# pulse

The ElringKlinger AG Magazine —— Issue 2021

## Fuel of the future

ElringKlinger has been active in the fuel cell sector for 20 years and has established a technological leadership role. Why does hydrogen make a good source of energy?

## The force of change

ElringKlinger offers a wide range of components for electric drives.

## Family Ties

The ElringKlinger family sticks together, especially in difficult times.

elringklinger

# ElringKlinger – Facts & Figures

## EXPERIENCE MOBILITY – DRIVE THE FUTURE.

**As an automotive supplier, ElringKlinger develops high-tech solutions for all drive systems in order to actively shape the world of mobility today and in the future.**

### SALES REVENUE

**1,480** EUR million

were generated by ElringKlinger in fiscal year 2020.

### HUMAN RESOURCES

**9,724**

people were employed by ElringKlinger worldwide as of December 31, 2020.

### INNOVATIONS

**5.1** %

of Group income was used for activities in research & development in the reporting period.

### GROUP HEADQUARTERS

**48°30'43"N, 9°21'45"E**

ElringKlinger's corporate headquarters are located in Dettingen/Erms, approx. 40 kilometers south of Stuttgart.

### GLOBAL PRESENCE

**45** sites

ElringKlinger is represented globally: in all the major automotive markets and always in close proximity to its customers.

### TRADITION

In **1879**

the foundation stone was laid for today's global ElringKlinger Group.

### SOCIAL MEDIA

**# ElringKlinger**

Follow ElringKlinger on the social media networks of Facebook, Twitter, Xing, and YouTube (Elring – Das Original).

**As an independent and globally positioned supplier, ElringKlinger is a powerful and reliable partner to the automotive industry. Be it passenger car or commercial vehicle, equipped with an optimized combustion engine, with hybrid technology, or with an all-electric motor – we offer innovative solutions for all types of drive system. In doing so, we are making a committed contribution to sustainable mobility.**

# Dear Readers,

Hydrogen is a powerful source of energy. With wide-ranging applications, it offers major opportunities – especially in the field of mobility.

Here we will unveil the key strategic course charted by ElringKlinger in 2020 with regard to hydrogen-based fuel cells. Thanks to the power density of our stacks, Airbus has now chosen us as a partner to develop the technology for aviation. Working with Plastic Omnium, we plan to break into the global market for fuel cell stacks and components.

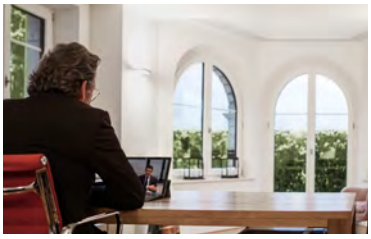
The transformation will also extend to our traditional areas as we deploy our expertise in materials and processes to develop new products for alternative drive technologies.

One point is particularly close to my heart: the sense of solidarity at ElringKlinger is second to none, as we have witnessed even in the extra-ordinary situation of a pandemic.

Over the pages that follow, we invite you to feel the energy cours-ing through the world of ElringKlinger.

**Dr. Stefan Wolf,**
**CEO of ElringKlinger AG**









# Contents

# MEGA IMPACT

**What is it that is changing multiple facets of life in societies around the globe? Megatrends. Innovations driven by climate change, urbanization, and resource shortages (especially in the automotive sector) and what ElringKlinger is doing to take these developments to the next level – a trilogy of transformation in words and imagery.**

Countries around the world are passing laws to cut their emissions drastically. Alongside China, several countries have declared their intention to be climate-neutral; most envisage this by 2050, China by 2060. The targets have sent out a signal to many sectors – including the automotive industry. ElringKlinger shares this vision of climate neutrality and plans to make the Group carbon-neutral by 2030. Through its products, the Group is seeking to help reduce (or ideally prevent) emissions of carbon dioxide, nitrogen oxide, hydrocarbons, and soot particles, thereby playing an active part in the shift to "green mobility".

**48 %**

As measured by the Mauna Loa Observatory, Hawaii, global concentrations of $CO_2$ now stand 48 % above pre-industrial levels.

**According to forecasts by the United Nations, almost 70 percent of the world population will be living in urban environments by 2050 – a trend that is having a direct impact on inner-city mobility, with congested roads and high levels of air pollution the consequence. The deployment of driverless electro-shuttles known as robotaxis, however, has the potential to minimize traffic jams and emissions; intelligent networking will enable the needs-based, sustainable, and efficient transport of people and goods. Through its systems expertise in battery-powered drives and its intelligent lightweight construction concepts, ElringKlinger is already shaping the mobility of tomorrow in its capacity as a development partner.**


## 108 hours

**In 2020, car drivers in Berlin – Germany's congestion capital – had to spend an additional 108 hours negotiating rush hour traffic. This also meant Berlin has displaced Hamburg as Germany's traffic jam blackspot.**

**234** out of 365 days were needed by humanity in 2020 to use up the resources that nature is able to restore in one year.

In purely mathematical terms, this means that as things stand, we would need three planet earths to cover humanity's resource consumption between now and 2050. Since we only have one earth, though, there is no escaping the fact that we will need to utilize renewable resources if we are to stay mobile in the future. Hydrogen will be a fundamental element in tomorrow's mobility, provided energy from renewable sources is used to produce it. In the vehicle itself, an electrochemical process in the fuel cell will directly convert hydrogen and oxygen from the air into electricity and water. With its low temperature fuel cell stack, characterized by its high power density and dynamism of power delivery, ElringKlinger already possesses the drive technology to facilitate low-emission mobility.

# FACTOR

Due to the coronavirus pandemic, the conversation between Laurent Favre and Dr. Stefan Wolf takes place virtually.

# 5

**ElringKlinger and Plastic Omnium have been working on joint plans to harness the potential of the fuel cell market since October 2020. Both company CEOs, Dr. Stefan Wolf and Laurent Favre, are confident that hydrogen will be an important driver of future mobility systems. Due to their performance capabilities, the fuel cell stacks of the joint company EKPO Fuel Cell Technologies in particular represent a competitive alternative to battery-electric drives or the internal combustion engine. Higher unit volumes are expected to reduce the current price of a system by a factor of 5 before 2030.**

**IS THERE A LINK BETWEEN THE PARTNERSHIP DEAL YOU HAVE AGREED AND THE CORONAVIRUS PANDEMIC?**

**FAVRE** — The pandemic is accelerating a transformation that began years ago in the automotive sector, especially with regard to the development of climate-neutral forms of mobility. Another factor here is that governments all over the world are investing huge amounts of money to promote "green" growth once the crisis is over. If you take just Germany and France together, around €16 billion is being plowed into measures to create a hydrogen economy.

**WOLF** — The EU's hydrogen strategy has certainly sent out a really useful signal, but the main factor in our decision to set up a joint venture is our corporate strategy. ElringKlinger has been working on fuel cells for the last 20 years. We knew we had an excellent stack but we realized that we would need a partner to produce a complete system. Plastic Omnium is a leading industry player in the field of hydrogen pressure tanks. We began talking before the pandemic, and since then we have just carried on negotiating, mostly by video conference.

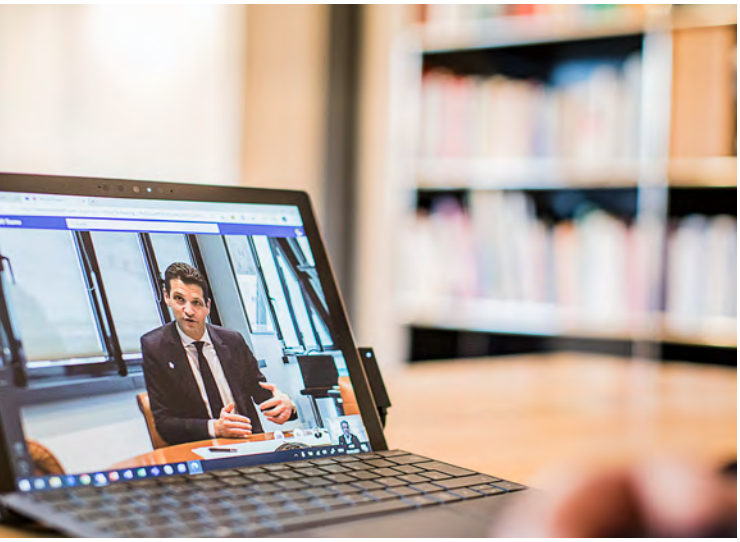
**THERE ARE ALREADY QUITE A FEW PROVIDERS COMPETING IN THE FUEL CELL MARKET. WHAT IS UNIQUE ABOUT YOUR JOINT COMPANY?**

**WOLF** — Flexibility is one of our strengths. Some of the big car makers have chosen to develop their own systems in-house and buy in high-quality components and modules. In that case, we will simply be performing the same role as for the combustion engine. However, smaller vehicle manufacturers need to find a partner whose expertise covers the entire fuel cell system.

**FAVRE** — … and that is exactly where we come in and why we decided to combine ElringKlinger's system business in Austria and our own operations in Switzerland into a single company.

**WOLF** — And let's not forget, in terms of our competitive position, that our components are technologically at a very advanced stage. We already have the capacity we need to produce up to 10,000 stacks a year.

**FAVRE** — If we receive a new development order today from one of our customers, we reckon we can supply that product in series quality within three years – anywhere in the world!



**»From a geostrategic perspective, too, hydrogen-based mobility systems would make us less dependent on other regions when it comes to meeting demand for energy and raw materials.«**

**Laurent Favre, CEO of Plastic Omnium**

**LOOKING AHEAD, WHY DO WE NEED HYDROGEN FUEL CELLS WHEN WE ALREADY HAVE BATTERY-ELECTRIC DRIVE SYSTEMS?**

**FAVRE** — A vehicle driven by fuel cells that use hydrogen is an electric vehicle. For us, it's not a question of either-or. There are so many factors involved – the level of infrastructure provision in each local market, for example – that will determine which technology comes out on top. When it comes to range, hybrid vehicles that combine a fuel cell drive with a small battery have the edge.

**WOLF** — It's also worth bearing in mind that hydrogen from solar, hydro, or wind energy is a potentially infinite resource. By contrast, the production of lithium-ion batteries is based on the extraction of finite raw materials, and the extraction methods used are not always environmentally friendly. That's not an argument against the use of electric drive systems in urban areas, but when you are dealing with vehicles that need to cover very long distances, the fuel cell is a better solution from a sustainability point of view.

**FAVRE** — From a geostrategic perspective, too, hydrogen-based mobility systems would make us less dependent on other regions when it comes to meeting demand for energy and raw materials.

**WOLF** — I would certainly agree with that. At present, Europe is way behind the Asian countries in the battery cell market. By contrast, we lead the world in fuel cell technology.

**IT LOOKS AS THOUGH MANUFACTURERS AND SOME GOVERNMENTS IN ASIA ARE MOVING AHEAD IN THE FUEL CELL MARKET, TOO.**

**WOLF** — We have already set up numerous development projects in China and other countries through EKPO. That shows our technology is highly regarded all over the world. The fact that countries such as Japan are now investing heavily in hydrogen presents us with a great opportunity. After all, car makers in every one of those countries will be looking to buy in components.

**FAVRE** — We expect the business to take off initially in Asia, where the market is growing faster than here and where we have already strong industrial presence and customer portfolio. That said, we have operations all over the world and have also set up our first projects in North America and of course in Europe.

**WHEN WILL FUEL CELL DRIVES REACH COST PARITY WITH THE DIESEL ENGINE?**

**FAVRE** — That depends on the technology, the materials, and of course production volumes. Our target is to reach cost parity

somewhere between 2027 and 2029. To do that, we will have to reduce our production costs by a factor of five or so.

**WOLF** — It also depends on how expensive it is to clean up the exhaust gases produced by diesel engines. With regulations governing internal combustion engines getting stricter all the time, we expect demand for new technologies such as the fuel cell to keep on growing.

**WHAT CONCRETE PLANS DO YOU HAVE TO MAKE FUEL CELLS CHEAPER?**

**WOLF** — Bringing the cost down is one of the key tasks we have set our new joint venture. Let me give you an example. We used a platinum coating for the first generation of our bipolar plates. Now we use gold, and we are already working on a technique that would dispense completely with the need for precious metals.

**FAVRE** — I'm very confident that fuel cell drives will be competitive across the board by 2030, not just in trucks. Even a large SUV with a fuel cell drive will be more cost-effective than a plug-in hybrid with a combustion engine.

**WOLF** — One Japanese car maker has announced plans for two million fuel cell vehicles in 2030, and a Korean manufacturer for one million. What's more, all the European car makers are at least running development programs. I believe we have good reason to be optimistic.

**IN MANY CASES, THE SUCCESS OF A BUSINESS PARTNERSHIP DEPENDS ON THE CULTURE RATHER THAN THE TECHNOLOGY. WHAT MAKES YOU SO CONFIDENT THAT ELRINGKLINGER AND PLASTIC OMNIUM ARE A GOOD MATCH?**

**FAVRE** — We both represent listed family-owned companies, so we have a lot in common in terms of culture. We have solid foundations, so we get on with things and then talk them over. What's more, we stand for strong values and take responsibility for our employees.

**WOLF** — I agree with every word of that. We are aware, too, that while we take our climate obligations very seriously, it's just as important to maintain economic prosperity. Thanks to fuel cell technology, we will be able to produce vehicle drives that give us a bigger share of the value chain, and that will help us to keep more skilled jobs here in Europe. It's a win-win for the economy and the environment. ■

**THE INTERVIEW WAS CONDUCTED BY JOHANNES WINTERHAGEN.**

**LAURENT FAVRE**

**The French automotive engineer Laurent Favre (born 1971) took on the role of CEO at the French supplier Plastic Omnium in early 2020. He is the first CEO in the company's history to come from outside the Burelle family, which founded the company in 1946. Favre speaks excellent German after working for ABB, Benteler, Thyssenkrupp, and ZF, and even lived in Swabia for three years.**

**» Thanks to fuel cell technology, we will be able to produce vehicle drives that give us a bigger share of the value chain, and that will help us to keep more skilled jobs here in Europe. It's a win-win for the economy and the environment. «**

**Dr. Stefan Wolf, CEO of ElringKlinger AG**

The world's major automotive markets are banking on hydrogen. In 2016, the Chinese government included the objective of promoting the hydrogen industry in its plan for the period up to 2030. In Europe, meanwhile, governments are announcing national strategies aimed at establishing hydrogen technologies as part of the transformation in the energy and mobility sector, ring-fencing substantial funding in the process. Similar initiatives are reported in North America. For around 20 years, ElringKlinger has been successfully undertaking research into fuel cell technology, a field in which the company perceives significant potential for the mobility of the future. What are the specific properties of hydrogen? Why does hydrogen make a good source of energy?

# FUEL OF THE FUTURE

As an energy source for the future, hydrogen is solely made up of protons and electrons. In the case of a PEM fuel cell, hydrogen is broken down into electrons and protons on the anode side; the electrons travel outside of the cell to the cathode side via an appliance (e. g., a battery storage device or electric motor), while the protons migrate through a polymer membrane and react with the oxygen on the cathode side to form water. The water produced, which is emission-neutral, is then discharged from the cathode in liquid or vapor state. This, in particular, is what makes hydrogen a fuel of the future.

**Demand for mobility in China, the world's largest mobility market, is continuing to rise.**

Hydrogen is first on the list: in the periodic table of elements, hydrogen (represented by the symbol H) is top left with atomic number 1. As the chemical element with the lowest atomic mass, hydrogen only exists as a molecule under the conditions that prevail on earth – hence the symbol $H_2$.

Hydrogen is common, one feature that fossil energy sources cannot claim. Crude oil and natural gas are finite and scarce, and the methods used in their extraction are becoming ever more challenging and complex. Hydrogen production is also energy-intensive, which means sustainable electricity generation is an essential element in developing a hydrogen industry.

From an environmental technology point of view, hydrogen has one major advantage: it can be used for mobility or heating applications just as a fossil energy source would be, but without emitting carbon. In the long term, hydrogen also promises industrial uses. Hydrogen therefore offers considerable potential in terms of slowing climate change through decarbonization.

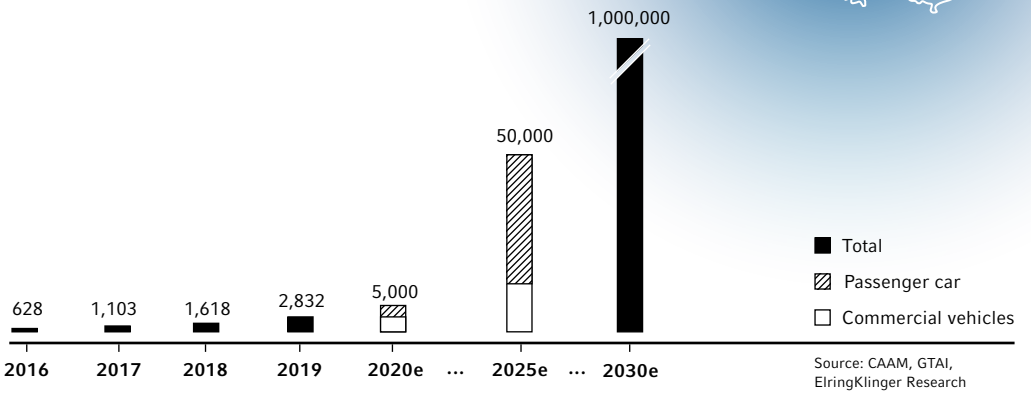
Since it is available regardless of the weather or the time of day, hydrogen outshines other environmentally friendly forms of energy production such as wind power and solar energy. Hydrogen is not a primary energy source in its strict sense, though – energy is needed to produce hydrogen in the first place before it can be used for the desired purpose; for this reason, it is often thought to be less efficient than the direct utilization of electricity. This, however, overlooks the fact that unlike electricity, hydrogen can be stored. Whereas batteries discharge over time, hydrogen enables us to produce the energy needed within the vehicle itself, without any being lost. The major advantage here is that the time and the place of production can be independent of hydrogen usage. Hydrogen can also be transported via pipelines or in liquid form, which makes a difference where long distances are involved or energy needs vary considerably over the course of time. Other potential uses of hydrogen include aircraft, ships and trains, and (passenger) transportation by road.

It all adds up to huge potential for the mobility sector. Basically, deriving the electricity needed to produce hydrogen from renewable sources enables vehicles to be powered in a completely carbon-neutral way. In particular, excess wind, hydro, or solar energy can be used throughout daylight hours to produce hydrogen. Existing pipelines can then be used to, for example, supply hydrogen to caverns in northern Germany for storage.

In order to widely utilize stored hydrogen for mobility purposes, one can fall back on the existing infrastructure of filling stations. Studies indicate that of the 14,000 or so filling stations in Germany, around a thousand would need to be modified for hydrogen to ensure a nationwide supply. This means a decentralized structure (such as that supporting purely battery-driven vehicles) is not required.

Making use of the existing filling station network will not radically transform mobility habits. Drivers would go to a gas station to take the energy source on board, just as they do now; the fueling process would be similar to that for familiar fossil energy sources and also take a matter of minutes. Compared to purely battery-driven vehicles, which take around 20–30 minutes to charge at rapid-charging stations, idle times are significantly lower.


## Fuel cell vehicles in China




Source: CAAM, GTAI, ElringKlinger Research

Trucks and buses are particularly suitable applications for hydrogen-powered fuel cells.

**As early as 2016, China published its energy policy guidelines for the coming 15 years. The country's 13th five-year plan envisaged an industrial performance aimed at reducing Chinese society's greenhouse gas intensity to 60 % by 2030. Restating this vision in 2020, President Xi Jinping declared the objective of making China a climate-neutral state by 2060. Included in the road map are fuel cell vehicles, a field in which China is looking to become competitive as it aims to sever reliance on fossil forms of energy. To this end, the government announced a wide-ranging funding program in which the value chain for fuel cell vehicles will be as significant as the establishment of a hydrogen industry. Regions will be able to apply for the main programs.**

**The state also plans to showcase its technological pre-eminence at the 2022 Winter Olympics in Beijing. In Zhangjiakou, for example, the current fuel cell fleet of 174 buses will be expanded to some 1,500 vehicles.**

**Having taken this first step with commercial vehicles, China plans to install fuel cells in automobiles. By 2025, it is anticipated that four times as many cars as commercial vehicles with a fuel cell drive will be on the roads – something many manufacturers have been preparing for over many years. China remains the market of the future.**


**Gray hydrogen**
is obtained from fossil energy sources (usually through steam reforming or dehydrogenation). This also produces $CO_2$.


**Blue hydrogen**
like gray hydrogen, is produced using fossil energy sources. The $CO_2$ thereby produced, however, is directly captured and can be stored.


**Turquoise hydrogen**
is obtained by using heat to break down methane (methane pyrolysis). Instead of $CO_2$, this produces solid carbon (C) as a by-product.


**Green hydrogen**
is produced from water using electrolysis. Neither $CO_2$ nor other greenhouse gases are produced.

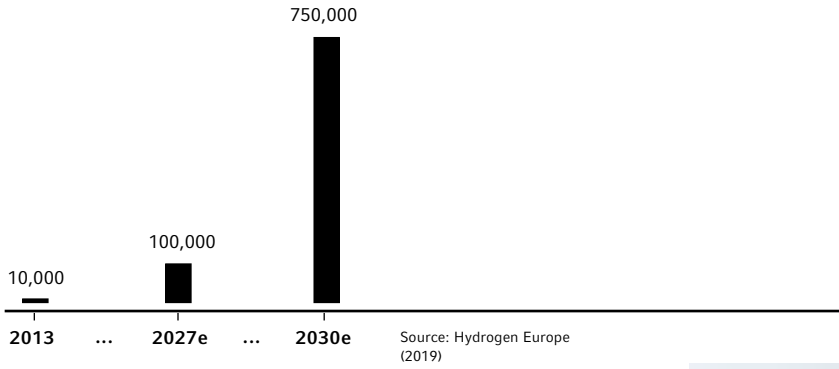
Source: Federal Ministry for Economic Affairs

This makes hydrogen-powered fuel cells an interesting prospect for certain applications. Wherever time is money, the advantages of the fuel cell come to the fore. In the heavy goods area especially, where operating costs are critical, a fuel cell offers all the benefits of an efficient drive technology. Ultimately, manufacturers will need to make a choice between a solely battery-driven or a fuel-cell-based drive. Given that the manufacturing processes for synthetic fuels have a low efficiency level, these technologies will be reserved for specific applications. Using batteries alone to supply the drive for a truck is less cost-effective than utilizing a fuel cell. Either the battery is large enough to facilitate a long range while recharging frequencies and idle times are minimized for the carrier (in this case, however, the weight of the battery lessens the payload of the truck, meaning the carrier can only convey smaller loads); or the carrier chooses a smaller battery to maximize the available payload, forcing drivers to head for rapid-charging stations frequently, which has an adverse effect on operational time.

A truck powered by a fuel cell is not subject to these restrictions to the same degree. Refueling with hydrogen takes a reasonable amount of time (similar to that needed for fossil energy sources), payload is not limited and the range remains relatively high. Fuel cells thus constitute an excellent alternative in the case of commercial vehicles and buses, where the same arguments apply.

Given the advantages that fuel cells offer for these particular applications, they are gaining ever more ground and production is poised to increase in the next few years. The resulting economies of scale will cut the unit prices of fuel cell stacks, which will duly become more attractive to the automobile sector from an economic standpoint. Fuel cells are also a good option for applications involving longer distances or certain vehicle sizes. In the automobile segment too, the boundaries defining the coexistence of the various drive types are shifting in favor of the fuel cell, underlining hydrogen's status as a fuel for the future.

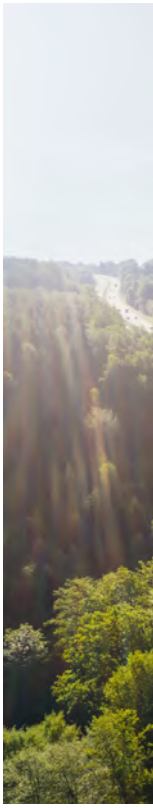
## Annual sales of fuel cell cars in Europe



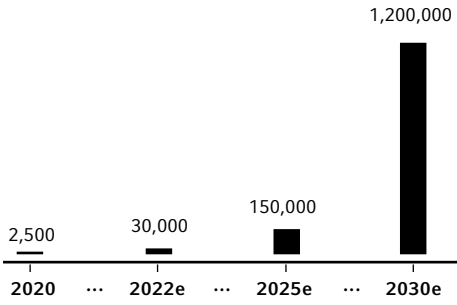

Source: Hydrogen Europe (2019)


**Fuel cells are becoming established as the basis for alternative drive systems in Europe as well as China, with many EU states launching wide-ranging funding programs. Germany, for instance, has earmarked EUR 9 billion to activate the market and boost hydrogen technologies, while France has committed EUR 7 billion to a similar program; Spain plans to invest some EUR 9 billion, with Italy investing as much as EUR 10 billion and Austria approving EUR 2 billion.**

**Studies suggest that in Europe fuel cell technology will be installed in buses and trucks initially and in automobiles at a later date. The benefits in terms of refueling times and range, and the cost-benefit ratio this implies, will drive this development. By 2030, for example, it is expected that one in five taxis will be fitted with fuel cells.**



## Sales of fuel cell vehicles in the USA





Source: Road Map to a US Hydrogen Economy

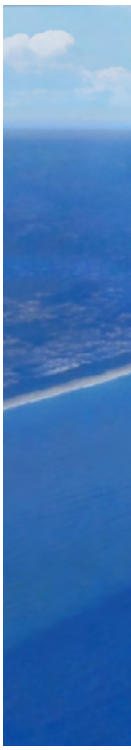
**Driven by private-sector initiatives, a hydrogen industry is also likely to be established in the USA, with the main steps carried out in four phases. The immediate measures to be realized over the next two years will include the provision of research funds and implementation of initial applications (involving forklifts at logistics centers). In phase two, around the middle of the decade, comprehensive testing in relation to industrial applications will be carried out. Preparations will also be made to deploy hydrogen in the transport sector. In phase three, taking us to the end of the decade, the application fields will be diversified. Away from the roads, hydrogen will also be used to run trains and aircraft. From 2030 onwards, hydrogen will be utilized across a whole range of industrial applications.**

**Fuel cell stacks like the NM12 from ElringKlinger can enable climate-neutral mobility on the road.**

**In the USA, the state of California has been pioneering the use of fuel cell vehicles.**

# BOARDING, PLEASE!

**In October 2020, ElringKlinger announced its strategic partnership with Airbus. The two partners are aiming to bring about a marked reduction in emissions from air travel. Mobility must be designed as carbon-neutrally as possible in order to address the finite nature of fossil fuels and the consequences of global climate change. Over the next few years, therefore, ElringKlinger and Airbus will be working together to develop and validate fuel cell stacks suitable for use in aviation applications.**



ElringKlinger's engineers are being driven by its vision: to shape mobility in an environmentally sustainable way. The Group's products are geared toward optimizing existing drive technologies in an effort to cut emissions. For example, its state-of-the-art gaskets enable the high pressures and temperatures required to make combustion engines consume less fossil fuel. Meanwhile, the use of plastic housing modules instead of metal components throughout the engine and the introduction of lightweight structural components help to cut back the vehicle's weight. Lower weight means lower fuel consumption and thus reduced emissions.

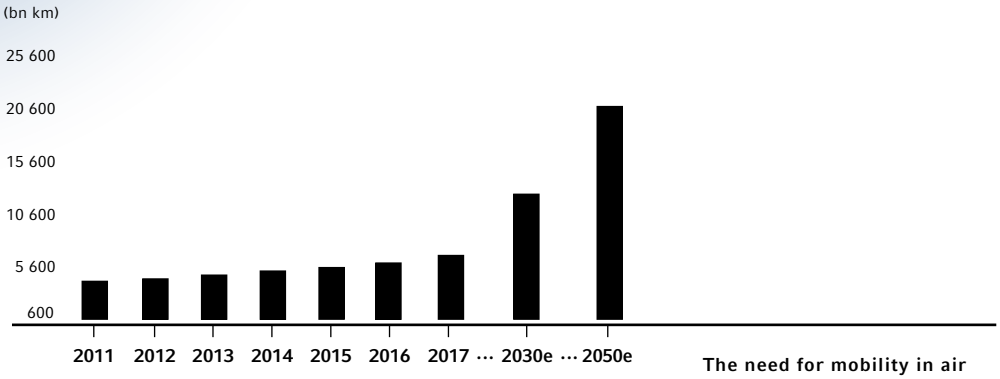
But optimizing existing technologies is just the first step. If we are to be equipped to meet the challenges of the future, a second step is just as important: developing alternative drive technologies that elevate the standards applied to date. The hydrogen fuel cell gives us the opportunity to make this next step in mobility and the energy sector a reality. Hydrogen is available in a virtually unlimited supply and can be produced using environmentally friendly wind, hydro, or solar power. This makes a hydrogen fuel cell 100 % carbon-neutral, because the only "exhaust gas" produced from the sophisticated electrochemical process is water vapor.

The growing need for mobility is making this property of the technology particularly relevant. People are doing a lot of traveling and covering great distances, while at the same time the global population is increasing. In a globalized world, meanwhile, goods need to be transported all around the planet. Meeting this ever-greater need for mobility and transportation, while taking account of climate change, requires sustainable solutions.

Airbus is backing hydrogen as the key technology behind its ZEROe aircraft concept in a bid to develop the first-ever zero-emissions aircraft for the commercial market by 2035. To this end, the European aerospace corporation is testing and studying numerous configurations and technological alternatives that use hydrogen, including generating electrical energy from fuel cells.

Airbus studied the fuel cell stack market in great detail before signing its deal with ElringKlinger, ultimately feeling confident that the company was the best candidate in the international selection process. The high performance density of its stacks and its extensive expertise in industrial-scale manufacturing processes were key factors in the decision to opt for ElringKlinger.

## Worldwide air passenger traffic




**The need for mobility in air travel is set to increase, making carbon-neutral energy production for aircraft all the more important.**

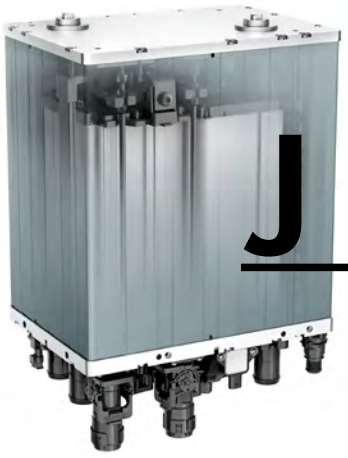
Source: ICAO (2018), Annual Report of the Council 2017 for data through 2017, Data for 2030 and 2050 are ITF projections from the current demand pathway using region of origin.


Source: Airbus

**ElringKlinger and Airbus work together to develop and validate aviation-compatible fuel cell stacks.**

The move to focus on hydrogen was also prompted by the finding that battery power alone soon reaches its limits in certain aviation applications, such as on long distances or in larger aircraft, due to its limited performance with a given weight. With its higher energy density, hydrogen offers a powerful alternative form of energy production on board thanks to fuel cells.

The vision of carbon-neutral air travel is much more far-reaching, of course, going well beyond an aircraft's drive technology. Airports must be equipped to ensure an adequate supply of hydrogen at all times, and aircraft must be able to be refueled with hydrogen just as reliably as they are currently with fossil fuels. If so, then "Boarding, please!" will very much be the order of the day on the carbon-neutral aircraft of tomorrow.



# JOINT FORCES

ElringKlinger's headquarters in Dettingen/Erms will also be home to EKPO Fuel Cell Technologies. Initial series production of up to 10,000 stacks per year will be possible there.

**Hydrogen is set to play a pivotal role on the road to decarbonization. Confident of the promising future associated with this sustainable source of energy, ElringKlinger and Plastic Omnium have agreed to push ahead forcefully with hydrogen-based fuel cell technology. Operating through a joint venture by the name of EKPO Fuel Cell Technologies, the companies will team up in an effort to develop, manufacture, and market fuel cell stacks and components.**

It all began on the fringes of an IAA motor show in Frankfurt. ElringKlinger had already invited Plastic Omnium to an initial meeting at the trade fair. Taking up this invitation, the French delegation headed by Laurent Burelle, majority shareholder and then CEO of Plastic Omnium, and Félicie Burelle, then Head of Strategy & Development and now Managing Director, visited ElringKlinger's booth at the show. During discussions that involved ElringKlinger CEO Dr. Stefan Wolf, Head of Fuel Cell Technology Armin Diez, and Head of Global Strategy, M&A, and Innovations Dr. Gernot Stellberger, those attending the meeting soon realized that the companies not only had similar structures but also shared the same values. Both corporations are listed on the stock exchange, but have families as strong anchor shareholders. What is more, both companies have a clear vision of emission-free mobility: hydrogen will be an essential energy carrier of the future.

On this IAA meeting, both partners were equally enthusiastic about their shared awareness and agreed on further rounds of negotiation to sound out and define a joint approach. Dr. Gernot Stellberger led the discussions on behalf of ElringKlinger. His counterpart at Plastic Omnium, Marc Perraudin, CEO of Plastic Omnium New Energies, joined the project task force in early 2020 after the initial groundwork had been laid. This turned out to be a fortunate coincidence, as both men knew each other from earlier collaborations. "This gave us a tremendous sense of trust in each other, which proved beneficial to the subsequent workflow," Stellberger recalls. "We didn't have to spend time on figuring out what makes the other person tick," adds Perraudin. "Instead, we were able to focus fully on our common goals." As part of this process, both maintained a close dialogue with their respective CEOs. Both Dr. Wolf and Laurent Favre, now CEO at Plastic Omnium, were always kept fully briefed on the individual steps of the project.

The initial task for Perraudin and Stellberger involved defining the companies' common views on mobility. Both Groups are of the firm opinion that the hydrogen-based fuel cell represents the next generation of drive technology. Both realize that large-volume production will make this particular solution more appealing, as economies of scale help to reduce the overall price per unit. Initially, the strengths associated with this technology are likely to come to the fore primarily in the commercial vehicle sector. After all, a battery-powered truck would probably have to stop at a charging station on several occasions to complete its tour in the case of long-distance travel or delivery routes that have a particularly demanding profile. However, recharging also means idle time for the forwarder and thus additional costs. Alternatively, the battery fitted to a truck could be dimensioned in such a way that fewer recharging stops are required.


**The CEOs of the two partners, Laurent Favre (r.) and Dr. Stefan Wolf (l.), jointly signed the partnership agreement at the end of October 2020.**

## 1. FRANCO-GERMAN ALLIANCE – WHY WILL THE PARTNERSHIP BETWEEN ELRINGKLINGER AND PLASTIC OMNIUM WORK?

**Plastic Omnium, a French group, has been working with German companies for many years – both in customer relations and through joint ventures or technological partnerships. In addition, we have established a strong presence throughout Germany, reflecting the country's position as a technology leader in the automotive industry. Against this backdrop, it was almost a foregone conclusion that the two partners Plastic Omnium and ElringKlinger would be brought together – given their identical corporate culture, the companies' innovatory prowess, and a shared vision of the future of mobility.**

## 2. WHAT WAS YOUR BIGGEST CHALLENGE ON THE PATH TO THIS PARTNERSHIP?

**Arranging a joint venture is always a challenge. A successful partnership is based on a shared vision, but also on mutual trust, fairness, and respect. We displayed these credentials at all levels of the two companies – from the very beginning and at every stage of the talks. That was the key to success.**

## 3. WHERE DO YOU SEE EKPO FUEL CELL TECHNOLOGIES IN 2030?

**EKPO Fuel Cell Technologies will be a game changer from day one: a unique technological offering, market-ready products for next-generation mobility, decades of technological and industrial expertise from ElringKlinger, and production capacity already in place. Building on this foundation and benefiting from the clout of both partners and the significant investment opportunities, we believe that the venture is destined to take a leading role within the market. Hydrogen-based drive systems will become reality and EKPO Fuel Cell Technologies will be the world's principal player in fuel cell stack technology.**

In this case, however, the forwarder would be faced with additional costs or less profit due to a smaller payload. Trucks powered by fuel cells, by contrast, are capable of resolving this conflict. The power needed is generated on board, which translates into greater distances covered and the avoidance of lengthy downtime. Refueling is unlikely to take much longer than before. Even if it takes twice as long, truck drivers will certainly not be held up for an hour or more, as they would be in the case of battery recharging.

"Based on this common understanding, we then went on to identify the strengths that each partner can contribute and planned the next stage," Stellberger explains. "It was clear that we wanted to work in very close collaboration to cultivate the fuel cell market." Agreement was reached on a joint venture for stacks and components. At the same time, Plastic Omnium would acquire ElringKlinger's Austrian subsidiary for the purpose of establishing a focus on systems. ElringKlinger possesses the technology needed for reliable components and high-performance stacks and was prepared to contribute it accordingly. The emphasis for Plastic Omnium, meanwhile, is on supporting the joint venture in an effort to expand production capacity and accelerate market penetration. The company based in Levallois near Paris will provide a total of EUR 100 million for this purpose. "Our joint venture has access to outstanding technology. It is equally important that customers are made aware of this quickly and in as compelling a manner as possible," says Perraudin in explaining the objective of the cooperation.

A key objective of the joint venture is that it should be able to grow rapidly. "We see tremendous potential in Asia in particular," Stellberger notes. "Here, many manufacturers in the bus but also in the passenger car segment have already clearly committed themselves to fuel cell technology." Toyota and Hyundai, for example,

**Marc Perraudin has been with Compagnie Plastic Omnium since 1995 and has headed the Plastic Omnium New Energies division since March 2020. Previously, he was primarily responsible for R&D and business development within the Group.**

Dr. Gernot Stellberger joined ElringKlinger in 2017 and is Head of Global Strategy, M&A, and Innovations. In the spring of 2021, he was appointed as one of three general managers of EKPO Fuel Cell Technologies.

already offer mass-produced cars fitted with fuel cells. This approach is also being supported by various governments. China, for example, is promoting fuel-cell-powered buses through state funds with a to view to also advancing technologies beyond those associated with battery power. This is clearly underpinned by a commitment to diversity in drive technologies for the various fields of application.

Public-sector support in Europe, by contrast, has been slower off the ground. Recent efforts include the National Hydrogen Strategy adopted by the German government in 2020. It covers a volume of EUR 9 billion, while a similar program launched in France is worth EUR 7 billion. The Franco-German alliance between ElringKlinger and Plastic Omnium is also counting on these state-led efforts to help fuel cell technology achieve its breakthrough. "Companies – often supported by funding programs – have taken a leap of faith when it comes to developing technologies. Now all players are called upon: it is imperative that the associated infrastructure and hydrogen production be built up quickly," says Stellberger. One of the key advantages is that the existing filling station network can be used for this purpose. "Retrofitting will not be cheap. But such aspects have to be put into perspective. The decentralized infrastructure of recharging stations – with a sufficiently powerful grid – required for battery-powered vehicles is also expensive," Stellberger continues.

Having agreed on the framework conditions of the joint venture, the final task was to find a suitable name. "We were adamant that the name should be representative of the contributing partners as well as the technology involved," says Perraudin in explaining the solution swiftly found by the team. "EKPO Fuel Cell Technologies" was born as a brand – ready to conquer global markets. The business plan drawn up for the joint venture envisages rapid growth by the end of the decade: the company is targeting a market share of 10 to 15 % by 2030, with sales revenue totaling EUR 700 million to 1 billion. "It's ambitious, without doubt," they both agree. "But, then again, our technology and our shared vision of next-generation mobility are a convincing proposition. ■

## 1. FRANCO-GERMAN ALLIANCE – WHY WILL THE PARTNERSHIP BETWEEN ELRINGKLINGER AND PLASTIC OMNIUM WORK?

**Franco-German cooperation has become something of a tradition and always works when both actors respect each other and see themselves as partners on an equal footing. That is the case here. Against this backdrop, ElringKlinger and Plastic Omnium are the perfect match: they have a very similar corporate culture and the same ownership structure; both have a dynamic organizational set-up and clearly defined, uncluttered decision-making channels. These are essential success factors that should by no means be underestimated. When we first met at the IAA motor show it was obvious that the chemistry was right.**

## 2. WHAT WAS YOUR BIGGEST CHALLENGE ON THE PATH TO THIS PARTNERSHIP?

**Without doubt, the coronavirus pandemic with all its repercussions. If it hadn't been for our successful efforts to establish a basis of trust as part of various meetings held in Germany and France during the initial stages leading up to March 2020, the entire project would have been much more difficult and, above all, significantly more protracted. In some ways, after all, the physical presence of team members is essential to managing complex processes such as these. But we fully met our targets in terms of project timing and substance – not even covid-19 managed to prevent us from doing so.**

## 3. WHERE DO YOU SEE EKPO FUEL CELL TECHNOLOGIES IN 2030?

**By 2030, fuel cell technology will have become fully established. Mobility will be driven by a mix of different propulsion technologies, with infrastructure and cost-benefit factors playing a key role. It is precisely here that fuel cells will be able to excel. Initially, for commercial vehicles, trucks, and buses, but later also in the passenger car segment. In this environment, EKPO Fuel Cell Technologies will be a brand name that stands for one of the leading fuel cell players worldwide. We will play a pivotal role in shaping the process of transition within the mobility sector and will pursue the goal of decarbonization by driving our technology forward at full throttle. That is our ambition.**

# D E L I

Bernd Weckenmann has been responsible for global procurement within the ElringKlinger Group since 2016. On taking up this role, he restructured the department by introducing a matrix organization. This helped to pool and manage requirements more effectively across the Group, while also achieving greater economies of scale. With an annual purchasing volume of around EUR 800 million, each and every optimization measure within his area of responsibility has a significant impact on Group performance as a whole. Embracing the fundamental principle of partnership-based supplier relations, Bernd Weckenmann is on the right track. His belief: » Ultimately, doing business has to be enjoyable for all those involved – for our suppliers as much as for us. «

**BERND WECKENMANN,**
**Vice President Purchasing, ElringKlinger AG**

# V E R !

Jorin Preuß has been accountable for Supply Chain Management (SCM) within the ElringKlinger Group since 2016. He thus represents the control center for material supply in global operations. SCM is responsible for ensuring the smooth flow of goods throughout the entire supply chain – from suppliers and production to customers, from raw materials and intermediate products to the end product. Among Jorin Preuß's key challenges is the long-term strategic task of steadily optimizing net working capital within the ElringKlinger Group. The significant improvement in cash flows is visible evidence of his success. His credo: »Always six inches of water under the keel!«

JORIN PREUSS,
Vice President Supply Chain Management,
ElringKlinger AG

**Supply chains felt the economic repercussions of the coronavirus pandemic at a very early stage. The virus thus hit a very sensitive point of an industrial world that is highly intertwined at a global level – a network in which the cross-border movement of goods, just-in-time supply, and tailor-made supplier products are of vital importance. At ElringKlinger, too, the crisis had a major impact on the activities of both Purchasing and Supply Chain Management. Despite many bottlenecks, the company succeeded in maintaining its operations almost entirely without disruptions in 2020, a year that can be considered truly exceptional. As managers of the respective areas, Bernd Weckenmann and Jorin Preuß outline the challenges faced by the company during this period.**

What happened to supply chains in the spring of 2020 in the wake of the coronavirus pandemic is unprecedented: goods transportation was impeded by border closures within Europe, assembly lines came to a standstill, consumption stopped, entire countries were in lockdown. The manufacturing industry was forced to switch from carefully planned processes to operations management without any reliable forecasts. The repercussions of the pandemic were first seen in China, where ElringKlinger also had to close down local plants in February. From March onward, the effects were soon felt at other locations, first in Europe and subsequently in America. Almost immediately and across the board volumes requested by customers as part of their scheduling arrangements fell dramatically, in many cases by more than 50 % and at times even by as much as 80%, while the raw materials ordered for budgeted quantities were already on their way to ElringKlinger plants. "Imagine a train that suddenly stops, while additional railcars continue to pile up from the back," says Jorin Preuß in explaining the situation. This led to a surge in inventories that reached its culmination at the end of April/beginning of May.

Purchasing was initially hit equally hard by the effects of the pandemic. Large purchasing volumes and long-term planning horizons as the best basis for negotiations were suddenly a thing of the past. However, there were some bright spots: in order to avoid tariffs, especially on steel and aluminum, ElringKlinger had already created more room for maneuver in the preceding year in order to be able to change suppliers. Faced with new tariffs, buyers initially focused on local sourcing. However, as supply within the US market was far too limited to cope with the sudden rise in demand, local market prices subsequently soared to such an extent that it was once again more favorable for ElringKlinger to source from abroad.

Within the area of Supply Chain Management the emergency brake was activated as soon as the rear railcars started piling up. The first task was to adapt the flow of information to the changed circumstances. "It's disastrous when customers reduce quantities dramatically over the phone but these changes are not reflected in the automatic delivery schedules," says Jorin Preuß in reviewing the situation. Irrespective of the legal position, it quickly became clear that immediate action was needed. The requirements were completely redefined: quantities requested from customers as part of their scheduling arrangements were adjusted downward, production orders were stopped and restarted to match the lower quantities, and orders placed with suppliers were reduced.

Purchasing was quick to see the crisis as an opportunity. When suppliers are suddenly faced with a complete slump in volumes the negotiating position tends to change. "Essentially, we stepped up what we are already doing, which is to continuously check across all areas how we can make the best possible purchases," says Bernd Weckenmann. He used various instruments to achieve his goals. For example, contract durations were a key issue in those cases in which market price fluctuations were expected. However, certainty of supply and lead times also had to be taken into account – two aspects that were of great importance, particularly in the year of covid-19. Bernd Weckenmann still sees a lot of potential at present in the area of process improvements, which are implemented together with suppliers. "Collaboration often leads to solutions from which both parties benefit," the expert says.

» Customer purchase orders saw an abrupt plunge across the board, but the raw materials ordered for projected volumes were already in transit and could not be stopped. «

» Shipping containers were filling up the yard at our plant in Buford, USA, because there was no more material flowing off to production. «

» The entire industry was suddenly invoking force majeure clauses, even though this was not applicable. However, rather than debating the matter it was clear that we needed immediate action in order to contain the damage as much as possible. «

» The databases have to be accurate. Given the breadth of our product range and the fact that we operate almost 40 plants around the globe, it is essential that customers from the respective regions supply us with accurate data so that our operational processes can work. «

» At our American plants, we benefited from the fact that we had already established fast and flexible procurement structures due to US customs policies. «

» Our approach is based on the concept of total cost of ownership. When selecting a source we factor in not only the price of goods but also all procurement costs, including transportation, tariffs, and similar incidental costs. «

» When volumes suddenly slump, every supplier is eager to secure orders. That changes the negotiating position. «

» There are specific parameters for each material. Due to the supply chains involved, commodities tend to be negotiated on a long-term basis, but here too fluctuations in market prices are taken into account. «

» There are many ways to streamline costs. This may also include an adjustment to processes, for example, allowing suppliers to manufacture in a more cost-effective manner. «

Thanks to the rapid response measures by Supply Chain Management, the material backlog initially seen in factory yards was cleared by early summer. In fact, ElringKlinger actually reported a significant quarter-on-quarter reduction in inventory levels at the end of the first half. This favorable trend was also the result of a longer-term program: Jorin Preuß and his team are working continuously to reduce inventories throughout the global Group. This requires SCM employees to conduct an in-depth assessment of the various processes in order to be able to identify possible improvements relating to operational material flow. The aim is to be able to keep stock levels lower while theoretically maintaining the same output. ElringKlinger's recently shown ability to improve cash flow from operating activities is to some extent evidence of the company's success in this area.

»Reducing inventories without jeopardizing operational output requires in-depth knowledge of processes.«

In the third quarter, the pandemic-plagued year changed tack again – in a more favorable direction. Customer demand surged to such an extent in September that the supply of raw materials, which had previously been heavily reduced, could not be increased again as quickly as required. While so far ElringKlinger had been able to navigate through the pandemic without disruptions to the supply chain, late fall saw the emergence of bottlenecks that again posed a challenge for Purchasing. "We have always placed great importance on risk management, which also means scaling back dependencies. This too, however, has its limits," emphasizes Bernd Weckenmann, citing an example of several serial production orders within the area of Lightweighting. A supplier of plastic granules had not been able to offer the quantities needed. The search for alternative suppliers at short notice was compounded by another problem: the material used for the mass-produced parts has to be validated by the customer, i.e., approved in line with strict and time-consuming procedures. In this specific case, escalation was avoided only in collaboration with the customer. By involving the Sales team and maintaining a close dialogue with the customer, ElringKlinger managed to source replacement materials in time for production.

»In a tough exceptional case like this, supplier, producer, and customer have to pull together to avert the danger of escalation level 3, i.e., production line stoppage at the OEM. Risk management can minimize threats, but not eliminate them.«

»The supply chain is long when it comes to raw materials in particular. Once we have placed an order, our supplier in turn orders the production of the input materials from his upstream supplier.«

The SCM team headed by Jorin Preuß mastered a steep learning curve in the period up to the end of 2020. In pre-crisis times, the planning horizon in the systems was between six and twelve weeks. This system collapsed during the first lockdown of 2020. In response, the situation had to be reassessed very quickly. The ERP system deployed by ElringKlinger at the majority of the manufacturing plants around the globe proved instrumental in this context. "It allowed us to react very quickly and, ultimately, coordinate activities as part of weekly reviews," says Jorin Preuß in summary. Another crucial success factor was his team's close dialogue with customers on a daily basis.

»An important foundation was provided by our well-organized ERP information system, which is used worldwide. With it, we were able to make updates at short notice and were very flexible.«

Purchasing and Supply Chain Management can look back on an unusually challenging year, requiring tremendous efforts. Ultimately, however, ElringKlinger fared well. As with any challenge that has been overcome, the same holds true: it makes you stronger for the future. "We seized opportunities during the crisis and exploited them. Renegotiations helped us to improve our performance and raise our overall level of flexibility," summarizes Bernd Weckenmann. Jorin Preuß adds, "The crisis ruthlessly exposed specific dependencies, but at the same time it was precisely the aspects of close networking and intensive cooperation both internally and with customers and suppliers that proved instrumental in overcoming it." ■

»2020 was a year with a below-average enjoyment factor – but our commitment to partnership within the supply chain proved particularly valuable.

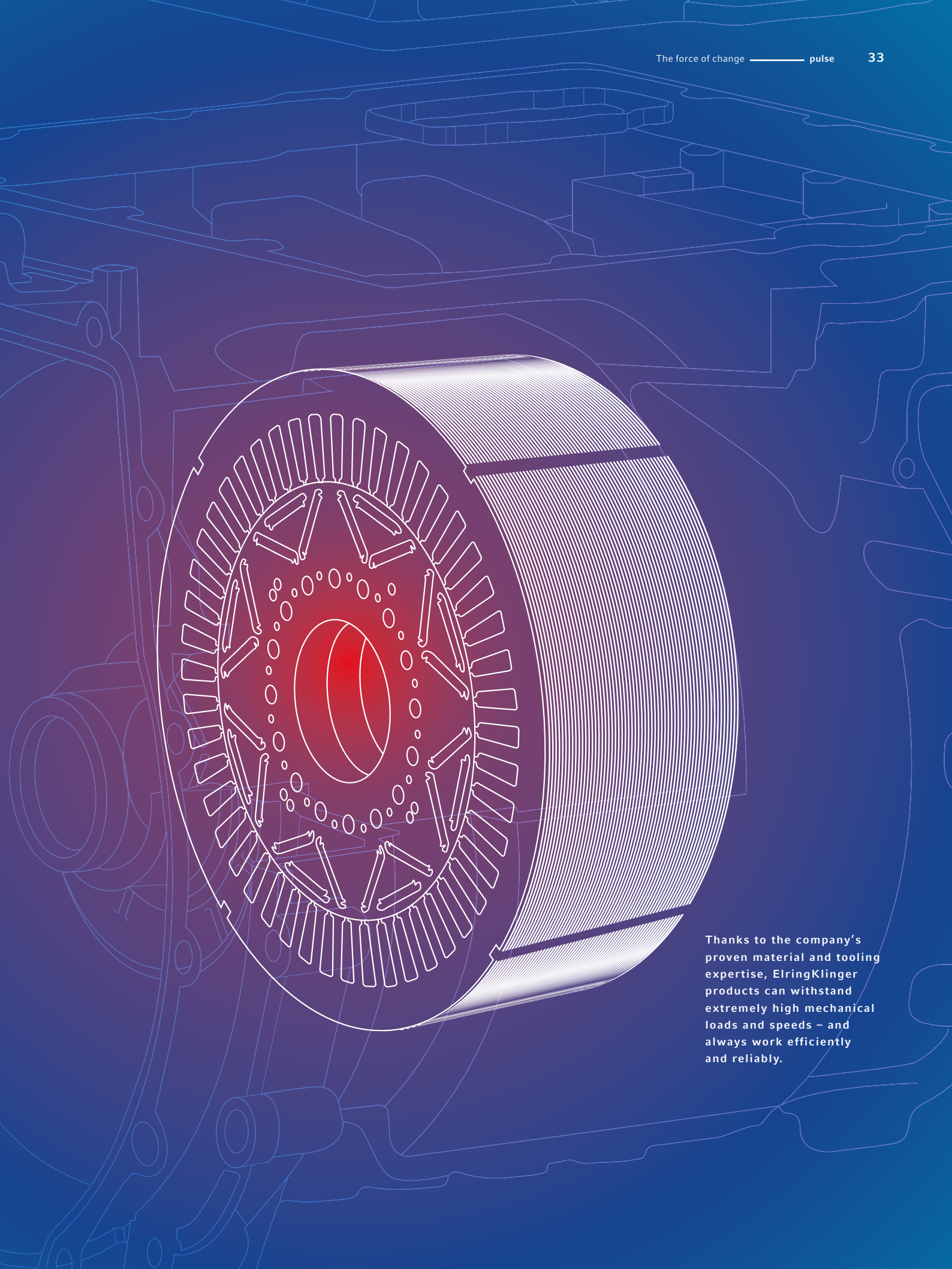
»In retrospect, we applied the brakes extremely hard at the beginning of the crisis. What counted in the end, were out agility and good interfaces with contractual partners. Despite low water levels, navigability was maintained and ElringKlinger remained on course in 2020.

# THE FORCE OF CHANGE

**ElringKlinger looks to a future that could not be more diverse. A "transparent" drive unit with dynamic precision parts and various sealing solutions for electric-powered vehicles shows how decades of experience in the manufacturing of conventional automotive components help when it comes to developing innovative products for next-generation technologies.**

Early one morning in August 1888, Bertha Benz set off on an adventure that would change people's lives. At the wheel of the Benz "patent motor car" model 3, she undertook the first long-distance road trip in automotive history, from Mannheim to Pforzheim and back again. By driving these 180 kilometers, she proved for the first time that the automobile had a big future ahead of it. Just like back then in 1888, society is today facing a fundamental change in the very nature of mobility. Whereas then, the shift was from coach to automobile, now it is completely new mobility concepts and technologies that are set to permanently change what is a key industry in many countries. The example of Bertha Benz shows that believing in one's own innovations as well as courage and staying power play an important role in achieving commercial success.

The force of change is also what is driving ElringKlinger, as the current transformation in the automobile industry is breaking up established processes, structures, and systems and calls for strategic realignment. This is a key challenge that the ElringKlinger Group has been helping to resolve for more than two decades, as it is the company's declared objective to steer its technological expertise successfully into the future.



Thanks to the company's proven material and tooling expertise, ElringKlinger products can withstand extremely high mechanical loads and speeds – and always work efficiently and reliably.

The development of the automobile has been remarkable. Whereas a good 130 years ago, Bertha Benz drove her combustion-engine-powered car noisily over stony tracks at around 20 km/h, modern electric cars can accelerate from 0 to 100 km/h in just 4 seconds and reach top speeds of around 200 km/h with hardly any noise.

Modern electric cars achieve this enormous power needed to accelerate the vehicle using an integrated electric drive unit in which electric motor, transmission, and drive shaft are combined into one unit. The electric drive unit contains both the power electronics and the overall drive control system and converts the direct current of the high-performance battery into three-phase AC power. The electric motor in turn converts this electrical energy into mechanical energy so that the transmission can transfer the torque to the wheels.

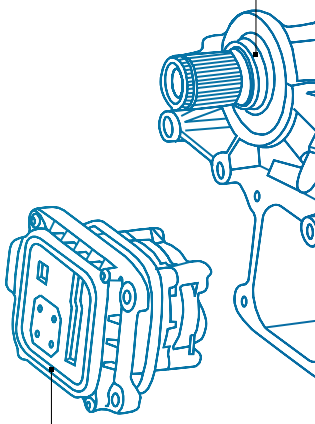
The products installed in electric cars must meet stringent requirements, because both speed and torque are many times higher than the respective requirements for a combustion engine. In this area, ElringKlinger is leveraging its extensive experience in punching, embossing, forming, and coating to transfer knowledge from the combustion engine environment to the new drive concepts. As regards the electric drive unit, for example, this knowledge is being applied systematically to develop and manufacture dynamic precision parts and customized sealing solutions.

As a development partner, ElringKlinger applies its expertise in precision punching and forming to the development of dynamic precision-formed and punched parts, the aim being to achieve performance increases in the vehicle through intelligent product design, while using the minimum of material possible and optimized manufacturing processes. A good example of this is the new stator and rotor concept. The stator and rotor represent the heart of every electric motor and are what enable an electric vehicle to be driven with high speeds of revolution and torques in the first place. To increase the performance of the electric motor and the cost effectiveness of the product, the development engineers have optimized no less than three key parameters: material thicknesses, joining technologies, and manufacturing process. The resulting benefits are a higher packing density, cost-effective machining of sheet thicknesses less than 0.25 mm, and the option of direct cooling of stators, which until now were integrated into a separate stator housing.

The electric drive unit also brings new challenges related to sealing. Because unlike combustion engines, where due to high pressures, the sealing systems guarantee a reliable seal of the various media – oil, coolants, fuels, and fuel gases – to the outside and between one another, the focus with electric drive units is on protecting the technologically sensitive areas from an ingress of media from the outside. So the direction is reversed. Therefore, the new sealing systems must meet special IP protection classes to prevent any media from getting into the interior of the sensitive system. This is precisely why the newly developed sealing systems differ from the previous systems used in combustion engine vehicles, in respect of both the composition of the elastomers used and the product design.

The electric drive unit pictured below shows that thanks to its abilities as a developer the ElringKlinger Group is already providing the answers to the questions of the future and mastering challenges in its capacity as a driver of innovation. Due to the continuing transformation of its product range, ElringKlinger made more changes to its organizational structure in 2020, by combining the Cylinder-head Gaskets and Specialty Gaskets business units into the new Metal Sealing Systems & Drivetrain Components business unit. As part of the same process, the Group repositioned the new business unit to combine metal sealing systems and precision punched and formed components for all kinds of drive systems with one another. ■

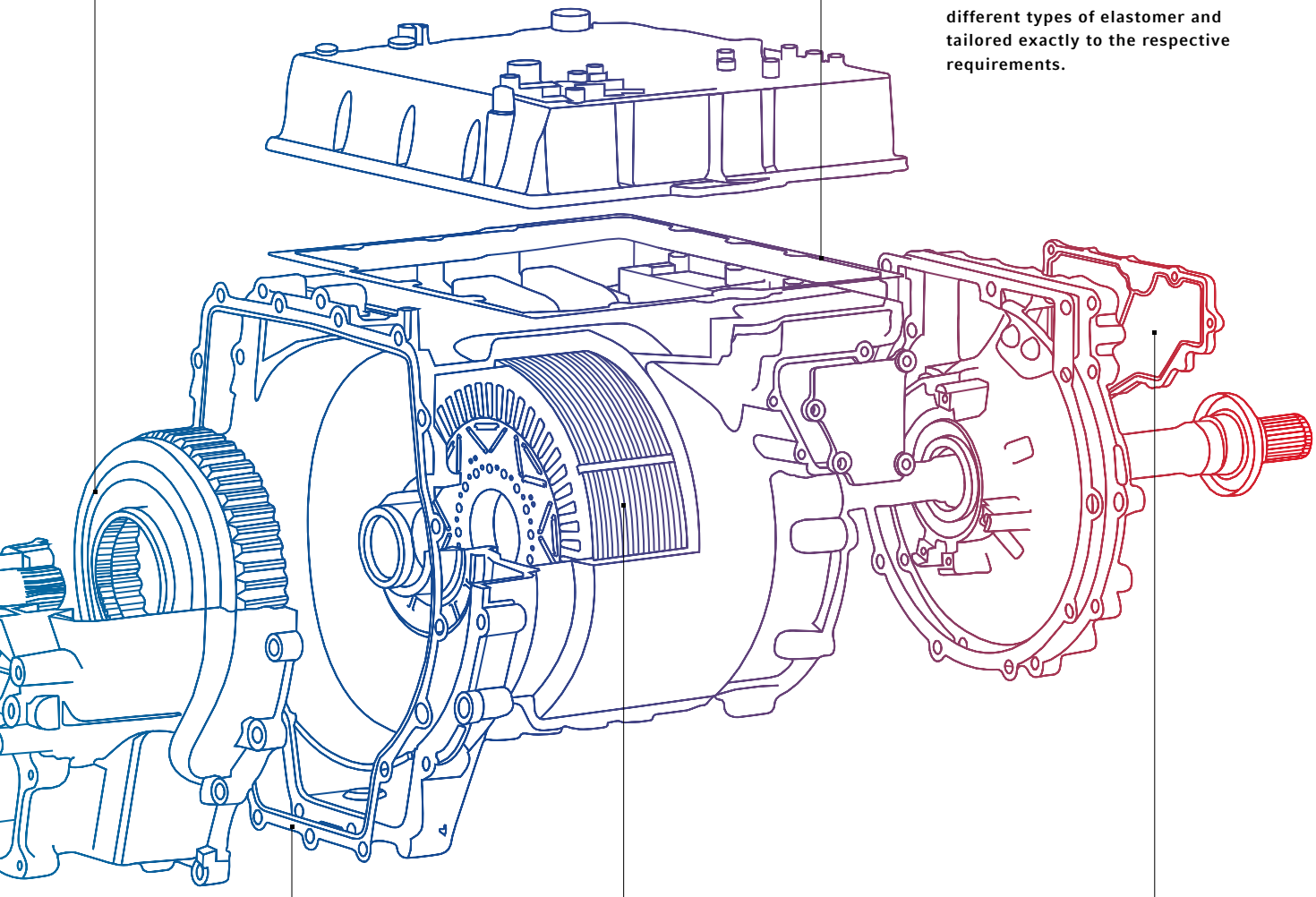
**Thanks to the use of fluoropolymer sealing technology, rotary shaft seals withstand high speeds of revolution, alternating directions of rotation, and high pressures and temperatures.**



**A pressure-boundary flanged connection has to be created for elastomer sealing systems in the case of load-carrying joints, e. g., by means of a groove in the component. Precisely matched profile geometries ensure maximum functionality at extremely low sealing pressures.**

Disc carriers are made of metal and are manufactured in just a few process steps in special dies using high-precision forming technology.

Metaloseal gaskets are based on elastomer-coated and uncoated metal carrier materials. Different metals can be combined with different types of elastomer and tailored exactly to the respective requirements.



In the electric motor, the rotor and stator ensure efficient operation thanks to their high packing density. A specially developed three-stage manufacturing process reduces the punching strokes while using thinner sheets to achieve the necessary package height.

Metal covers with an integrated seal cover and seal off the housing and passages in the electric drive unit. They can be used as a service cover, a cover for electronic parts, or a cover plate in engine and transmission.

Metal-elastomer seals are particularly suitable for sealing highly stressed components. Thanks to modern injection molding technologies, customer-specific elastomers can be bonded to a carrier material in metal or plastic.

# FAMILY

# TIES

Staff at ElringKlinger's Mexican site help to plant trees on 0.75 hectares of land.

ElringKlinger may be an international group of companies employing just under 10,000 people at 45 sites all across the world, but it has not lost its personal touch. And, when the going gets tough, the tough stick together. At the peak of the coronavirus crisis, for instance, when travel restrictions imposed by the authorities prevented a great many staff at the Chinese plant in Suzhou from returning after their New Year festivities and production was in jeopardy, an army of colleagues from Administration signed up to operate the machinery after being shown the ropes.

People from nearly 70 countries work within the ElringKlinger Group. They have different backgrounds and different walks of life. However, they are united by the same values that ElringKlinger also embodies: loyalty and responsibility, for example, but also reliability and appreciation. They treat one another with respect, offer mutual support, keep their promises, and take responsibility for their own actions. Just like in a family, in other words. This set of values counts for so much more when times are tough and is especially important for shaping team spirit when challenges can be overcome more easily by working together. And 2020 – the year of the global coronavirus pandemic – is a good example.

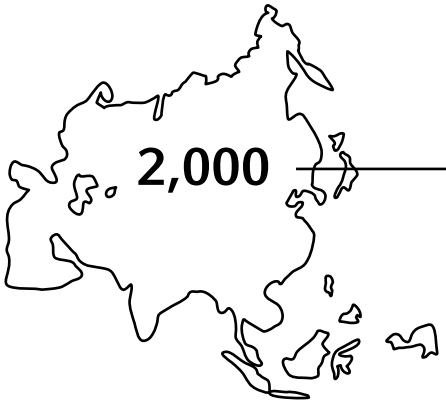
The employees in Asia were among the first to be hit by the impact of the pandemic. Even before the lockdown in Wuhan, where the virus is currently believed to have originated, initial measures were taken at ElringKlinger's sites in Suzhou, Changchun, Qingdao and Chongqing to do as much as possible to prevent it from spreading within the company. This rapid response meant that the Suzhou plant only had to be mothballed for as long as the official restrictions remained in force. Production was able to resume as early as February 10 with protective measures in place. As many employees were still unable to return from their Chinese New Year holidays on time as a result of various travel restrictions in the interior of the country and production was therefore at risk, an army of staff from Administration stepped up to keep production processes going following a brief induction – similar to one family member supporting another. When the staff did come back, they were obviously tested before resuming work. These prompt and, above all, comprehensive measures were the reason that not a single employee in Suzhou has been infected to date.

Since February 2020, volunteers at ElringKlinger's Changchun plant have been getting on the shuttle bus at the first stop every morning to take the temperatures of staff as they board. Besides the particular dedication being shown by these employees, this also demonstrates successful management work by departmental heads, who have been collecting and analyzing all coronavirus-related information and using it as a basis for recommending measures. But the departmental heads also agree that such a good result would not have been possible without the full support and extraordinary commitment shown by each and every member of staff. Last but not least, the successful efforts to suppress the virus at the Changchun site enabled a staff basketball tournament to be organized. Made possible thanks to a favorable infection situation, this sporting activity was important for employees' health and team spirit as well as providing a welcome change from the rest of the year.

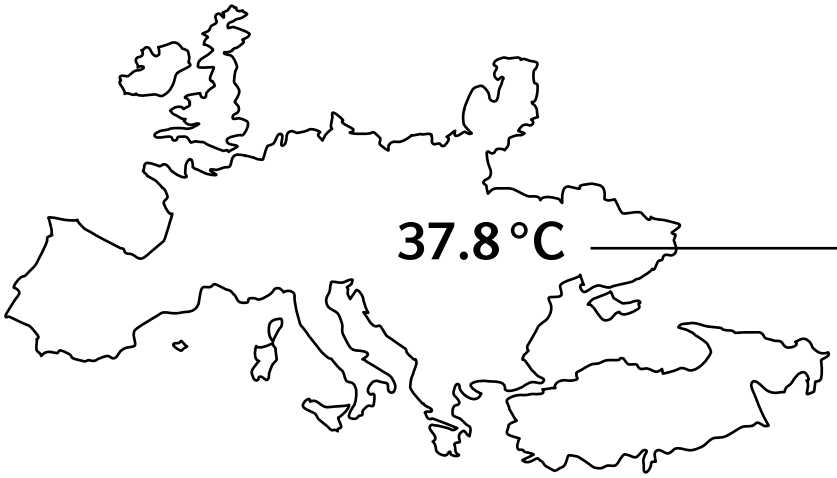
**Staff boarding the shuttle bus in Changchun have their temperatures taken every morning.**

**MARIO XU**
**is responsible for safety, security, hygiene, and the canteen at the Suzhou site in China. He has been working extraordinarily hard to implement safety measures during the covid-19 pandemic.**

The Gumi plant in South Korea also introduced measures at a very early stage and enforced them strictly, ensuring that not a single case has been reported among staff there until the beginning of 2021. Comprehensive measures were likewise implemented in India, where coronavirus infections peaked in mid-September, to provide employees with maximum protection. For instance, most administrative staff were given the opportunity to work from home, despite the fact that India's Internet and electricity infrastructure still has room for improvement, by providing them with hotspots. Like so many, however, our Indian ElringKlinger colleagues are not just taking care of themselves but are also looking out for others who have been hit particularly hard. One example of this came during India's first lockdown in March 2020: so-called migrant laborers were no longer being given work by local companies, leaving them out of a job. Although ElringKlinger does not employ any of these migrant laborers itself, colleagues recognized the difficult situation they were in and supported them by making up 2,000 food parcels. They also helped a local aid organization hand out food and water to homeless people.




**ElringKlinger staff in India put together 2,000 food parcels for migrant laborers.**




**Staff in Hungary needed a temperature below 37.8°C to be let into the building.**

# »As far as ElringKlinger is concerned, it is not just the company that is important – it is the whole local area the site is in.«

February and March 2020 saw the pandemic sweep its way from Asia to Europe in a wave. The sites all faced the same challenges: how can we protect ourselves while working together to curb the pandemic? Countless measures, such as temperature checks, PPE, social distancing rules and, where possible, working from home were introduced in order to keep the ElringKlinger family together and as healthy as possible. In Kecskemét in Hungary, for instance, all visitors and employees had their temperature taken and were only allowed into the building if it came up as less than 37.8°C. Many staff at the Hungarian plant spent their free time looking after elderly friends and relatives. In the Spanish city of Reus, some employees volunteered for welfare organizations or delivered food to the elderly and offered to chat to elderly and lonely people over the phone. After all, as far as ElringKlinger is concerned, it is not just the company that is important – it is the whole local area the site is in, be this Alberton in South Africa, Sevelen in Switzerland, or Dettingen/Erms in Germany. This is because people can only harness the full potential of their strengths in an atmosphere that is full of appreciation and respect. In Italy, where the pandemic had a devastating impact in March that put the whole of the rest of Europe on red alert, the plant was forced to shut at short notice to prevent an outbreak within the company. After setting up a task force that shared information and introduced measures that gave the ElringKlinger family as much protection as possible, the plant was able to resume production in May 2020.


**JORDI ARTIGAO AND ANA TRUJILO together with all staff in Reus, largely managed to prevent an outbreak of the virus at the Spanish site by taking decisive action.**

**Ana Trujilo is a member of a group that does elderly people's shopping for them, while Jordi Artigao supports an organization that arranges food for those in need.**


**Staff in Toluca donated 200 blankets to care home residents in need to keep them warm through the cold winter.**

The coronavirus situation in North and South America was also especially challenging.

As in Europe and Asia, the staff at the sites in the United States and Canada had to work together to combat the spread of the virus and its consequences. For instance, all employees and visitors in Burford, USA, were – and still are – required to pass through a full-body thermal scanner that takes their temperature. However, people are not just thinking about what is happening on the plant premises: staff are also supporting their socially vulnerable relatives and neighbors. Some are lending a hand in care homes, while others are looking after elderly relatives or helping to serve food to the homeless and socially vulnerable.

Mexico has also been affected by the global pandemic. ElringKlinger's Toluca site has not managed to prevent infections in the workforce despite taking extensive precautions. In fact, the site was hit so hard that four employees sadly lost their struggle against the virus, a somber moment for their colleagues and a devastating blow for their friends and families. You lose a family member, a colleague, a fellow human being, a friend.

**Fighting the virus on the front line: the medical and cleaning team at our plant in Toluca, Mexico.**

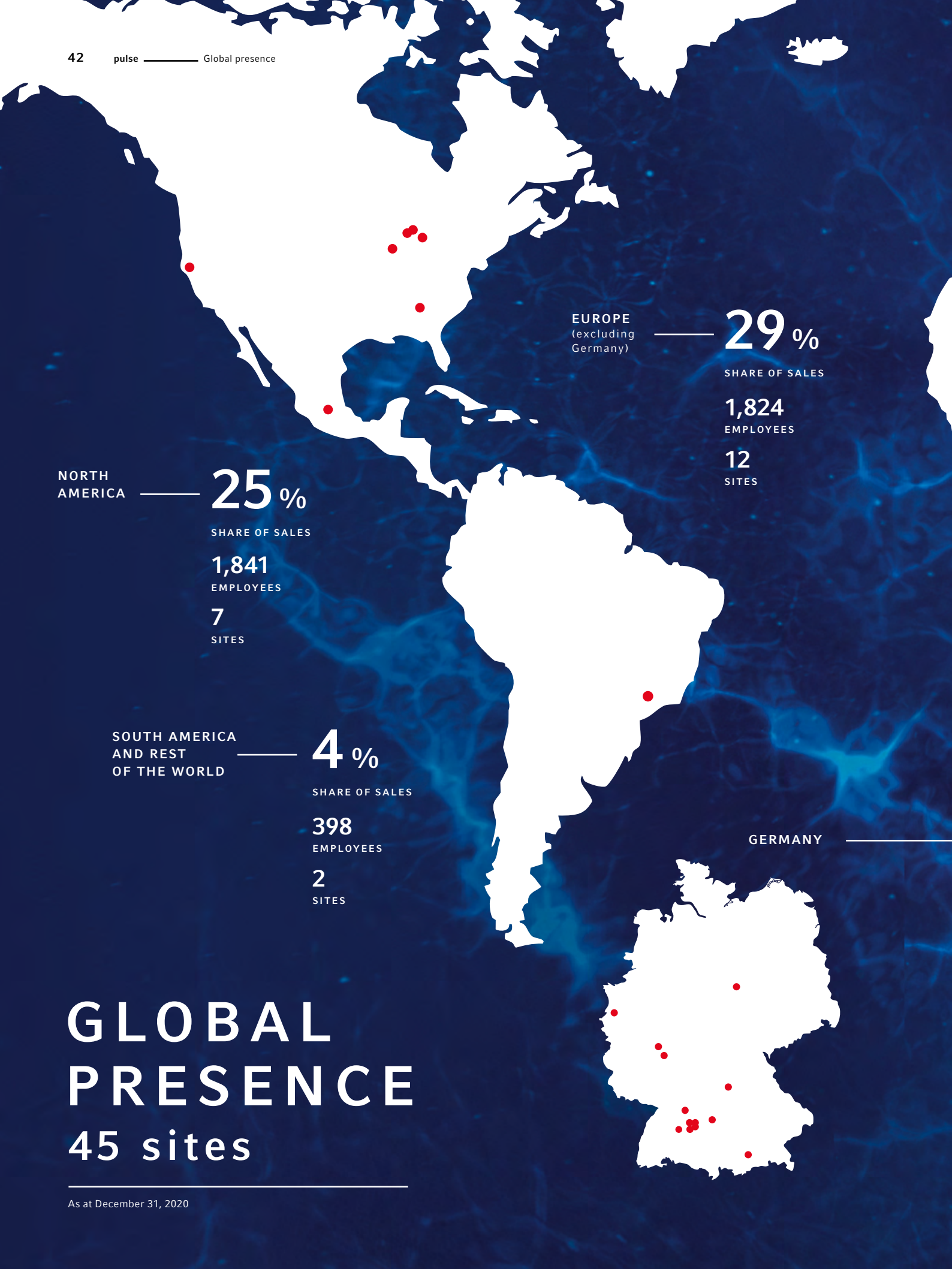
Especially in a situation like this, you stick together: to help ease the families' pain, colleagues at the plant showed their solidarity by providing them with financial support on their own initiative. This ensured that they would not have any money worries on top of their emotional anguish.

The Mexican plant in Toluca always places great emphasis on social engagement. As in previous years, employees donated more than 200 blankets to care home residents in need to keep them warm through the cold winter. And the youngest are not forgotten either: over 1,000 toys were given out to children at Epiphany. This is how staff show what is important to ElringKlinger: each site is like a family. Loyalty, responsibility, reliability, and mutual appreciation are what counts – in Toluca just as it is at all other ElringKlinger sites around the world. ■


**Two residents of a retirement home accept their warming blankets with thanks.**

**Children in Mexico are happy about donated toys at Epiphany.**

**»Each site is like a family. Loyalty, responsibility, reliability, and mutual appreciation are what counts.«**



EUROPE (excluding Germany)
29 %
SHARE OF SALES
1,824
EMPLOYEES
12
SITES

NORTH AMERICA
25 %
SHARE OF SALES
1,841
EMPLOYEES
7
SITES

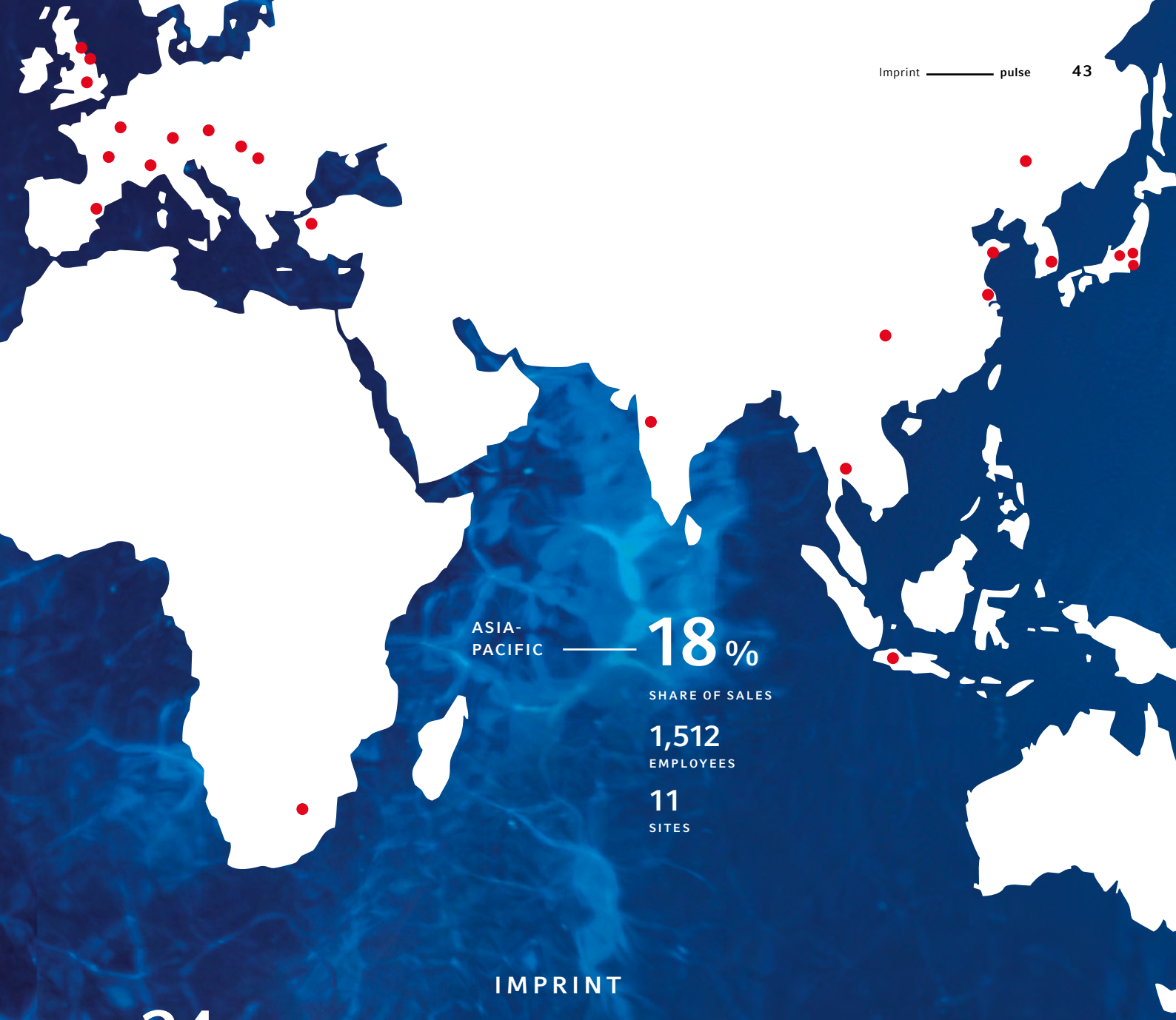
SOUTH AMERICA AND REST OF THE WORLD
4 %
SHARE OF SALES
398
EMPLOYEES
2
SITES

GERMANY

# GLOBAL PRESENCE

## 45 sites

As at December 31, 2020



ASIA-
PACIFIC

**18 %**
SHARE OF SALES

**1,512**
EMPLOYEES

**11**
SITES

**24 %**
SHARE OF SALES

**4,149**
EMPLOYEES

**13**
SITES

# IMPRINT

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Max-Eyth-Straße 2
D-72581 Dettingen/Erms
Germany
Fon +49 7123 724 – 0
Fax +49 7123 724 – 9006
www.elringklinger.com

## Editorial Team
Dr. Jens Winter (responsible),
Kathrin Graf, Niklas Hoss, Heiderose Mall,
Johannes Winterhagen

## Concept & Design
3st kommunikation, Mainz

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## Contact (Editorial Team)
info@ir.elringklinger.com

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For the purpose of readability, we have not used gender specific forms of grammer when referring to general designations of people. Specific terms relate to all people irrespective of gender.

**ElringKlinger AG**
Max-Eyth Straße 2
D-772851 Dettingen/Erms
(Germany)