industry are meat and meat processing, dairy and confectionery. The export ratio of these three sectors is almost 50 percent. In addition, German exports of alcoholic drinks and convenience food are also increasing.

**Challenges in the Global Arena**

Most German food exports (78 percent) are still destined for other EU countries due to the advantages of the internal market, shorter transportation routes and the similarity of consumer tastes. However, the increasing level of competition and market saturation are hindering further growth.

This means that manufacturers are becoming increasingly dependent on markets outside the EU - for example in Asia and in America - where consumer purchasing power is growing. Many companies have already recognised this potential, with the increase in exports to the Asian market in particular, making a key contribution to the strong export figures in 2016, offsetting the impact of the decline in the value of exports to other markets including Russia. In 2016 the value of German food exports to non-EU countries totalled EUR 12.3 billion.

However, further growth was hindered by factors including insufficient market access, increased competition, higher trade barriers, bureaucracy, economical and political crises, inadequate legal security and uncertainties with regard to exchange rates and trading partners. Small and medium sized enterprises in particular often lack the time and resources to develop exports out-side the EU, which can be a costly process.

In order to continue to compete successfully in the global arena and grow its market share, the industry requires specific export assistance in the form of expert and financial support as well as reliable and stable trading rules. With this in mind, the food industry is actively engaged in discussions with policy makers and is firmly committed to a more liberalised trade policy.

■ [www.bve-online.de](http://www.bve-online.de)



The highest quality control standards are employed in food production.

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# Internationally on Course for Growth

Ursula Geismann, Press Spokesperson of the German Association of Furniture Industry

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Modern sophisticated and delicate furniture looks like coming from the Mid-Century-Design from the 1950<sup>th</sup>

In 2016, the German furniture industry grew by 3.2 percent and achieved a new all-time high of 17.96 billion euros. The domestic furniture manufacturers thus achieved an increase in sales for the third year in succession. Especially after the successful year in 2015, it was not easy to produce a further increase at this high level in 2016. But with the innovation, quality and reliability of our companies we were successful both nationally and internationally.

The German producers are confident about 2017 also, because the underlying economic conditions remain good. In particular, further increases are expected in construction investments, which have a direct influence on the furniture industry due to corresponding demand for furniture.

The overall positive export development in the German furniture industry also continued in 2016. According to the available foreign trade results the industry's exports in the whole of 2016 amounted to 10.4 billion euros. With an increase of 1.3 percent

compared to the previous year, exports once again proved to be an important support for the domestic furniture industry. The share of exports has been increased continuously over the past ten years to its present 32 per-

cent. By comparison: In 2006, exports accounted for 24.6 percent. The positive economic trend in Europe was particularly important to the good result in the previous year. At the same time, the number of un-

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The German furniture industry has multipurpose furniture with a multifunctional character in stock for "living in a small space".



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The classic sofa is out. So-called long chairs or long-back chairs are, which invite you to relax comfortably in your own, private living room, are on the up.

certainly factors increased worldwide.

Furniture exports to EU countries increased in 2016 by an above-average 3 percent to 7.2 billion euros. The EU share of total exports rose to 69.8 percent. The most important importing countries for German furniture remain France with an export volume of 1.3 billion euros (+2.2% compared to the previous year), Switzerland with 1.2 billion euros (-0.2%) and Austria with 1 billion euros (+1.5%). Exports to the Netherlands pleasingly developed positively with 815 million euros (+8.6%) and to Belgium with 539 million euros (+2.3%), which now finally appear to have overcome their long-lasting weak phase. Positive developments



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One trend in 2017: The bed with plush baldachin for relaxed switching off.

were also registered in Central Europe – exports to Poland increased by 3.8 percent to 427 million euros and to the Czech Republic by 13.7 percent to 420 million euros. The southern European markets also recorded slight growths once again: Spain with plus 5.8 percent to 360 million euros and Italy with plus 2 percent to 341 million euros.

The British and US American market require special consideration in view of the Brexit and US presidency elections. With an export value of 750 million euros, last year Great Britain ranked 5th in the list of most important export markets of the German furniture industry. Exports across the Channel increased by 4.8 percent over the whole year in 2016, however, a reverse in the positive trend could be seen towards the end of the year. German furniture exports to the USA – currently in 7th place in the export ranking – reduced significantly in 2016 by 7.6 percent to 450 million euros.

The numerous crises around the world and increasing protectionist trends had a negative effect on the development of German furniture exports to countries outside the EU in 2016. For example, exports to China fell by 11.5 percent to 248 million euros, to Russia by 15.5 percent to 138 million euros and to the United Arab Emirates by 14.4 percent to 78 million euros. These uncertainty factors

will probably also have a damping effect on furniture exports to countries outside the EU in 2017.

German furniture imports in 2016 amounted to around 12.4 billion euros. Compared with the previous year, the value of imports thus increased by 2.1 percent. Eastern Europe remains the most important region of origin for imported furniture. Almost all Eastern European countries were able to develop their position during the past year. More than one quarter of all German furniture imports now come from the most important country of origin by far, Poland. The value of imports from here rose in 2016 by 7.4 percent to 3.1 billion euros. Imports from the Czech Republic increased by 12.7 percent to 1.6 billion euros, those from Hungary by 7.7 percent to 499 million euros and from Romania by 17.8 percent to 391 million euros. At the same time, imports from China – currently in 2nd place in the ranking of the most important supplier countries – fell by 0.6 percent to 1.8 billion euros. The classic Western European supplier countries also lost market shares in Germany: Italy with 783 million euros (-8.2%), Austria with 309 million euros (-8.1%) and France with 289 million euros (-12.5%). In 2016, the German export deficit for furniture climbed by 6.1 percent to around 2 billion euros.

#### At Home: Chilling out is in

Door shut and privacy. Retreating into one's own four walls continues. Events developing into political burdens cross the paths of the actually peaceable population,



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The up-and-coming new drinks culture is reflected in freshly interpreted bar furniture. It is about enjoying a dignified aperitif or digestif and not the consumption of large quantities of alcohol.

which has absolutely no interest in conflict. The “global generation” is internally a deserter, because harmony is particularly close to its heart. Along the lines of: “The world is too much for me, I’m all that I need! many people are unable to cope with the speed of events and with the phenomena themselves. Christmas was longed for last year as seldom before. Rising Christmas tree sales and high retail trade sales benefit from people’s yearning to withdraw, for being happy and making others happy, and for privacy. The speed of digitisation contributes towards this. For most people “chilling out” in their home is becoming and understandable and active demand.

So it is not surprising that much of current furniture has a nostalgic character. Because these designs have a time reference, come from a (supposedly) better time and are reliable like a good old friend. The furniture based on the mid-century design familiar to us since last season therefore continue to enjoy high demand. The so-called classics, that is to say furniture whose style is familiar to almost everyone in some way or other, also fit into this nostalgia image. Whether they are from the Bauhaus period or the 1950s, classics are experiencing a high level of popularity. They are stable in value, sustainable and durable. Indeed for some buyers they are even investments for generations, which can be passed on or bequeathed, in the same way as a luxury brand watch.

Alongside these, regional cultural topics that reflect certain traditions are noticeably popular. Above all, last year a strong Oktoberfest romanticism with corresponding style elements was found in the home segment. The cuckoo clock, the stag’s antlers, the wooden chair with sawn-out heart, the rustic open fireplace, ..., alongside fur fabric, Baroque, and indeed at times kitsch. Homeland design has acquired a cult character for many people.

You could almost say that “plush or purism” is the order of the day. However, the precise typical style is increasingly absent from the mainly individual selection, so that we must speak instead of an unconventional living style with non-uniform selected furniture and home accessories. In future we will live even more individually, diversely, personally. To feel more comfortable and at ease! Austerity and kitsch then also go together - like in real life.

### Security Culture Instead of Risk Society

Security is changing from a passive state into an active process. This is already very clear in buildings, where multiple protection door and window locks, automatic blinds and video surveillance are used. Inside the home it is controlling apps, which together with electrical appliances in the kitchen or water supply in the bathroom, control tem-



Natural and untreated materials are popular. Real wood and real leather impress due to their individuality and robustness.

perature, etc. Security covers the wish for control and freedom at the same time. Especially when it comes to freedom, however, critics warn of mountains of data, which the commercial analysts want to climb for their next advertising strategy. Amazon shows how consumers are already “bombarded” merely through simple interest.

We will live in a smaller space. Rural depopulation is unbroken and the high rents in cities are forcing us into smaller apartments. The former public space of towns and cities will become more private. Furniture will therefore once again become more multifunctional, compact and even smaller. At the imm cologne and LivingKitchen trade fairs there will be many offers with a multifunctional character. For most German and international manufacturers, the urbanisation megatrend is already present in the development of their new products. Micro and mini apartments need small, top-quality furniture.

The classic sofa is out. It used to be the 123 set, with a three-seater and two-seater sofa with matching easy chair that stood in most living rooms. The family on the sofas, the father on the easy chair, all facing the television. Cigarettes, beer and crisps completed the Saturday evening. Much has changed since then. It was followed by voluminous living landscapes, sometimes as corner combinations, then smaller two-seater sofas on which armrests and seat depths could be altered. The sofa models of the coming season are mainly characterised by versatility. On the one hand they tend to be subtle in their style and on the other hand they are extremely different. Whether a Récamier, or under the new name long chair, or a chaise longue, now a long back chair, an Ottoman, that is to say a chaise longue without backrest, now called a lounge sofa,

there are virtually no limits to choice and a great deal of variety is also in demand. Living behaviour has changed fundamentally.

The living room is losing its significance. Since the arrival of tablets, small transportable monitors and smartphones and their rapid spread, the central TV is losing its significance. Since open dining rooms docked onto the kitchen and living room, equipped with comfortable dining chairs made their mark, gatherings no longer move to the living room. The living room is becoming a place of private retreat. This is where relaxation and privateness are found. The long chair precisely meets the new need for a more comfortable and relaxed stance.

The bathroom and kitchen will become twins. Because the functional areas of living are increasingly becoming free from boundaries and are merging with each other, living will in general become more livable. The erstwhile bathroom as a hygiene room will become just as homey and comfortable, in the same way as the kitchen, as a functional room, acquired a cosy character. Washbasin or sink, elegant and smooth furniture fronts, material combinations of wood, glass and stone, and all with very functional LED lighting, so an aesthetic approach to the furniture elements for these once clearly different areas can already be seen today. In the meantime, even bathroom developers are discovering control with the help of apps. The bath tub fills with the desired water temperature and quantity, controlled from the car via the touch of a smartphone. In addition to hygiene, it is now the daily wellbeing routine, which now takes place in the homey bathroom.

People love living and their home. So in 2017 our industries are looking to the future with positive optimism.

■ [www.germanfurniture.de](http://www.germanfurniture.de)

# Well on the Way to Becoming Europe's

Germany remains the number one port of call in Europe for foreign companies: in a global survey of 505 companies by the consulting firm Ernst & Young on the attractiveness of the European economic area and current investments by foreign companies in Europe, 20 per cent of the firms consulted chose Germany as one of three top investment destinations worldwide. Only China and the USA stood ahead of Germany in the international destination ranking.

Despite the Brexit vote Great Britain remained slightly ahead in terms of the number of investments actually carried out by foreign companies last year - the number of investment projects rose by seven per cent in the UK to 1,144 while Germany posted a 12 per cent increase to 1,063. These were new record foreign direct investment figures for both countries. However, Great Britain profited above all from the willingness to invest of US companies, which traditionally favour the UK as a European investment destination. For the rest of the world, on the other hand, Germany is the top investment destination in Europe. If US companies are not factored in as investors, Germany reported 869 investment projects in 2016 (up 15 per cent year on year), ahead of Great Britain with 788 investments (an eight per cent increase). Since 2007 the number of investment projects carried out in Germany by foreign companies has more than tripled. Hubert Barth, Chairman of the Managing Board of Ernst & Young Germany, says of the findings: "Last year could represent a turning point: While Great Britain was able to defend its position as Europe's top investment destination, its rivals - in particular Germany and France - are steadily closing the gap. There is a strong case to be made



The number of companies setting up business in Berlin doubled in 2016 compared with 2014 to 126. And the strongest growing sector is the digital industry.

for Germany overtaking Great Britain as Europe's top investment destination this year."

## Germany Has the Best Image in Europe

While Great Britain remains just ahead of Germany in terms of the number of foreign direct investment projects, the Federal Republic has long since outshone the UK in terms of image. In a global survey conducted in March 2017, one in five managers rated Germany as one of the three most attractive investment destinations in the world. Only China (37 per cent) and the USA (33 per cent) ranked higher than Germany - two countries that are unassailable owing to their size and importance as sales markets for internationally active companies. Bernhard Lorentz, Government & Public Sector Leader for Germany, Switzerland and Austria at EY, states: "Despite Europe's political and economic problems Germany has become established as one of the world's most attractive destinations - German companies are highly successful in global markets and 'Made in Germany' products enjoy an outstanding reputation. As well as its highly skilled workforce, investors appreciate the political, social and legal security that Germany offers - these seemingly soft location factors are becoming increasingly important in light of the growing populism in Europe. In uncertain times they are a precious asset."

Almost one in two investment projects in Europe in 2016 were in the areas of sales and marketing - a proportion that rose to 67

per cent in Germany. This puts Germany at the top of the European ranking in this field ahead of Great Britain. In the area of investments in research and development Germany also leads the way, with the UK just behind in second place. In investments in industrial manufacturing, however, Germany is behind countries such as France, Great Britain and Russia.

## Overwhelming Praise for Location Germany

Although Germany fared slightly worse compared to last year in the eyes of investors in the evaluation of most location factors, seven in ten companies continue to praise Germany's location policy, with one in four responders rating it as exceptionally investor friendly. Around four in five managers rate location factors such as the skill levels of the workforce, transport infrastructure and the stable political and legal environment in Germany as attractive overall.

It is striking that companies which are already active in Germany - and whose opinions are therefore based on their own experiences - have a significantly more positive image of Germany than those which are not operating in the Federal Republic: whilst 79 per cent of the former group are positive about the location, just 57 per cent of companies which do not have business activities in Germany signal their approval.

Investment activity is again likely to be brisk in 2017 - above all because the proportion of companies wishing to make fresh



With new developments such as the "TechQuartier" FinTech hub, Frankfurt am Main is strengthening its position not just as Europe's leading financial centre.

# Top Destination for Investment

investment in Germany is significantly higher than the proportion that wish to relocate part of their business activity overseas from Germany. Of companies already active in Germany, 14 per cent are planning to relocate part of their business activity elsewhere while 37 per cent of companies already active here plan to bolster their presence, i.e. to establish additional business areas in Germany.

## Further Development from an Industrial to a Digital Location is Required

International investors believe that Germany is essentially heading in the right direction and that its appeal as a location will continue to increase over the coming years: 43 per cent of the managers surveyed expect the attractiveness of Germany to grow over the next three years, while just six per cent think it will diminish.

Germany's automotive sector remains its flagship industry: 39 per cent of the managers surveyed consider it to be a growth driver in Germany. In second place is information and communication technology, which is named by more than one in four managers. In third place with 23 per cent is environment technology, ahead of the energy sector and the pharmaceutical and biotech industry.

In order to maintain its ranking among foreign investors Germany must concentrate on forging ahead with the digitalisation of its industry and on the transition from the world's leading industrial and high-tech location to a leading global digital location. Although 70 per cent of the managers polled approve of the pursuit of digital business models in Germany, only 28 per cent are completely convinced that this is the right approach. According to Hubert Barth, Chairman of the Managing Board of Ernst & Young Germany: "Germany's future wealth,



In October 2016, the software firm Microsoft moved into its new German headquarters in Munich-Schwabing.



Hamburg is among the top ten most attractive cities in Germany. In the background is the Elbphilharmonie building, the new cultural emblem of the harbour city, which opened in January 2017.

its attractiveness as an investment location and employment in the years ahead will depend on the ability of our economy - and in particular of our leading sectors, the automotive and engineering industries - to maintain its competitive edge in the digital era."

Germany's advantages clearly lie in the area of pioneering products and services, based on the high skill levels of the labour force, the country's outstanding global reputation as a premium location and the close links between German university and non-university research institutions and major companies located here and active globally. On the other hand, especially wage-intensive areas, in which labour costs are a more important consideration than the skills of the employees, are set to steadily decline in Germany.

Within Europe, Germany continues to stand out as a beacon of calm - politically stable, pro-European and notably economically robust. The current economic success of German companies is beneficial for the continent as a whole: last year, the 651 investment projects carried out by German companies in other European countries created almost 48,000 jobs - conversely, investments by European companies in Germany created just 8,000 new positions. In 2016 one in five jobs created in Europe by foreign investors was created by a German company.

■ [www.ey.com](http://www.ey.com)

## Europe's Top Investment Destinations

### Number of investments by project type

Sales and marketing	
Germany	714
Great Britain	612
France	369
Spain	139
Belgium	107
Corporate head offices	
Great Britain	106
Germany	35
The Netherlands	26
Ireland	23
France	15
Research and development	
Germany	66
Great Britain	63
France	50
Spain	29
Ireland	27
Manufacturing	
France	212
Great Britain	160
Russia	136
Germany	129
Poland	119
Logistics	
Great Britain	102
France	81
Germany	64
Spain	53
Belgium	40

# Cologne – City with Tradition and Character



One of the finest panorama views in Germany – a look at the world famous Cologne Cathedral

Cologne is a city with tradition and character. 17 million people within a radius of 100 kilometres stand for marketability and potential customers. Cologne, the fourth largest city and the third largest industrial region in Germany with one million inhabitants, is situated right in the centre of the European market.

**F**antastic location and perfect logistics are its trademarks. Three international airports can be reached in less than an hour from the city-centre: Cologne/Bonn (12 minutes), Düsseldorf (20 minutes) and Frankfurt (48 minutes). The airport is the central location for cheap airlines in Germany and offers long-haul flights at low-cost prices with Eurowings. UPS, FedEx and DHL guarantee efficient air freight turnover seven days a week round the clock with their hubs. International high-speed trains connect Cologne to Amsterdam (2 hours 37 minutes), Brussels (1 hour 48 minutes) and Paris (3 hours 14 minutes). Cologne's ports are the second largest inland port in Germany.

Pioneering industry for the future plays in the premiere league here. Among others, Ford is the city's largest employer with its European headquarters and one of Europe's most state-of-the-art car factories and Deutz has been supplying engines to the whole world since 1862. The Cologne region is a

centre for international automobile manufacturers with distribution centres for DAF, Mazda, Nissan, PSA Peugeot Citroën, Renault, Toyota Deutschland and Volvo. "Secret" market leaders in the SME sector, such as Alfred H. Schütte, Felix Böttcher, Igus, Leybold, Rimowa, Schwarze-Robitec and Sonderhoff are also at home here.

The healthcare and life science sectors make Cologne into the nerve centre of an outstanding health region where the spectrum ranges from basic research to training specialists and specific services in prevention, diagnostics and rehabilitation. Cologne is among the top international locations for research on aging. Growing biotechnology and major companies like Lanxess, Ineos and Bayer provide important dynamics for Europe's third largest chemical region.

As Germany's film and television capital, Cologne is the heart of North Rhine-Westphalia's media landscape. The cathedral city is just as much a top address for gaming, the Internet industry, telecommunications, publishing and start-ups. Cologne has become a digital capital. Numerous stakeholders, a diverse range of education and training on offer and a number of events make Cologne the perfect location for a company of any size.

Koelnmesse, the sixth largest exhibition centre in the world, presents about 90 per cent of the globally produced export goods to roughly two million buyers from all over

the world. Anuga, Art Cologne, Asia-Pacific-Sourcing, Gamescom, Intermot, International Hardware Fair, Imm cologne and Photokina are world fairs. And with the Hudson's Bay Company/Kaufhof and Rewe Group, two of the most important international retail groups are at home in Cologne.

Science and research are superbly positioned in Cologne. The University of Cologne is one of the country's few universities of excellence. Additionally there are other sometimes unique institutions, such as the German Sport University Cologne, the Academy of Media Arts Cologne, the Hochschule für Musik und Tanz and the TH Köln/University of Applied Sciences. Roughly 100,000 students and researchers in all disciplines shape Cologne as a science location. The German Aerospace Center, four Max Planck institutes and companies such as TÜV Rheinland guarantee the most innovative research results for the challenges of the future.

A company's success very much depends on its employees. Cologne offers highly qualified, motivated, and conscientious specialists. And through a combination of on- and off-the-job training in Germany's so-called dual education system, hiring and training costs are reduced and recruitment risks minimized. In addition, there are different models of employment, providing investors with flexible employment solutions – especially in the starting phase of the business. Recruitment services are offered by the Federal Employment Agency in Cologne, which provides its services free of charge.

The City of Cologne's Office of Economic Development offers comprehensive services ranging from the initial steps to setting up business operations. It provides support services from site selection to arranging contacts with relevant public administration departments, industry and business associations as well as key networks. Furthermore, it provides interested companies public support regarding visas, work permits and approval processes. All services offered are free of charge.

Cologne's cathedral, the most visited monument in Germany, is a real crowd puller. The Cologne lifestyle complements the hard location factors and makes the city a lovely place to live – temporarily or permanently. People from more than 180 nations and over 250 different cultures make the city a cosmopolitan metropolis that is characterised by tolerance, a love of life and a distinctly welcoming culture. A wide range of attractive shopping opportunities and top events such as the Cologne Carnival, Cologne Lights or Christmas markets attract millions of people to the city on the Rhine every year.

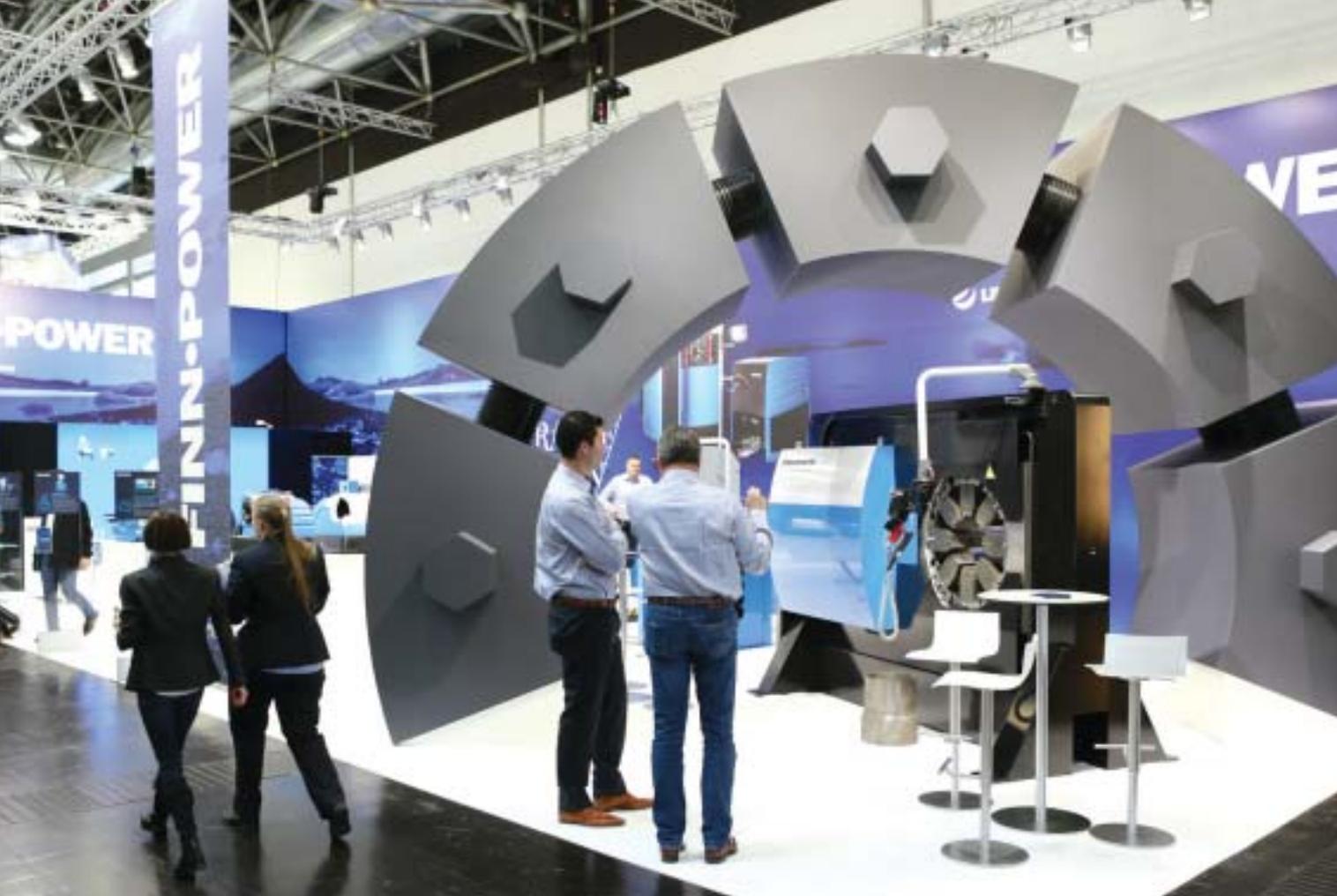


# And when can we welcome you to Cologne?

The key success factor for the economic location of Cologne is its central situation at the heart of the European single market. Within a radius of 100 kilometres of the city, you can reach 17 million potential customers and thus far more than in most of the other European metropolises. Whether by land, on water or in the air – Cologne offers the fastest possible connections in all directions. For example, with the airports in Frankfurt and Düsseldorf, as well as Cologne Bonn Airport, no less than three international airports can be reached in less than an hour. Cologne Bonn as a hub of the low-cost airlines is particularly interesting for costconscious companies.

Cologne's infrastructure, its balanced mix of industries and its higher education scene, as well as its art and culture, have already convinced companies like Berner Group, Eurowings, FedEx, Hudson's Bay Company, Kienbaum, Lanxess, Mitsui Sumitomo Insurance, PSA Peugeot Citroën, SCOR, UPS, Volvo or Zurich.

As a multicultural metropolis in which over 30 percent of the men and women who live here have other national backgrounds, Cologne makes it easy for people and companies from all over the world to quickly feel at home. See for yourself.



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■ The German Exhibition Industry

# German Trade Fairs – Attractive for Participants from around the Globe

By Dr Peter Neven, Managing Director of the Association of the German Trade Fair Industry (AUMA)

Even in the age of digitalisation companies from around the world take part in trade fairs. Why is this? The main reason is the same as it was 10 or 100 years ago and it's hardly surprising: because trade fairs offer the opportunity to make face-to-face contact with current and potential customers.

In a representative survey by the Association of the German Trade Fair Industry over 80% of the German companies polled said that they took part in trade fairs primarily in order to win new customers and foster relationships with existing ones. These are the two most frequently cited goals. And most of the other goals pursued by exhibitors are

also related to personal communication: from the showcasing of new products through the acquisition of new partners to the nurturing of media contacts. The closing of sales and contracts was a goal pursued by

two thirds of exhibitors. In addition, around 20% of exhibitors look for new employees at trade fairs, which is twice as many as ten years ago. The ultimately anonymous online world clearly has limitations at least in

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*“Foreign companies in particular are increasingly using German trade fairs to showcase their virtues - attracted above all by the broad range of international visitors that extends far beyond Europe’s frontiers.”*

Dr Peter Neven, Managing Director of the Association of the German Trade Fair Industry (AUMA)

terms of B2B communication, which means there is still scope for trade fairs to develop further. There is no sense of crisis in the German trade fair industry at present, or at least not in terms of competition between instruments.

2016 was a very strong year for international and domestic trade fairs in Germany: some 191,000 exhibitors took part in 186 trade fairs, booking over 7.5 million m<sup>2</sup> of stand space. The previous record of 181,000 exhibitors was registered in 2012, which was also the benchmark year for stand space with 7.1 million m<sup>2</sup>. The visitor number of around 10.5 million in 2016 has only been surpassed once, in 2001, when 10.7 million visitors were recorded. The reason for this strong turnout is the exceptionally strong trade fair programme in 2016, which had an unusually high convergence of major trade fairs that are held at three or four-year intervals.

In addition, the individual trade fairs have posted steady year on year growth in recent years - notwithstanding the strong competition from other marketing instruments and the often uncertain economic backdrop. This also applied to 2016, when the 186 trade fairs posted around a 1% year-on-year increase in exhibitors and stand space, with only visitor numbers remaining constant. Foreign companies in particular are increasingly using German trade fairs to showcase

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German trade fairs are also successful in the international arena. The number of exhibitors at analytica Vietnam 2017, for example, was up 15 per cent compared with the 2015 edition. The exhibition area increased by the same percentage.

their virtues - attracted above all by the broad range of international visitors that extends far beyond Europe's frontiers. The total number of international exhibitors in Germany increased by 4% in 2016. Most of these companies came from China, followed

by Italy. However, the other large and medium-sized countries in the European Union and the USA are also in the top ten. Eleventh and twelfth positions in the ranking are occupied by Turkey and India.

Naturally, German companies also remain

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Industrial Automation is one of the seven international leading trade fairs staged by HANNOVER MESSE, with a wider range of themes and exhibits than any other event in the world.

strongly committed to trade fairs and are now devoting 45% of their B2B communication budgets to trade fair appearances, a 3 per cent rise compared with a decade ago. For the 159 exhibitions planned in 2017, AUMA once again forecasts stable to slightly higher numbers of exhibitors and visitors compared with previous years.

The future prospects of the trade fair as a marketing tool are clearly bright, with over three quarters of companies expecting the importance of trade fairs to remain stable or grow over the next five years, while 22% expect them to diminish in importance. Almost none (1%) intend to stop participating in exhibitions in the future.

### The Trade Fair Industry Needs Free International Trade

The further positive development of German trade fairs could also be affected by current developments with regard to global trade. At some exhibitions, international participants serve a decorative purpose rather than shape the character of the event. In Germany, however, 60% of exhibitors and 35% of trade visitors are from other countries on average. This means German trade fairs are largely independent of national sector trends and of periods of weakness for branches of industry in Germany. This position as a stable global market is largely dependent, however, on international trade re-



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International machinery and equipment manufacturers, the largest group of exhibitors at the world's premier trade fair for the plastics and rubber industry K 2016, presented an abundance of world premiers.

## German Exhibition Centers Invest in Quality

German exhibition centers seek to invest more than €1.2 billion in their facilities by the year 2022, primarily in modernizing their halls and, to a certain extent, in expansion as well. Further investments are planned for infrastructure and catering. Growing demands on sustainability and energy efficiency will play key roles here. These are the results of a survey carried out by the Association of the German Trade Fair Industry (AUMA) in February 2017 of 25 exhibition centers of national and international significance. Existing hall capacities of 2,795,509 m<sup>2</sup> are to be expanded by a total of around 55,000 m<sup>2</sup>, representing an increase of 2% over five years.

In 2016, German trade fair companies invested a good €250 million in their exhibition and conference capacities, especially in the renovation and technical modernization of existing facilities. The capacities remained largely the same as the year before.

An AUMA survey in 2017 showed that exhibition centers of regional significance have a total hall floor space of 381,815 m<sup>2</sup>, which means that Germany currently has nearly 3.2 million m<sup>2</sup> of hall space available for exhibitions.

Trade Fairs in Germany 2017		
Exhibition capacities* gross in sq. m.		
Location	Halls	Outdoor
Hannover	451,165	58,000
Frankfurt/M	386,637	59,508
Cologne	284,000	100,000
Düsseldorf	261,817	43,000
Munich Exp. Center	180,000	425,000
Berlin ExpoCenter City	170,000	157,000
Nuremberg	170,000	50,000
Leipzig	111,300	10,000
Essen	110,000	30,000
Stuttgart	105,200	40,000
Hamburg	86,465	10,000
Friedrichshafen	86,200	15,160
Düsseldorf	78,000	
Dortmund	59,735	
Karlsruhe	52,000	62,000
Augsburg	40,250	10,000
Bonn	39,000	100,000
Erfurt	25,070	21,600
Offenburg	22,570	37,877
Freiburg	21,500	81,000
Offenbach	20,100	
Berlin ExpoCenter Airport	20,000	57,000
CheerMe! Messe	11,000	8,000
Idar-Oberstein	6,000	1,000
Hesum	5,500	50,500

\* Status: 1.1.2017  
\* Locations with at least one event according to AUMA categories International or national events

maintaining as free as possible of tariff and non-tariff barriers.

So it is all the more worrying that an increasing number of countries are considering or making concrete plans to protect their domestic economies from high imports. This could have a lasting impact on prosperity for all parties. For only very rarely does using the products and technologies of other countries cause damage in a country. Accordingly, German business and the German trade fair industry are staunchly committed to ensuring that Germany remains a strong



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German trade fair venues invest huge amounts in upgrading and expanding their exhibition capacities and infrastructure. Photo: NürnbergConvention Center NCC West

export country. This also means strengthening the "Made in Germany" brand, which is a key selling point for small- and medium-sized enterprises.

German industry is prepared to continue to position itself as a supplier of premium quality in the international marketplace. And German trade fairs are well placed to help in this regard thanks to the large numbers of international exhibitors and visitors that they attract. Therefore the German trade fair industry is very much in favour of ensuring the freest possible trading conditions between individual countries and economic regions. Tariffs and non-tariff trade barriers should be further reduced as far as possible.

Because German trade fairs are becoming ever more attractive to international visitors: in 2016 the number of visitors converging on German trade fairs in search of information and to forge business relationships topped the three-million mark for the first time. And well over half a million visitors travelled from countries outside Europe, in particular from South and East Asia and from North and South America. What's more, German trade fairs also attract participants from Africa and the Near and Middle East. But amid all this success



©thyssenkrupp Industrial Solutions

Exhibitors at bauma 2016 in Munich included the Industrial Solutions business area of thyssenkrupp, which showcased numerous new products as a leading partner for the engineering, construction and service of all industrial plants and systems.

# Succeed with us all over the world Small extract 2017 >>

## BRAZIL

### TUBOTECH 2017

9th International Trade Fair for Tubes and Pipes, Valves, Pumps, Fittings and Components  
Sao Paulo, 03 – 05 October 2017

### wire South America 2017

International Wire and Cable Fair  
Sao Paulo, 03 – 05 October 2017

## CHINA

### Valve World Asia 2017

The International Exhibition and Conference on Valve Industry  
Suzhou, 20 – 21 September 2017

### swop 2017

Processing & Packaging  
Shanghai, 07 – 10 November 2017

## IRAN

### IRAN PLAST 2017

The 11th International Exhibition of Plastics, Rubber, Machinery & Equipment  
Tehran, 24 – 27 September 2017

### pacprocess TEHRAN 2017

Processing & Packaging  
Tehran, 12 – 15 October 2017

### IRAN WIRE 2017

International Exhibition for the Wire & Cable, Rod and Tube Industry  
Teheran, 05 – 08 December 2017

## INDIA

### food pex India 2017

Processing & Packaging  
New Delhi, 26 – 28 October 2017

### indiapack 2017

Processing & Packaging  
New Delhi, 26 – 28 October 2017

### pacprocess India 2017

Processing & Packaging  
New Delhi, 26 – 28 October 2017

## RUSSIA

### CPM Herbst 2017

Collection Premiere Moscow  
Moscow, 30 August – 2 September 2017

### interplastica Kazan 2017

3rd International Trade Fair Plastics and Rubber  
Kazan/Tatarstan, 6 – 8 September 2017

### CHEMIE 2017

20th International Trade Fair for the Chemical Industry  
Moscow, 23 – 26 October 2017

We are there where you need us  
– all over the world.

[www.messe-duesseldorf.de](http://www.messe-duesseldorf.de)

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P.O. Box 10 10 06 \_ 40001 Düsseldorf \_ Germany  
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German trade fair organisers are also making sure they keep a close eye on the digitalisation of the world, aware that there is also significant scope for the simplification and acceleration of many trade fair processes.

### One-stop Analogue and Digital Services

For trade fair organisers it is vital to achieve the optimum blend of online and offline services in the future. Naturally their

expertise in the staging of trade fairs is beyond dispute; however, when it comes to online trade fair-related services there are many established rivals with online experience from other business areas, from media houses to booking portals. A number of trade fair organisers have therefore now started creating their own business units or subsidiaries with a view to securing business with exhibitors and visitors beyond the staging of trade fairs. Such one-stop offerings

have already demonstrated their worth in analogue services. For in the run-up to a trade fair participation an exhibitor already has enough different partners to deal with. In this way a trade fair organiser can become a brand synonymous with high quality standards beyond the staging of trade fairs – so for digital products too.

■ [www.auma.de](http://www.auma.de)

## A Journey into the World of Energy Today and in the Future



©Hamburg Messe und Congress (2)

On 10 June the International Specialised Exhibition EXPO 2017 got underway in Kazakhstan's capital Astana. The so-called small "specialised" EXPO between the World EXPOs in Milan in 2015 and Dubai in 2020, and whose main theme is "Energy of the Future", runs until 10 September and will showcase an array of ideas and measures for global sustainability. Around 110 nations, organisations and companies are taking part in this first World Exhibition in Central Asia, which is expected to attract some five million visitors. Under the "Energy on Track" banner the Federal Republic of Germany will present ideas and innovations related to the production, storage and distribution of sustainable energy over an exhibition area of 1,700 m<sup>2</sup>, using tried and tested examples. The world's fourth most powerful economy will make clear that it is moving in the right direction following the energy transition of 2008 and will also present itself as a cosmopolitan and friendly guest country with a passion for innovation. The German exhibition will be headed by the Federal Ministry for Economic Affairs and Energy (BMWi) and has been organised by Hamburg Messe und Congress GmbH. The consortium formed by the creative agency "insglück", the architect firm "gtp2 architekten" and mac trade fair and exhibition service is responsible for the content concept.

### The Theme of Energy – as Crucial as Ever

What does life tomorrow look like? How will we live? What means of transport will we use in the future? And where will all the energy required come from? The German Pavilion at EXPO 2017 has the answers to all these and other questions. Even before entering the Pavilion, the visitor meets the German federal states in the entrance passage, where displays and short films provide information on their regenerative energy production projects and highlight their tourist attractions. In this way visitors are familiarised with Germany and its diversity and also gain insights into the theme of the Pavilion – the "made in Germany" energy transition. Fascinating photographs of nature give an impression of the enormous potential of the five regenerative energy sources. In the first exhibition area, a giant map entitled the "Map of the Future" shows the changing world. Here the visitor can see five exhibits spanning the themes of wind power, solar energy, hydro power, geothermal energy and biomass. A so-called SmartStick, programmed in the visitor's language, can be used through-

out a visit to activate and interact with the individual exhibits: a wind farm with a control centre, a solar farm with the latest solar cells, a water turbine and virtual boreholes for geothermal energy production. The Smart Grid exhibit area focuses on the benefits of intelligent networks. Through a fun group experience, the interactive table conveys one of the main requirements of a modern network: that production and consumption are in balance. Visitors experience how the intelligent network reacts to different situations: no matter how much electricity is required, no matter whether it is generated by the wind or sun – electricity is always available without fossil fuels. The goal is to combine interaction and entertainment, in this way conveying knowledge in a playful and engaging manner. In the second exhibition area, the "City of the Future", the German Pavilion focuses on people's immediate living environments. Here mobility, energy production and efficiency and resource conservation are the key themes. All the exhibits demonstrate what German industry and research have already achieved or are in the process of accomplishing. In the Future of Mobility area visitors find out how the energy transition will impact the life of every individual for the better and about vehicles and technologies and their technical characteristics. The "Efficiency House Plus" exhibit shows how houses can already generate more energy than they consume. The exact reproduction of an algae bioreactor in the form of an algae facade illustrates that algae are no longer just found in the sea and how they can have a visible impact on the daily lives of every individual. Water purification, heat generation and algae foam as biomass for the production of foodstuffs and cosmetics – all these things are no longer the stuff of science fiction but a reality in a building in Hamburg.

### It's Show Time

A tour of the German Pavilion is rounded off by the "Energy Show". For the show, 40 visitors gather around a projection table in a 12-cornered room, where the SmartPoints on all the visitors' SmartSticks are combined to start a spectacular five-minute laser show. Naturally the show is combined with a clear message: namely, that everyone has a significant role to play in the energy transition, and by drawing on their knowledge and experience people can change the world for the better together.

■ [www.expo2017-deutschland.de/eu/](http://www.expo2017-deutschland.de/eu/)



Visitors to the German Pavilion look at the Map of the Future

# Trendsetter worldwide

The NürnbergMesse Group has entered 2017 with great momentum and has successfully completed the first half year. The previous year, for the first time in their corporate history, the exhibition company achieved a turnover of more than 275 mill. Euro. “Our classic core business – namely trade fairs, exhibitions and congresses, both in Nuremberg and worldwide – is the foundation for this dynamic corporate development”, states Dr Roland Fleck (one of the NürnbergMesse Group CEOs). The theme for 2017 is new events setting trends around the globe.

## A successful decade in China

The NürnbergMesse Group is active around the world through its five subsidiaries and international representatives, currently operating in a total of 115 countries. In March, NürnbergMesse China celebrated its tenth anniversary. With 30 employees, this subsidiary is organizing trade fairs and congresses in Shanghai on the topics that motivate the young, aspiring nation of China: e-mobility (SAECCE), lifestyle (CRAFT BEER CHINA and GREENERY AND LANDSCAPING CHINA) along with healthy nutrition (BIOFACH CHINA).

## New events in Nuremberg and worldwide

With the focus on the hot topics of our times, nine new events organized by NürnbergMesse, six of them abroad, are being launched or have already been held for the first time in 2017. Net.Law.S (law, society and industry in the digital world), U.T.SEC

(unmanned technologies and safety) and MT-CONNECT (medical technology) have already celebrated their premieres in Nuremberg. Lifestyle and sport are the themes of the Brasil Cycle Fair (bicycles) and the URB (skate-boarding, street wear and trainers) staged by the Brazilian subsidiary. In India,

NürnbergMesse is organizing the FIRE & SECURITY INDIA EXPO (fire protection and building security) and the Broadcast India Show (film and television technology) for the first time. The GREENERY & LANDSCAPING CHINA trade fair, an offshoot of GaLaBau, the International Leading Trade Fair for Urban Green and Open Spaces, is being held in Shanghai. NürnbergMesse Italia is celebrating its first own event, CRAFT BEER ITALY in Milan, which is presenting technology for craft brewers. “Overall, these events are creating new, tailor-made distribution platforms for our customers – customized exactly to the respective sectors and target countries”, states CEO Peter Ottmann.

## Spectacular exhibition architecture: the new Hall 3C

Meanwhile, at the home location, a further exhibition hall is being built according to the plans drawn up by the world-renowned architects Zaha Hadid from London. The new Hall 3C with exhibition space of approximately 10,000 square metres is being constructed according to the same high quality and energy standards that already have been applied to Hall 3A. The new jewel in the crown is scheduled for completion in 2018.

■ [www.nuernbergmesse.de](http://www.nuernbergmesse.de)

©NürnbergMesse, Heiko Stahl



Hall 3A was designed by the world-renowned architects Zaha Hadid from London

©NürnbergMesse, Jan Schreitzow



The CEOs of the NürnbergMesse Group, Peter Ottmann (left) and Dr Roland Fleck

# Tourism from Abroad again Reaching



A popular tourist destination: Heidelberg Palace

©Achim Mende/Heidelberg Marketing GmbH

major tourist destinations in Europe. Even under difficult conditions, we were able to defend our place as a top destination for cultural and city trips, number 1 for Europeans.”

While holidays remain a strong market segment, with 55 percent of all trips from Europe to Germany (+3 percent in comparison to the previous year), Germany is the number 1 destination for Europeans when it comes to city trips. 12.1 million city trips indicate a strong increase of 25 percent in 2016. Germany also staked its claim as a leading destination for business trips in Europe, with 12.8 million trips out of a total of 60.5 million business trips.

Based on the votes of international tourists in Germany in 2016, the Miniatur Wunderland Hamburg is the new top destination, followed by Heidelberg’s old town and castle and Europa Park in Rust (last year’s winner). Miniatur Wunderland in Hamburg – the largest model railway in the world – opened in 2001. It has detailed models of central Germany and the Harz region, including an ICE route with 130 trains. The small town of Knuffingen is also part of Miniatur Wunderland, a representation of the South German automotive centres with 90 driving cars. Knuffingen even got its own airport six years ago, where 40 airplanes take off and land. The Miniatur Wunderland has expanded over the past 15 years with new “worlds” – most recently, an Italy section over 190 square metres. The fascinating miniature reproductions attract 1.3 million visitors from all over the world each year. The castle and old town of Heidelberg have been favourites in the ranking for years.

**Germany’s attractiveness as a travel destination continues: for the first time, the German incoming tourism registered more than 80 million overnight stays by foreign guests in 2016. That is the seventh record-breaking result in a row.**

Overnight stays in accommodation establishments with at least 10 beds went up by 1.1 million in comparison to the previous year, according to the Federal Statistics Office. That corresponds to an increase of 1.4 percent in German incoming volume compared to 2015. Europe remained the strongest source of revenue in 2016 with a market share of 73.7 percent (an increase of 1.9 percent). Asia went down by 1.1 percent compared to the previous year, while America increased slightly by 1.2 percent.

Overnight stays from the USA were the largest overseas market for incoming tourists to Germany, with an increase of 2.5 percent compared to the previous year. Overnight stays by Chinese guests in Germany went up by 1.6 percent; India generated an increase of 8.1 percent and 5.8 percent more overnight stays were registered for guests from South Korea. Overnight stays from the Arab Gulf states and Japan, on the other hand, went down.

## Longer Holidays and City Trips Remain the Drivers of Growth

According to the current assessments of the World Travel Monitor by the market-research institute IPK International, Germany’s 53.7 million trips from Europe put it in se-

cond place behind Spain (62.5 million trips) for the top travel destinations of Europeans, followed by France (37.6 million trips), Italy (36.5 million trips) and Austria (27.5 million trips). Petra Hedorfer, Chairman of the Board of the German National Tourist Board (GNTB), noted that “Germany is superbly positioned as a brand in the top group of the



©Miniatur Wunderland Hamburg

Miniatur Wunderland in Hamburg, the largest model railway in the world, became Germany’s most popular attraction in 2016.

# Record Levels

The same is true of Europa Park in Rust, the flagship German amusement park. The newest highlight among the over 100 attractions and shows is the "Voletarium", which opened in 2017. The largest "flying theatre" in Europe takes its passengers to the most beautiful and fascinating places on the continent.

Other attractions that have been traditionally popular among guests from abroad include Neuschwanstein Castle, the old town of Rothenburg ob der Tauber, Lake Constance with the Island of Mainau, and two UNESCO World Heritage Sites: the monastic island of Reichenau and the Cologne Cathedral. Other places that have increased in popularity among visitors – and pushed their way into the favourite sites in Germany – include Mannheim Palace, the Ulm Minster and the old town of Dresden with its Frauenkirche and Zwinger.

## On eight Routes on the Footsteps of Luther

The tourism year 2017 is a highlight of the Luther Decade; there are eight different routes that follow the traces of Martin Luther under the banner of the theme, "Luther 2017 – 500 years of Reformation in Germany". They relate to Martin Luther as a symbolic figure, aimed at getting culturally and religiously motivated travellers excited about Germany. GNTB Chairwoman Petra Hedorfer said: "Germany is firmly established as the number 1 cultural destination for Europeans. With our activities in the Luther Decade and the anniversary of the Reformation, we are also addressing the 400 million Protestants around the world who feel connected to the heritage of the Reformation. The campaign presents a modern image of Germany and adds additional accents in order to further increase Germany's place as a travel destination in international competition."

The Reformation goes well beyond religion; it is a milestone in the cultural history of Europe. Places and people associated with the Reformation are world-famous cultural and historical treasures. Visitors to Germany can follow major sites where the reformer lived and worked, such as the Luther cities of Wittenberg, Eisleben and Mansfeld, Torgau, Schmalkalden, Wartburg Castle in Eisenach, Erfurt, Augsburg, Coburg, Worms and Heidelberg.

In 2018, the GNTB is presenting the campaign "Culinary Germany", which focuses on the wide variety of culinary experiences that Germany offers its guests. Simple guest houses, gourmet restaurants, regional and seasonal delights – all represent the authenticity and tradition of the German cultural land-

©Europa-Park



Europa Park Rust, Germany's largest theme park, remains exceptionally popular with visitors. Photo: View of the huge Wodan Timburcoaster wooden rollercoaster

scape. More than 250 top restaurants offer dining experiences at the highest level. 2019 is dedicated to the 100th anniversary of Bauhaus. The tourism industry will pay homage to the synthesis of art, design, architecture and craft that formed the basis for the entire avant-garde in classical modernism. It was developed in 1919 by the people around Bauhaus founder Walter Gropius. In 1933, they brought the idea of the Bauhaus from Weimar, Dessau and Berlin into the whole world. From Chicago to Tel Aviv, the ideas have influenced modern architecture to this day. The Bauhaus building in Dessau became a UNESCO World Heritage Site in 1996.

Other themes include the 200th birthday of the poet Theodor Fontane in 2019 and the 250th birthday of Ludwig von Beethoven in 2020. Born in Bonn in 1770, he was the most significant representative of Viennese classical music and a trailblazer of the Romantic era. Beethoven had an enormous influence on Germany as a musical country. His symphonies, piano concerts, chamber music and songs are in the permanent repertoire of German concert halls. This will also excite travellers about Germany as a cultural destination.

■ [www.germany.travel.de/index.html](http://www.germany.travel.de/index.html)

©Investitions- u. Marketinggesellschaft Sachsen-Anhalt mbH/Johannes Winkelmann



The celebrations to mark the Luther anniversary are a particular highlight in 2017: Eight "Luther Routes" illustrate stages in the life of the reformer in 30 languages.

# GERMAN EMBASSIES

## AFRICA

### Algeria

165, chemin Sfindja (ex Laperlier), Algier

### Angola

Avenida 4 de Fevereiro, 120, Luanda

### Benin

1438, Avenue Jean Paul II, Cotonou

### Botswana

Queens Road 1079-1084, Gaborone

### Burkina Faso

14 Rue Kafando Romuald, La Rotonde, Ouagadougou

### Burundi

22, Avenue du 18. Septembre, Bujumbura

### Cameroon

Novelle Route Bastos, Bastos-Usine, Jaunde

### Central Africa

See Embassy Jaunde (Cameroon)

### Chad

Avenue Félix Eboué, N'Djamena

### Congo

s/c ICO WOOD, Avenue Denis Loemba, Pointe-Noire

### Congo (Democratic Republic)

82, Avenue Roi-Baudouin, Kinshasa-Gombe

### Egypt

2, Sh. Berlin, Zamalek, Cairo 11211, Cairo

### Eritrea

Warsay Street, Saba Development Building, Asmara

### Ethiopia

Yeka Kifle Ketema, Woreda 03, Addis Abeba

### Gabon

Boulevard de l'Indépendance, Immeuble les Frangipaniérs, Libreville

### Gambia

See Embassy Dakar (Senegal)

### Ghana

No. 6, Kenneth Kaunda Road, North Ridge, Accra

### Guinea

B.P. 540, Conakry

### Kenya

Ludwig Krapf House, Riverside Drive 113, Nairobi

### Lesotho

See Embassy Pretoria (South Africa)

### Liberia

Tubman Boulevard, Monrovia

### Libya

See Embassy Tunis/Tunisia

### Madagascar

101, Rue de Pasteur Rabeony Hans (Ambodirotra), Antananarivo 101

### Malawi

Convention Drive (Capital City), Lilongwe

### Mali

Badalabougou Est, Rue 14, Porte 334, Bamako

### Morocco

7, Zankat Madnine, Rabat

### Mauritania

Boile Postale 372, Nouakchott

### Mauritius

See Embassy Antananariva (Madagascar)

### Moçambic

Rua Damião de Góis 506, Maputo

### Namibia

Sanlam Centre, 6th Floor, Independence Ave., Windhoek

### Niger

Avenue du General de Gaulle, Niamey

### Nigeria

15, Walter Carrington Crescent, Victoria Island, Lagos

### Rwanda

KN 27 St No 5, Kiyovu, Kigali

### Sambia

5219 Haile Selassie Avenue, Lusaka

### Senegal

20, Avenue Pasteur, Angle Rue Mermoz, Dakar

### Sierra Leone

3, Middle Hill Station, Freetown

### Somalia

See Embassy Republic of Kenya

### South Africa

201 Florence Ribeiro Avenue, Groenkloof Ext 11, Pretoria 0181

### Sudan

Riverside Apartment C7, Plot 12/13, Bahri, Helat Hamad Kafouri Estate, Khartoum

### Tanzania

Umoja House, Mirambo Street/Garden Av., 2nd Floor, Daressalam

### Togo

Boulevard de la République, Lomé

### Tunisia

Impasse du Lac Windermere, Les Berges du Lac, Tunis

### Uganda

15, Philip Road, Kololo, Kampala

### Zimbabwe

30, Ceres Road, Avondale, Harare

Edificio World Trade Center No. 20, Panama

### Paraguay

Avda. Venezuela 241, Asunción

### Peru

Av. Dionisio Derteano 144, Edificio Alto Caral, Pisos 7y8, San Isidro, Lima 27

### Surinam

See Embassy Port-of-Spain, Trinidad

### Trinidad and Tobago

19 St. Clair Avenue, St. Clair

### United States of America

4645 Reservoir Road NW, Washington, DC 200007

### Uruguay

La Cumparsita 1435, Plaza Alemania, 11200 Montevideo

### Venezuela

Avenida Eugenio Mendoza y Avenida José Angel Lamas, Edif. La Castellana, 10. Stock, La Castellana, Caracas

## AMERICA/CARIBBEAN

### Argentina

Calle Villanueva 1055, C 1426 BMC Buenos Aires

### Bahamas

Sandyport Office Center, Lagoon Court Building Suite 115, Nassau

### Barbados

See Embassy Port-of-Spain, Trinidad

### Bolivia

Avenida Arce 2395, La Paz

### Brazil

SES, Avenida das Nações, Lote 25, Quadra 807, 70415 - 900 Brasília DF

### Canada

1, Waverly-Street, Ottawa, Ontario K2P 0T8

### Chile

Las Hualtatas 5677, Vitacura, Santiago de Chile

### Columbia

Calle 110 No 9-25, piso 11, Torre Empresarial, Edificio Pacific P.H., Bogota

### Costa Rica

Edificio „Torre La Sabana“, 8° piso, 300 mts oeste del ICE, Sabana Norte, San José

### Cuba

Calle 13. No. 652, Esquina á B, Vedado, La Habana

### Dominican Republic

Edificio Torre Piantini Piso 16, Calle Gustavo Mejia Ricart, esq. Ave. Abraham Lincoln, Santo Domingo

### Ecuador

Edificio „Citiplaza“, piso 14, Casilla 17-17-536, Quito

### El Salvador

77a, Av. Norte, esq. 7a Calle Poniente 3972, Colonia Escalón, San Salvador

### Grenada

See Embassy Port-of-Spain, Trinidad

### Guatemala

Avenida La Reforma 9-55, Zona 10, Edificio Reforma 10, Nivel 10, Ciudad de Guatemala

### Guyana

See Embassy Port-of-Spain, Trinidad

### Haiti

2, Impasse Claudinette, Bois Moquette, Pétion-Ville, Port-au-Prince

### Honduras

Avenida República Dominicana 925, Callejon Siria, Col. Lomas de Guisjarro, Tegucigalpa M.D.C.

### Jamaica

10 Waterloo Road, Kingston 10

### Mexico

Horacio 1506, Col. Los Morales Sección Alameda, Deleg. Miguel Hidalgo, 11530 Mexico D.F.

### Nicaragua

Carretera a Masaja km 5, del Colegio Teresiano 1 c. al Sur, 1 c abajo Calle Erasmus de Rotterdam, Managua

### Panama

Calle 53 E, Urbanizacion Marbella,

## ASIA/NEAR EAST

### Afghanistan

Wazir Akbar Khan, Mena 6, Kabul

### Bahrain

Salmaniya Av., Block 327, Road No 322, Building 39, Manama

### Bangladesh

Gulshan Avenue 178, Gulshan 2, Dhaka 1212

### Brunei

Unit 2.01, Block A, 2nd Floor, Complex Yayasan Sultan Haji Hassanah Bolkiah, Jalan Pretty, Bandar Seri Begawan BS 8711

### China

17, Dong Zih Men Wai Da Jie, Chaoyang District, Beijing 100600

### India

No. 6/50G, Shanti Path, Chanakyapuri, New Delhi 110001

### Indonesia

Jalan M. H. Thamrin Nr. 1, Jakarta 10310

### Iran

Ferdowsi Ave., No. 320-324, Teheran

### Iraq

PO Box 2036, Mansour, Baghdad

### Israel

3, Daniel Frisch Street, 19. Stock, 64731 Tel Aviv

### Japan

4-5-10, Minami-Azabu, Minato-ku, Tokyo 106-0047

### Jordan

Benghazi Street 25, Jabal Amman

### Korea (Republic)

Seoul Square 416, 8. Etage, Hangang-Daero, Jung-Gu, Seoul 140 - 816

### Kuwait

Al Hamra Tower, 40th Floor, Al Shuhada Street, Sharq. 13009 Kuwait

### Laos

Rue Sokpalouang 26 (Sisattanak), Vientiane

### Lebanon

Maghzal Building near Jesus a. Mary High School, Rabieh

### Malaysia

26th Floor, Menara Tan & Tan, 207 Jalan Tun Razak, 50400 Kuala Lumpur

### Maldives

38, Orchid Magu, 20213 Malé 20-02

### Mongolia

Baga Toiruu-2, Straße der Vereinten Nationen 16, Ulan-Bator 14201

### Myanmar

9 Bogyoke Aung San Museum Road, Bahan Township, Rangoon (Yangon) 11201

### Nepal

P.O. Box 226, Kathmandu

### Oman

Near Al-Nahda Hospital, Ruwi, Maskat

### Pakistan

Ramna 5, Diplomatic Enclave, Islamabad

### Philippines

25/F Tower II, RCBC Plaza, 6819 Ayala Ave. 1200 Makati City, Metro Manila

## **Qatar**

No. 6 Al Jazira Al-Arabiya Street, Fareej Kholoib Area, Doha

## **Saudi Arabia**

Diplomatic Quarter, Riyadh

## **Singapore**

50 Raffles Place, 12-00 Singapore Land Tower, Singapore 048623

## **Sri Lanka**

40, Alfred House Avenue, Colombo 3

## **Syria**

Abdulmunem Al-Riad Street, Corner Ebla Street, Malki, Damaskus

## **Thailand**

9, South Sathorn Road, Bangkok 10120

## **United Arab States**

The Towers at the Trade Center, West Tower, 14<sup>th</sup> Floor, Abu Dhabi Mall

## **Vietnam**

29, Tran Phu, Hanoi

## **Yemen**

Near Hadda Road/Outer Ring Road, Sanaa

## **AUSTRALIA/OCEANIA**

### **Australia**

119 Empire Circuit, Yarralumla, ACT 2600

### **New Zealand**

90-92 Hobson Street, Thorndon, 6011 Wellington

## **EUROPE**

### **Armenia**

Charents 29, 375025 Eriwan

### **Austria**

Gauermanngasse 2-4, 1030 Wien

### **Azerbaijan**

ISR Plaza, 69 Nizami Str., AZ 1005 Baku

### **Belarus**

Uliza Sacharowa 26, Minsk 220034

## **Belgium**

8-14, Rue Jacques de Lalaing, 1040 Bruxelles

## **Bosnia and Herzegovina**

Ul. Skenderija 3, 71000 Sarajevo

## **Bulgaria**

Ul.ia Frederic-Joliot Curie 25, 1113 Sofia

## **Croatia**

Ulica Grada Vukovara 64, 10000 Zagreb

## **Cyprus**

10 Nikitares Str., 1080 Nicosia

## **Czech Republic**

Vlaská 19, Malá Strana, 11801 Praha 1

## **Denmark**

Stockholmsgade 57, 2100 Kopenhagen Ø

## **Estonia**

Toom-Kuninga 11, 15048 Tallinn

## **Finland**

Krogiuksentie 4b, 00340 Helsinki

## **France**

24, Rue Marbeau, 75116 Paris

## **Georgia**

c/o Sheraton Metechi Palace Hotel, Telawi Str. 20, 0103 Tbilisi (Tiflis), Georgien

## **Greece**

Karaoli & Dimitriou 3, 10675 Athen-Kolonaki

## **Great Britain**

23, Belgrave Square, London, SW 1 X 8 PZ

## **Hungary**

Uri utca 64-66, 1014 Budapest 1

## **Iceland**

Laufásvegur 31, 101 Reykjavik

## **Ireland**

31 Trimleston Av., Booterstown, Blackrock/Co., Dublin

## **Italy**

Via San Martino della Battaglia 4, 00185 Roma

## **Kazakhstan**

Ul. Iwanilowa 2, 050059 Almaty

## **Latvia**

Raina Bulv. 13, 1050 Riga

## **Lithuania**

Z. Sierakauskio Gatve 24, 03105 Vilnius

## **Luxembourg**

20-22 Avenue Emile Reuter, 2420 Luxembourg

## **Malta**

Whitehall Mansions, 3rd Floor, Ta'Xbiex Seafront Ta'xbiex XBX, 1026

## **Monaco**

Le Bristol, 25 bis, Bd. Albert 1er, MC 98000 Monaco

## **Netherlands**

Groot Hertoginnelaan 18-20, NL-2517 EG Den Haag

## **Norway**

Oscarsgate 45, 0244 Oslo

## **Poland**

ul. Jazdow 12, 00-467 Warszawa

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## **Ukraine**

Wul. Bohdana Chmelnyzko 25, 01901 Kiev

## **Vatican**

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Cámara de Industria y Comercio Argentino-Alemana, Av. Corrientes 327, C 1043 AAD Buenos Aires  
[www.ahkargentina.com](http://www.ahkargentina.com)

### **Australia**

German Australian Chamber of Industry and Commerce, Level 6, 8 Spring Street, Sydney NSW 2000  
[www.germany.org.au](http://www.germany.org.au)

Level 5, Int. Chamber House, 121 Exhibition Street, Melbourne, VIC 3000, [www.germany.org.au](http://www.germany.org.au)

### **Austria**

Deutsche Handelskammer in Österreich Schwarzenbergplatz, 5/Top 3/1, 1030 Wien, [www.dhk.at](http://www.dhk.at)

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Chambre de Commerce Belgo-Luxembourgeoise-Allemande asbl, Manhattan Office Tower, Bolwerklaan 21 (Av. du Boulevard), 1210 Bruxelles [www.debelux.org](http://www.debelux.org)

### **Bolivia**

Cámara de Comercio e Industria Boliviano-Alemana, Calle 15 de Calacoto 7791, Torre Ketal of. 311 Casilla 2722, La Paz, [www.ahkbol.com](http://www.ahkbol.com)

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[http://zentralamerika\\_karibik.ahk.de](http://zentralamerika_karibik.ahk.de)

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Cámara Chileno-Alemana, P.O. Box Casilla 19, Correo 35, Santiago de Chile  
[www.chamchal.cl](http://www.chamchal.cl)

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German Industry and Commerce Beijing Landmark Tower 2, Unit 0811, 8 North Dongsanhuan Road, Chaoyang Dist., 100004 Beijing  
<http://china.ahk.de>

Delegation Of German Industry and Commerce in Shanghai, 25F China Fortune Tower, 1568 Century Avenue, 200122 Shanghai, <http://china.ahk.de>

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Česko-německá obchodní a průmyslová komora, Václavské náměstí 40, 11000 Praha 1  
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Det Tysk-Danske Handelskammer, Kongens Nytorv 26, 3. Stock, DK-1050 Kopenhagen K  
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German-Arab Chamber of Industry and Commerce 21, Soliman Abaza St, off Jamet El Dowal El Arabia St. Mohandessin-Giza, Cairo, Egypt. [www.ahk-mena.com](http://www.ahk-mena.com)

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La Chambre Franco-Allemande de Commerce et d'Industrie, 18, Rue Balard, F-75015 Paris  
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Kringlan 7, 103 Reykjavik  
www.ahk.is

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www.indo-german.com

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http://indonesien.ahk.de

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http://iran.ahk.de

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German-Irish Chamber of Industry and  
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www.german-irish.ie

## Israel

Israeli-German Chamber Of Industry and Commerce,  
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www.israel.ahk.del

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www.ahk-italien.it

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Deutsche Industrie- und Handelskammer, Sanbancho  
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Tokyo 102-0075  
http://japan.ahk.de

## Kazakhstan

Delegation der Deutschen Wirtschaft für Zentralasien,  
Businesszentrum Koktem Square/Bostandyskiy rayon/  
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www.zentralasien.ahk.de

## Korea

Korean-German Chamber of Commerce and Industry,  
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www.kgccci.com

## Latvia

Deutsch-Baltische Handelskammer in Estland, Lettland,  
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www.ahk-balt.org

## Lithuania

Deutsch-Baltische Handelskammer in Estland, Lettland,  
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## Malaysia

Malaysian-German Chamber of Commerce and Industry  
Lot 20-01, Letter Box No 33, Level 20, Menara Hap  
Seng 2, Plaza Hap Seng, No 1 Jalan P. Ramlee,  
50250 Kuala Lumpur  
http://malaysia.ahk.de

## Morocco

Chambre Allemande de Commerce et d'Industry au  
Maroc, Lot. El Manar, Villa 18 rue Ahmed Ben Taher El  
Menjira Quartier El Hank, 20160 Casablanca  
http://marokko.ahk.de

## Macedonia

Repräsentanz der Deutschen Wirtschaft,  
Blvd. St Kliment Ohridski 30, 5. Etage, 1000 Skopje  
http://mazedonien.ahk.de

## Mexico

Cámara Mexicano-Alemana de Comercio e Industria, A.C.  
Apartado Postal 10-872, 11002 México, D.F.  
http://mexiko.ahk.de

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2585 EC Den Haag  
www.dnhk.org

## New Zealand

Repräsentanz der Deutschen Wirtschaft,  
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www.nigeria.ahk.de

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www.ccilia-portugal.com

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www.russland.ahk.de

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Singaporean-German Chamber of Industry and  
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www.sgc.org.sg

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www.dsihk.sk

## Slovenia

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## South Africa

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www.ahk.es

Córsega 301-303, 08008 Barcelona  
www.ahk.es

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www.handelskammer.se

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Handelskammer Deutschland-Schweiz,  
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www.handelskammer-d-ch.ch

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www.taiwan.ahk.de

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German-Thai Chamber of Commerce  
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Yannawa, Sathorn, Bangkok 10120  
http://thailand.ahk.de

## Tunisia

Chambre Tuniso-Allemande de  
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Immeuble „Le Dôme“, Rue du Lac Lemán,  
1053 Les Berges du Lac  
http://tunesien.ahk.de

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01004 Kiev  
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The German Industry and Commerce, P.O.Box 7480,  
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German American Chamber of Commerce Inc.  
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German American Chamber of Commerce of the Midwest,  
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IL 60654-4714  
www.gaccm.org, www.ahk-usa.com

German American Chamber of Commerce of the Southern  
United States, Inc., 1170 Howell Mill Road, Suite 300,  
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www.gaccsouth.com, www.ahk-usa.com

Representative of German Industry and Trade,  
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Washington D.C. 20036  
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Cámara de Comercio Uruguayo-Alemana,  
Plaza Independencia 831, 11000 Montevideo  
www.ahkuriuguay.com

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Cámara de Comercio e Industria  
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www.cavenal.org

## Vietnam

German Industry and Commerce Vietnam,  
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**Information about Germany on the Internet:**

www.bundesregierung.de  
www.auswaertiges-amt.de  
www.destatis.de  
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# 1 Deutschland Germany



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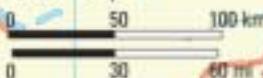
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SCHWEIZ  
SUISSE  
SVIZZERA

ITALIA



- World Heritage Site
- Airport
- Mountain Peak (in meters)
- State Boundary
- International Boundary
- Motorway
- Trunk Road
- Railway

**MÜNCHEN** Regional capital  
**Fürth** Town/city with a population of more than 100 000  
**Köln** Part of the "Magic Cities" association  
**Augsburg** Part of the "Historic Highlights" association  
**Murnau** Towns with ICE or EC/IC rail connection, population < 100 000  
**NP** National Park

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