

pulse

The ElringKlinger AG Magazine
Issue 2022

Sustainability enabler

ElringKlinger has its sights on its own carbon footprint and on its customers' too. The Group already has a transformed product range at its disposal – for emission-free mobility.

The whole package

From components to systems: ElringKlinger is a leading supplier of battery technology.

Concentrated power

Fuel cell drives form an integral part of next-generation mobility. EKPO's powerful stacks are suitable for a wide range of applications.



ElringKlinger – Facts & Figures

As an automotive supplier, ElringKlinger develops high-tech solutions for all types of drive system, the aim being to actively shape the present and future era of mobility.

EUR **1,624** MILLION

was the total revenue generated by ElringKlinger in the 2021 financial year.

5 %

of Group revenue was spent on research and development in the year under review.

9,466

people were employed by ElringKlinger around the globe as of December 31, 2021.

1879

More than 140 years ago, Paul Lechler laid the foundation for today's global group by establishing a trading enterprise for technical products and seals.

ElringKlinger

Follow ElringKlinger on the social media networks of Facebook, Instagram, LinkedIn, Twitter, Xing und YouTube.

» The transformation seen within our industry is gaining considerable momentum. ElringKlinger holds a formidable position when it comes to pursuing the mega trend of electromobility, both in battery and fuel cell technology. Drawing on our portfolio, we are actively shaping the process of transformation in the mobility sector, which includes reducing emissions, spearheading new drive technologies, and making conventional modes of transport more efficient. «



Dr. Stefan Wolf,
CEO of ElringKlinger AG

Dear Readers,

Hydrogen is a powerful source of energy with a multitude of uses. It offers major opportunities, both for industry and the mobility sector.

The fuel cell is thus a key drive technology for shaping next-generation mobility. However, ElringKlinger can do much more than that: in the field of battery technology, for instance, we can provide individual components as well as complete systems. We have aligned the Group consistently with the ongoing process of transformation and are one of the few suppliers to have already overhauled their product portfolio. This is because the race to transform has already begun and is getting ever faster. ElringKlinger positioned itself at an early stage and is among the frontrunners. In fact, those who have not been paying attention and have missed the start will find it hard to catch up.

Something else that I consider to be of importance: a global group can only function properly if everyone working for it does their bit and understands themselves to be part of a greater whole. ElringKlinger is more than just a company, as you will see.

We cordially invite you to experience the transformation of mobility at ElringKlinger for yourselves over the next few pages.



12

AHEAD IN THE RACE

The automotive industry is facing a transformation of historic proportions. Dr. Stefan Wolf, CEO of ElringKlinger AG, is joined by Hildegard Müller, President of the German Association of the Automotive Industry, to discuss how this transition can succeed.

SUSTAINABILITY ENabler

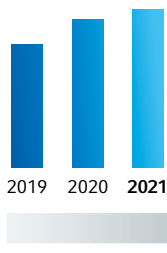
Curbing global warming is the most significant and urgent task facing our society as a whole. Explore the innovative solutions ElringKlinger already offers and implements to reduce its carbon footprint.

18



34

STRONG PERFORMANCE



At the beginning of 2019, ElringKlinger AG implemented a global program aimed at raising its efficiency levels. Today, the Group is in a much stronger position when it comes to shaping the process of transformation. A chance to take stock.

Contents

- 06 Sustainability is what drives us
- 12 Ahead in the race
- 18 Sustainability enabler
- 24 The whole package
- 28 Concentrated power
- 34 Strong performance
- 40 Material flows
- 44 At the cutting edge
- 48 11 questions to 11 sites
- 52 Global presence

48



11 QUESTIONS TO 11 SITES

What drives progress in China and what parallels are there between mountaineering and day-to-day work? Read the exciting answers here.

Sustainability is what drives us

It has always been our mission to meet the challenges of our times and show responsibility in the process. We embrace these challenges and turn them into opportunities – in a way that protects our environment and benefits society as a whole. Building on our innovations, we are already making sustainable mobility a reality and ensuring that harmful emissions of nitrogen oxides and hydrocarbons are reduced. We also want to be a carbon-neutral company by 2030 and achieve full climate neutrality by 2045. Together with all our employees, we are working day in, day out to successfully shape the transformation of mobility. After all, there can be no future without sustainability.

20 years

ElringKlinger has been researching and developing new drive technologies for over 20 years.

Read more about the transformation under way in the automotive industry in the CEO's interview with Hildegard Müller on [page 12](#).



2030

ElringKlinger has produced a clear roadmap for becoming carbon-neutral in net terms by 2030.

Read more about ElringKlinger's responsibility toward the environment and society in the "Sustainability Enabler" section on [page 18](#).



A woman with brown hair tied back, wearing a white lab coat, is working in a factory. She is looking towards the right, where a large, grey, rectangular piece of industrial equipment is mounted on a metal table. She has her hand on a handle of the equipment. The background shows a bright, modern industrial facility with large windows and overhead lights. A blue diagonal graphic element is in the top left corner, and a green and blue textured graphic element is in the bottom right corner.

6.2 kW/l

Boasting a performance density of up to 6.2 kW/l in a block of cells, the fuel cell stacks from EKPO Fuel Cell Technologies are ahead of the field.

Read more about the joint venture with Plastic Omnium in the “Concentrated Power” section on [page 30](#).



62 countries

ElringKlinger maintains a global presence in order to keep customers in its Original Equipment segment supplied locally in 62 countries.

Read more about the Group's worldwide supply chains in the "Material Flows" section on [page 44](#).

AHEAD



IN THE RACE

The car as we know it is evolving. In the future, it will be powered by new drive technologies, offer the experience of digital worlds, and drive around with increasing autonomy. The automotive industry is thus on the cusp of a historic transformation: powertrains, business models, connectivity – everything is being re-envisioned. Dr. Stefan Wolf, CEO of ElringKlinger AG, talks to Hildegard Müller, President of the German Association of the Automotive Industry, about how this transformation can succeed.



Ms. Müller, Dr. Wolf, if you were to compare the transformation in the automotive industry to a Formula 1 race, what stage would we be at?

Hildegard Müller: Following a barnstorming start, we're now coming into the first bend.

Dr. Stefan Wolf: I'd say the same, but also that the race is now picking up speed very quickly.

By "first bend," you mean that the race still has a long way to go.

Müller: For a transformation to succeed, you need to be able to take the long-term view. You can tell that it's still early days in the race because the political and legal framework has only just been put in place. Every race needs its direction and route to be clearly marked out like this. And now it is: Germany's new coalition government wants 15 million electric cars by 2030, and the EU's "Fit for 55" package includes the target of reducing CO₂ emissions by 55 percent by 2030 compared with 1990 levels. These are some ambitious goals, and Germany's automotive industry is ready to really get motoring for the mammoth task that this transformation represents.

How would you rate the chances of the German automotive sector in this race?

Wolf: Though the German automotive industry might not be ahead across the board at the moment, German technology is the global leader in many areas. Overall, we're in a strong enough position to be well out in front. Success will hinge on our ability to launch technical developments that can be marketed globally. Rather than being restricted to Germany or Europe, climate action is a global issue. With the combustion engine, German carmakers and suppliers have demonstrated for many years that they can develop the best technology in the world. Now we need to get ahead when it comes to these new technologies as well.

Müller: However, it's also clear that a race like this is going to have the odd tight curve and other surprises in store. Just think about Formula 1, when the heavens suddenly open and teams need to react quickly and switch to different tires. This is exactly the challenge facing us in the automotive industry: we need to be responsive. However, the government needs to play its part too. It has to make sure that we've got the best possible setup so that we really can perform to our full potential.



The meeting took place at Berlin's China Club, a stone's throw from the Brandenburg Gate.

What measures are you thinking of specifically?

Müller: Three things. First of all, any country that sets ambitious climate targets must also ensure that it makes itself the best place for industry to do business, in terms of taxes, charges, levies, and energy costs. Second, the infrastructure that this transformation requires has to be in place – both digital infrastructure and enough charging stations and energy. This is crucial, because it's already clear that the amount of renewable energy we're producing won't be sufficient to meet the huge quantities of electricity that we'll need on a daily basis in Germany in 2030. Third, geostrategic challenges have become more important in recent times – this is something we're seeing at the moment with raw material shortages but also with economic disputes between countries. For all three things, we in the automotive industry are reliant on the government taking action. In other words, we can't win the race on our own. We'd like to call on everyone involved in this transformation to now roll up their sleeves and make a committed contribution.

Wolf: Although we shouldn't forget a key player in all this: the consumer. Regardless of what targets the government sets, it is ultimately consumers who will decide whether electromobility is going to be a success. And they won't buy an electric car unless they can

be sure they'll have enough places to charge it. And do so cheaply. And not only in Germany, but also in France, Spain, or Italy, because people like to be able to take their car on holiday, after all. We need a pan-European solution to this problem.

Müller: With the wide range of issues, you quickly realize that it's not enough to simply pick a target and say: "Right then, off you go and meet it!" Will we achieve the goal of transformation? Yes, that's what we're working toward. As for how we'll do it, however, that's undecided to a certain extent. We'll keep on making minor adjustments to the course we've set; we'll see technical innovations that bring us further forward. What we mustn't forget in all this, and here I agree completely with Dr. Wolf, is considering people's day-to-day reality. We can't be allowed to overburden consumers – we have to convince them. That's the key to a successful transformation.

One of the realities is an uncertain global situation. All it takes is a ship stuck in the Suez Canal to throw the global economy off balance. And then there are conflicts, protectionism, the pandemic. Dr. Wolf, what has your experience of this volatility been like as a company?

Wolf: There are bottlenecks in supply, no doubt about it. All the talk is of memory chips, and those are definitely thin on the ground, but there's a host of other shortages that are hitting us even harder. We've got supply issues with steel, aluminum, and plastic pellets. Plus energy costs are skyrocketing, particularly in Germany: we operate at 45 sites around the world, and our German ones pay by far the most for their energy. Although I'm confident that these bottlenecks will sort themselves out, the situation is making planning a challenge at the moment.

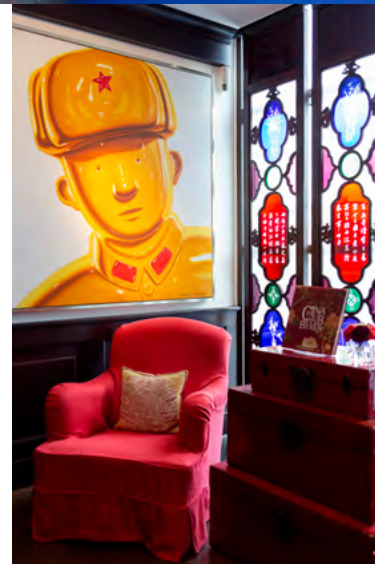
Faced with these volatile circumstances, how can companies in the automotive and supplier industry succeed?

Müller: As a company, it's never a bad idea to strengthen your core areas of expertise, i. e., take the things that you can do better than everyone else and develop them further. However, the boundaries between industries are definitely becoming blurred. Digitalization is opening the door to completely new business models, and companies will benefit from asking themselves again and again if there are any new sectors they might move into. These are turbulent times, no doubt about it. But times like these always present opportunities to companies as well. The way in which ElringKlinger has evolved is a prime example, as we know.



» People want freedom, which is why individual mobility will also be the most important factor in 2050.«

Dr. Stefan Wolf, CEO of ElringKlinger AG



» We can't be allowed to overburden consumers – we have to convince them. That's the key to a successful transformation.«

Hildegard Müller, President of VDA



Wolf: It's true that we began our development work as many as 20 years ago, first with stacks and then with complete systems for fuel cells. We started with battery technology about 15 years ago and are now able to mass-produce both technologies. These strategic decisions were born out of my prediction that the number of vehicles fitted with combustion engines was going to decline some day. I wouldn't have expected this to happen so quickly but I was sure it would eventually. And as we as a supplier were so heavily dependent on the combustion engine back then, it was my job as a businessman to find ways of offsetting this loss we were anticipating.

What was your starting point with these considerations?

Wolf: I asked myself "What can we do?" Make layers of cylinder-head gaskets, for example: thin metallic plates – punched, stamped, heat-treated, and coated. And what do you need for a fuel cell stack or for cell connectors on the battery module? Thin metallic plates –

punched, stamped, heat-treated, and coated. Our task was therefore to take what we could already do and apply it to new products. We succeeded in this, which is why we are already a good distance ahead of the companies that are only now embarking on the process of transformation.

Sounds really straightforward.

Wolf: Wasn't always, though. [laughs] I can remember some tough discussions at Supervisory Board level, when we on the Management Board needed yet another EUR 10 or 20 million for investments. Back then, I was often confronted with the same question: "When is all this going to pay for itself?" Nowadays, even these critical voices know what it was all in aid of.

Müller: It's this ability of the entrepreneur to take the long-term view that invariably turns German automotive companies into global market leaders. You need a certain amount of strength to say: the investment we're making today won't pay off until ten years' time. That's not always easy to get across, but I'm sure that it will be similar for climate action: we're investing now for a return that won't come until later but, when it does, will bring lasting success.

Looking ahead to 2030, what kind of mobility will we be experiencing? What role will the car play?

Wolf: A lot of the vehicles on the road will be all-electric, and many trucks and commercial vehicles will have fuel cells. However, there'll still be hybrid versions, i.e., ones that combine electric motors and combustion engines. Many of the advanced cars will already boast autonomous driving as well as a modern and attractive design. In a nutshell: fantastic products that we will be successfully marketing all over the world from here in Germany. And it will be equally attractive for young people to work on pioneering technologies in our industry. We're already seeing great interest in jobs in these areas among up-and-coming engineers.

Müller: As a general principle, I don't really agree with the idea that the next few generations will be much less interested in cars. The latest figures show that more and more young people are owning a car. So young people are clearly becoming more enthusiastic about driving one – and this trend will become even more pronounced if vehicles become an increasingly autonomous, digital, and climate-friendly way of getting around. This will make driving a car a completely different feeling. Of course, however, we have to rethink mobility and need our various modes of transport to be better connected – particularly in cities.

Will we still be driving a car in 2030 – or will we be “car users” instead?

Müller: More so a user, I’d say. There’s a great benefit to be had from this, as we’ll be able to use our traveling time for other things – reading, working, playing. And driving will become even safer, cleaner, and more convenient.

Wolf: Plus there’s the fact that the car will become a communicator. Much more than now, it’ll take on the role of a mobile office in which we work within our network, make calls, and hold virtual meetings. And, while we still tend to be sealed off from the world around us when we’re driving around nowadays, in 2030 cinemas, concert halls, or restaurants that we pass by will be able to transmit relevant information into our car via digital media.

Müller: As someone who’s always on the lookout for good restaurants, I can’t wait for that. [laughs] There’s also the prospect of completely new parking guidance systems that make it much easier to find a parking space. While this is mainly an issue for the big cities, we’ll find autonomous driving systems taking over some of the work of local public transport in rural areas and thus significantly improving the range of mobility services available there. We’ll always succeed with these new services in those cases in which we’re able to give people what they need and help them live their lives. Mobility means participation – and the car is the guarantee of this participation.

Here we are sitting in the unique atmosphere of the China Club in Berlin, so let’s talk about China: how is this market developing as far as the German automotive industry is concerned?

Wolf: China is and will remain a massive growth market, and it would be negligent to risk our commercial success for political reasons. If we lose ground over there, it’ll threaten jobs and thus prosperity here in Germany. Although we too are concerned about the human rights situation in China, it’s my firm belief that restricting economic contact can’t bring about an improvement in any way. Quite the opposite, in fact: every broken connection will jeopardize dialogue, especially since companies from other countries are just waiting to push into these markets – and that can’t be beneficial for the German economy.

Müller: Dr. Wolf is right. Allowing talks to break down is the worst thing you can do in a situation like this. As a general principle, I think that business should communicate its role as an enabler of dialogue and positive

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Dr. Stefan Wolf, CEO of ElringKlinger AG

developments more clearly. Companies are key players in society that are playing a crucial role in helping to shape the future. Directly and indirectly, the German automotive industry employs nearly four million people in this country. So the companies in our sector have a lot of responsibility, which they are also largely fulfilling, e.g., via their various forms of engagement or their development of forward-looking technologies to help protect the climate. Let’s tell people about it! Dr. Wolf, as a positive, constructive person who’s committed and fond of discussion, you’re a very good example in this respect. That’s very helpful and, yes, we need more people like you.

Let’s end with a little thought experiment: if you think about mobility in 2050, what’s the first thing that comes into your head?

Müller: I’ll be sitting in an autonomous car and enjoying wonderful features that I can’t even begin to imagine today. I’m happy to let myself be surprised by the inventiveness of the manufacturers.

Wolf: People want freedom, which is why individual mobility will also be the most important factor in 2050. Cars will look different. They’ll be able to do some fantastic things, but their main job will still be to take people from A to B: fast, in comfort, and without harming the climate.

The interview was conducted by André Boße.





» Mobility means participation – and the car is the guarantee of this participation.«

Hildegard Müller, President of VDA

Hildegard Müller has been President of the German Association of the Automotive Industry (VDA) since February 2020. Her career began with a banking apprenticeship at Dresdner Bank. She graduated from Heinrich Heine University Düsseldorf in 1994 with a degree in business administration. After university, she returned to Dresdner Bank, with her final role there being as Head of Department. She was a member of the German Bundestag from 2002 to 2008 and a Minister of State under Chancellor Angela Merkel between 2005 and 2008. In 2008, she took over as Chair of the Executive Board of the German Association of Energy and Water Industries before going on to be Chief Operating Officer Grid & Infrastructure at the energy firm Innogy.

SUSTAINABILITY ENABLER

The biggest and most urgent task facing our society is to limit global heating in order to protect the glaciers and permafrost, prevent extreme weather events, and preserve biodiversity – a mammoth undertaking that will require a concerted effort if it is to succeed. Limiting the global rise in temperature calls for innovations that bring about a direct reduction of the world’s carbon footprint – solutions such as those ElringKlinger is already able to deliver and offer. This is because, as a global company, the Group is actively fulfilling its responsibility toward the environment and society in terms of both its products and its production.



Humanity is heating the Earth up. All parts of the climate system – the oceans, the ice caps, the soil, the atmosphere, and the biosphere – have warmed significantly in recent years. The cause? Industrialization. Although it has brought progress and prosperity, it has also burned huge quantities of fossil fuels and continues to do so. The air on the Earth’s surface is now around 1°C warmer than before the Industrial Revolution. The consequences of rapid global heating are as diverse as they are serious. Forest fires and severe storms are just a few examples of extreme weather events that are posing ever greater challenges. If action is not taken, sea levels will rise by over one meter by 2100 according to the Intergovernmental Panel on Climate Change (IPCC), posing a further threat to millions of people around the world that live at sea level. A one-meter rise in sea levels would make some 15 million people homeless in Bangladesh alone, plus a further 2.5 million or so in the Nile Delta. Climate researchers are in no doubt that any additional warming will require stronger, more costly adaptation measures to keep our Earth in equilibrium. The more rigorously we work to reduce greenhouse gas emissions, therefore, the more we will mitigate the other consequences of climate change.

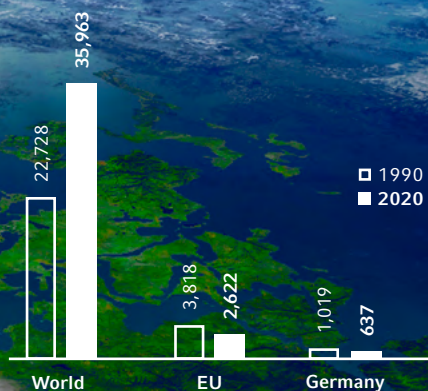
CO₂ emissions, CO₂ reduction, and carbon neutrality are terms that have now entered our everyday lexicon, that are shaping the spirit of our times, and that are synonymous with our global responsibility. Yet rather than cutting down, humanity is pumping out more and more carbon dioxide: global CO₂ emissions have risen by nearly 60% over the past 30 years. The transport sector accounted for around a fifth of all CO₂ emissions in 2020. As a result of globalization and the associated increase in traffic volume, it likewise

generated much higher CO₂ emissions than in 1990. However, more and more countries are showing signs of reversing this trend. They are setting climate targets and underpinning them with specific measures, serving as role models, and leading by example. This is about climate justice and many small reductions adding together to produce a drastic cut in total emissions – requiring efforts by countries and companies as well as each individual person on the planet.

The mobility transition is a prime example. It shows how innovations can significantly reduce energy consumption and thus emissions in the transport sector without restricting mobility. Electromobility holds the key to climate-friendly mobility in this respect insofar as electric vehicles are run on electricity or hydrogen generated from renewable sources. The carmakers that have announced plans to drop the combustion engine within the foreseeable future already represent 80% of the global market. The variety of electric car models available is increasing exponentially, and the expansion of charging infrastructure is also progressing space.

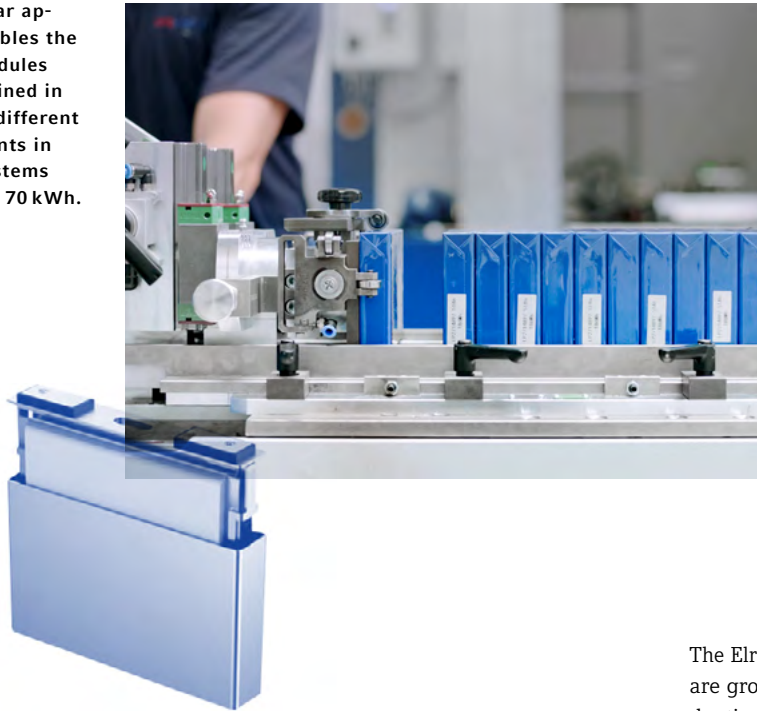
In other words, the transformation is already well under way in the automotive industry, and ElringKlinger is right in the thick of it. The “it” here is a new world of products where the focus is no longer on a vehicle’s fuel consumption and engine power but rather on its range and charging time. To this end, ElringKlinger took the step of expanding its product portfolio in line with its core areas of expertise at an early stage and has evolved into a leading innovator and pace-setter in several areas following a technology-agnostic approach. Many products are already helping to reduce emissions in mobility or even eliminate them entirely.

Total CO₂ emissions in millions of metric tons¹



¹ EU Commission. “Edgar” Emissions Database for Global Atmospheric Research

The modular approach enables the battery modules to be combined in numerous different arrangements in storage systems from 2.2 to 70 kWh.



800 v

ElringKlinger's battery systems achieve a total system voltage of up to 800 V.

ZERO EMISSIONS

ElringKlinger's zero-emission technologies include battery and hydrogen fuel cell technology as well as electric drive units. Battery-powered vehicles are more technologically developed, ready for the mass market, and cheaper to buy. Their hydrogen-powered counterparts, by contrast, are quicker to fill up, achieve longer ranges, and tend to contain much smaller and more lightweight battery packs. In both areas, ElringKlinger has the development and manufacturing expertise necessary to offer modules and components suitable for series production. After all, both technologies have a role to play in making mobility as a whole climate-neutral. On the one hand, battery technology has clearly come out on top for short to medium-length trips in the passenger car segment as refueling time is less of an issue here. On the other hand, the hydrogen fuel cell is proving increasingly popular for long journeys and heavy-duty transport since the vehicles can travel further in relative terms without having to stop for fuel.

ElringKlinger is actively driving carbon-neutral mobility forward – on the roads, off the roads, on the rails, and in the water. The Group considers all the relevant up- and downstream environmental issues at an early stage, while development is still ongoing. This is particularly important in order to prevent the risk of natural and non-renewable resources being exploited.

The ElringKlinger Group's battery technology operations are growing fast on both the development and production sides. Developers are aiming to increase the acceptance of battery-powered vehicles through technological progress, so the focus in all developments has always been on solutions for the most important purchasing criteria: range and charging speed. And this is why the latest battery concept for a manufacturer of sports cars consists of a pack with over 400 pouch cells that enable a capacity of over 70 kWh. Armed with 800 V technology and a particularly efficient cooling system, a battery capacity of 80% can be reached in as little as five or so minutes when the sports car is being charged. Alongside fast-charging technology inside the electric car, there is also a need for ultra-fast charging stations, and it was precisely with this in mind that ElringKlinger has developed another 800 V battery storage system with its own prismatic modules and readied it for series production. Arranging these batteries in parallel produces a level of capacity and power for autonomous fast-charging stations that the conventional power grid cannot yet guarantee.

Besides the passenger car segment, ElringKlinger is also focusing on off-highway markets for its batteries. The Group believes that there is potential in agricultural and construction machinery, electric boats, and small commercial vehicles. Just like carmakers, the key players in these segments are also facing the challenges of manufacturing climate-friendly products. The modular approach followed by ElringKlinger's battery modules offers a crucial advantage in this regard as it enables a wide range of applications in different-sized storage systems within a short space of time.



The most powerful stack module can supply energy to trucks as well as ships and trains. It contains 598 cells and has an electrical output of up to 205 kW.



Alongside battery technology, the fuel cell is also on the rise – in both passenger and goods transport. Unlike in a battery-powered vehicle, the power inside a fuel cell vehicle is generated in situ, meaning no lengthy interruptions for charging. Once fuel cells are being manufactured in sizable quantities, they will be competitive in terms of their unit price. ElringKlinger thus sees considerable potential with regard to performance, costs, and reliability. In partnership with French automotive company Plastic Omnium, ElringKlinger has been actively – and successfully – driving forward hydrogen-based mobility since 2021 through EKPO Fuel Cell Technologies GmbH, the joint entity set up specifically for this purpose. Its order book is filling up, and its highly efficient manufacturing processes and automated production capacity can already handle up to 10,000 units – fully audited and in proven automotive quality. The product range includes PEM fuel cell modules with stack-type peripheral equipment as well as various stack components such as metallic bipolar plates and end and media modules. Across three different electrical power classes, the stack modules – which are ready for series production – currently cover a range from 76 kW to 205 kW. These are the kind of levels that are needed for passenger cars as well as truck, rail, and marine applications. The modules represent a benchmark in terms of power and performance density and are setting international standards.

We need both battery and fuel cell technology in order to make mobility as a whole climate-neutral.

Interested customers currently include bus, truck, train, and ship manufacturers as well as companies that make off-highway vehicles such as construction machinery and municipal vehicles. This is because these vehicles also need to deliver maximum efficiency and performance if they are to be designed for long-term, multi-shift operation. The Group also entered into a strategic partnership with the aerospace corporation Airbus in 2020 in order to work together on developing and validating fuel cells suitable for use in aviation applications as well over the next few years.

The Group's pioneering spirit is as strong as ever and has ensured that, through its existing product portfolio, ElringKlinger is already in a position to make an active contribution to protecting the climate. It will also be this spirit that guides the Group successfully into the future – through innovations that overcome technological boundaries and, above all, steer the world toward greater sustainability.

LESS EMISSIONS

Instead of watching from the sidelines, ElringKlinger is leading by example. This is because the climate plans that many governments have unveiled to date will not be enough to achieve the 1.5 degree target under the Paris Agreement. Together with all its employees, therefore, the Group is rolling up its sleeves and intends to become carbon-neutral in net terms in 2030 and fully climate-neutral by 2045. The journey there will be long and full of challenges waiting to be solved. But it is an investment in the future that will pay off – for the company, for future generations, and for the environment. This is why the Group has produced a clear roadmap, one that leads to climate neutrality.

In a first step, all of ElringKlinger's German sites will switch to carbon-neutral production as from 2021. This means that all Scope 1 and Scope 2 emissions – i. e., all direct and indirect emissions within the company itself – will be cut significantly in line with the Greenhouse Gas Protocol.¹ To this end, all existing electricity supply contracts will be switched to green electricity first of all. Carbon neutrality at all European sites will then follow in 2025, with all sites around the world set to embrace carbon-neutral production by 2030. At the same time, the Group is working to reduce its Scope 3 emissions, i. e., those generated up- and downstream along its entire value chain.

Achieving climate neutrality is a project on a truly stupendous scale that will occupy and shape the Group for many years to come.

The Group has defined four fields of activity to structure the numerous measures that are being implemented on the road to climate neutrality: (1) increasing energy efficiency; (2) using more renewable energy; (3) switching to green electricity; and (4) offsetting any completely unavoidable CO₂ emissions by investing in CO₂-reducing projects outside the company.

In the first field of activity, the energy efficiency of all the Group's buildings and facilities is being assessed and optimized. The company's production sites have been tasked with reducing their CO₂ emissions by at least 2.5% a year relative to the baseline year of 2019. This reduction can be achieved by optimizing processes, via replacement investments or through the targeted modernization of buildings. The second field

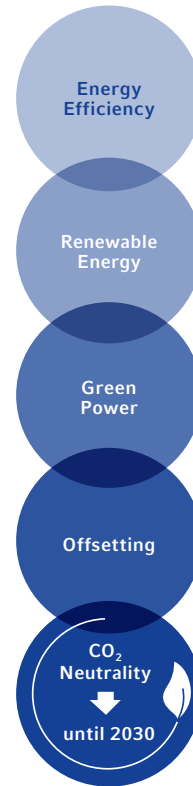
ElringKlinger built a new PV installation at its Indian production site in 2021. Nearly as big as two soccer pitches, it will supply the plant with green electricity from 2022 onward. With a capacity of 1.2 MWp, the PV installation is calculated to generate almost as much electricity as the plant needs in a year.



¹ The Greenhouse Gas Protocol (GHG Protocol) is a globally recognized standard for measuring and managing greenhouse gas emissions. It distinguishes between direct Scope 1 emissions and indirect Scope 2 and Scope 3 emissions.



The wind turbine in Redcar generates approx. 1,400 MWh of green electricity at an average wind speed of 6.1 m/s. This saves some 600 tons of CO₂ a year.



4

fields of activity have been identified by the Group on its journey toward carbon neutrality.

of activity is about building more installations that generate renewable energy wherever this is technically feasible and makes commercial sense. The third field involves switching all electricity supply contracts to electricity generated from environmentally friendly renewable sources. In the fourth field, all unavoidable CO₂ emissions are to be offset by investing in targeted projects designed to protect the climate. The Group is expressly committed to keeping these offsetting payments as low as possible, however, because ElringKlinger wants to become climate-neutral through its own efforts.

Alongside these steps, ElringKlinger is also setting aside 1% of its planned investments for energy-saving measures every year. All sites can put their own projects forward for a slice of this budget to compete for the chance of securing funding. The focus will then be

on those projects that promise the greatest reduction in CO₂ per euro spent as well as on those measures that will achieve significant energy savings.

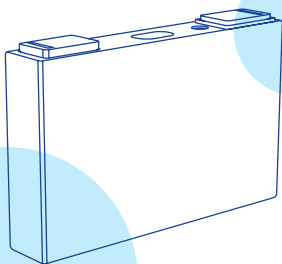
Achieving climate neutrality is a project on a truly stupendous scale that will occupy and shape the Group for many years to come. What makes this project unique is the fact that all staff across the Group are part of it and will drive it forward together, both on the product side and the production side. After all, ElringKlinger can and will only make a positive contribution to protecting the environment and achieve climate neutrality if everyone pulls together. As a "sustainability enabler," ElringKlinger has its sights set not only on its own footprint but on its customers' too. This is why the Group already has a transformed product range at its disposal that can unlock emission-free mobility.

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BACK PACKAGE

ElringKlinger set a course for tackling the challenges of transformation at an early stage. At a time when electromobility was seen as an idea embraced only by those with a visionary mindset, the Group was focusing on how it would be able to help shape mobility not only in the coming years but over a number of decades. The company's current orders for its battery technology prove that adopting this farsighted, long-term strategy early on was the right move. As an established full-service supplier for electric drives, ElringKlinger combines many years' experience with extensive expertise, allowing it to develop and manufacture a broad range of products from single components through to innovative end-to-end solutions.



The exceptional reliability of ElringKlinger's cellular housings in large volumes is based on its experience with large series and its expertise in sealing and forming technology.

ElringKlinger's success in electromobility is down to a consistent strategy, highly motivated employees, and a knowledge base that has been steadily expanded over the years. Today, the Group makes many different products for lithium-ion batteries in cost-effective series production. To this end, a whole team of experts at the Dettingen/Erms, Neuffen, and Thale sites work on battery technology research, development, and manufacture. ElringKlinger's goal in this segment is to be able to handle all the key processes apart from manufacturing the cells, always focusing on the interactions between components, module and system production and aligning its development and manufacturing processes accordingly.

Systemic expertise

Thanks to over ten years of expertise in battery technology, ElringKlinger is able to offer complete battery systems. In this context, the Group combines know-how in component production with smart battery management systems. Customers such as Piëch Automotive make extremely high demands of the battery system for the fully electric drives inside their vehicles – demands that ElringKlinger is able to meet thanks to the high level of innovation and performance offered by its product solutions.

Piëch's battery concept is based on a pack containing over 400 pouch cells, which forms the heart of the system together with the control unit. "We began



» Our innovative concept lets us do away with up to a quarter of the components.«

Gunnar Deichmann, Vice President Battery Technology & E-Mobility

Numerous experts work at the sites in Dettingen/Erms, Neuffen and Thale in research, development and production relating to battery technology.

implementing the first steps of Piëch's battery system project in Neuffen back in late 2021," explains Gunnar Deichmann, Vice President Battery Technology & E-Mobility. The real highlight of the concept from a technical perspective is how the voltage is switched from 800 V to 400 V. This allows the vehicle to be charged at 800 V, while a voltage of 400 V is used to drive it. The possible high charging rates can with this enormously reduce the time required for recharging. In addition, the innovative battery technology enables a range of 500 km with a capacity of more than 70 kWh.

A full-service supplier for battery technology

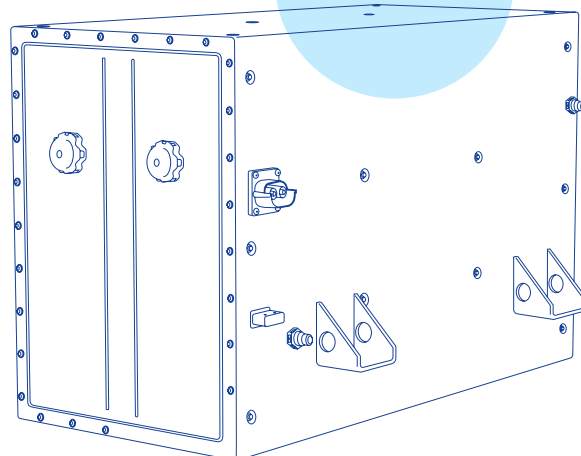
By setting its strategic focus at an early stage, ElringKlinger is now firmly established as a strong, innovative partner for battery technology. The sheer depth of the Group's development operation gives it a key advantage when it comes to developing individual components in line with customers' specific needs and scaling them up for series manufacture. ElringKlinger has been mass-producing battery components since as long ago as 2011. In 2021, a large-scale order for cell contact systems from a global battery manufacturer for the series platform of a premium German vehicle manufacturer proved that its strategy was the right one.

Another good example of the groundwork that the Group has laid on its journey to becoming a leading supplier for battery technology is its new site in Neuffen, which opened its doors in 2021. The Group is pooling the unit's various activities a stone's throw from its headquarters in Dettingen/Erms. These include sales,

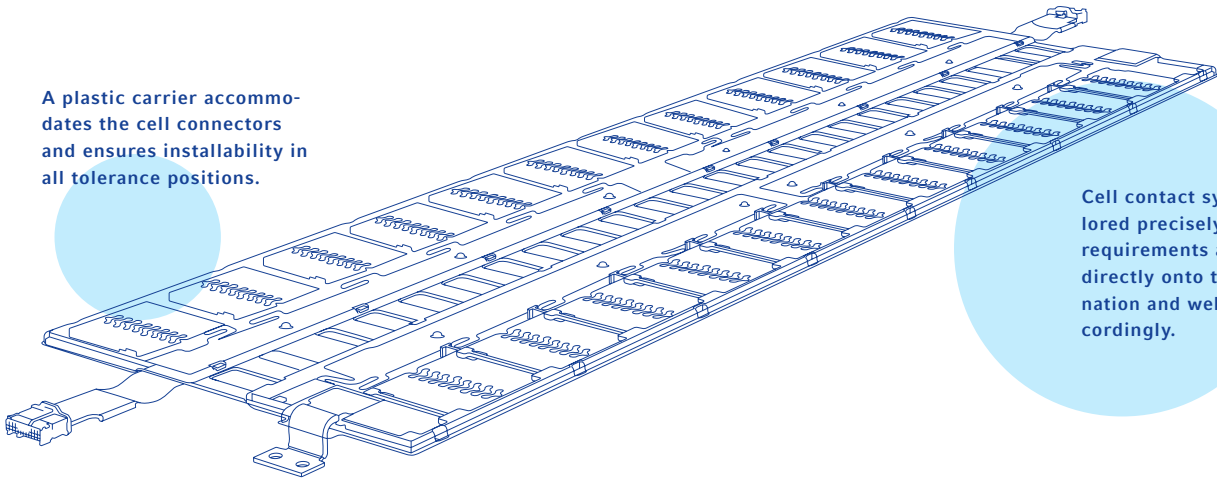


The first project steps for Piëch's battery system have already been implemented at the new competence center in Neuffen since the end of 2021.

The current market situation requires a high degree of flexibility within the area of electric mobility. Elring Klinger offers here standardized components and systems within 400 V and 800 V system voltage.



A plastic carrier accommodates the cell connectors and ensures installability in all tolerance positions.



Cell contact systems are tailored precisely to customer requirements and can be fitted directly onto the cell combination and welded together accordingly.

ElringKlinger offers everything from a single source in battery technology. From development and prototype production, testing through to series production.

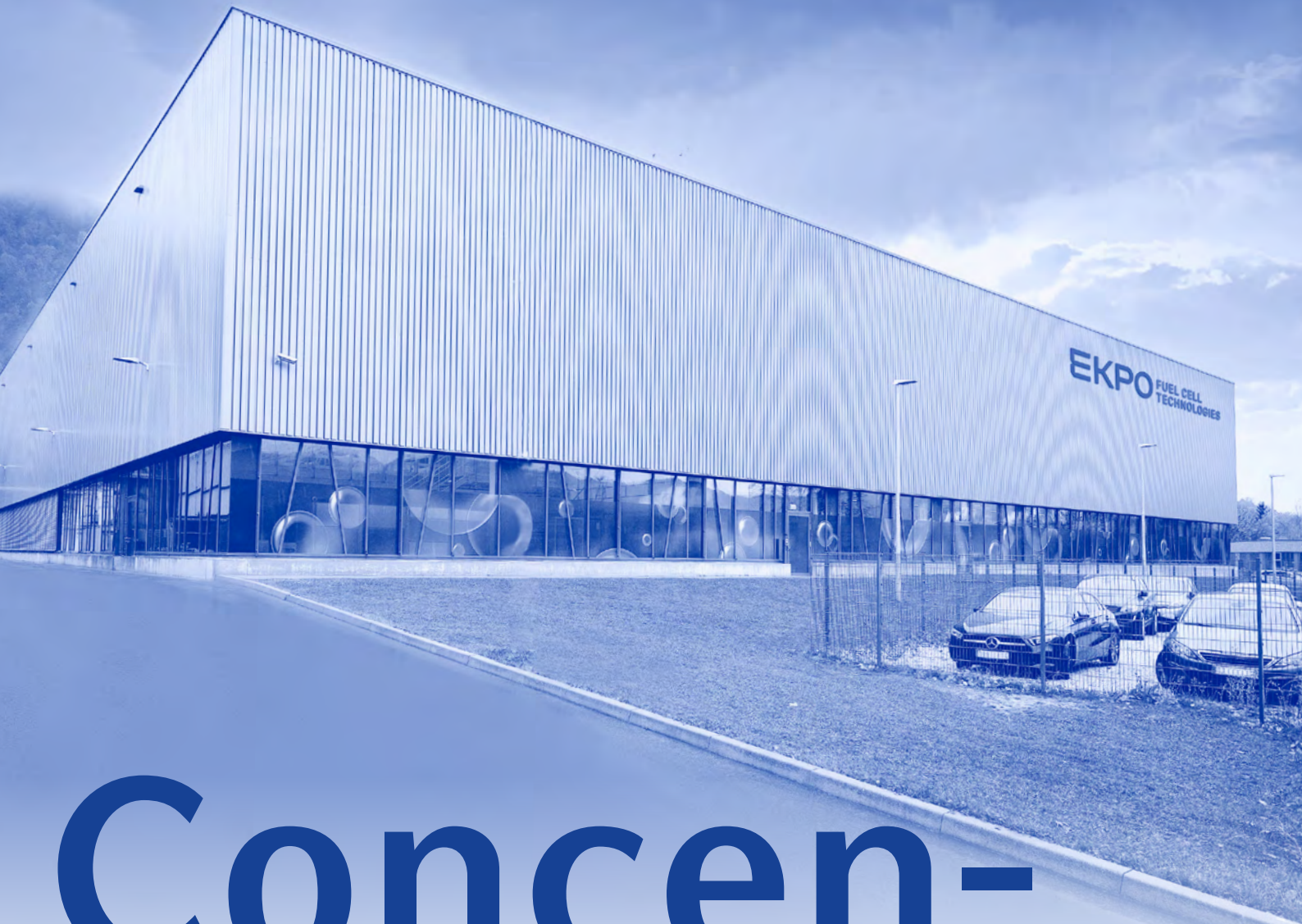
development, model construction, industrial engineering, production quality, and project management. The site also offers ideal conditions for meeting the demands of the market, which continues to see strong growth. Battery technology is a key technology for the future that will play a central role in industrial value creation. Together with the fuel cell and electric drive units, it stands as a symbol of the Group's transformation and its future. One building block in this strategy is the second battery IPCEI, entitled "European Battery Innovation – EuBatIn," which is being coordinated by the German government and funded by it and the federal states. The European Commission gave the go-ahead to this joint European project in late January 2021 with the aim of creating a value chain for the battery industry in the EU.

At the heart of a Europe-wide value chain

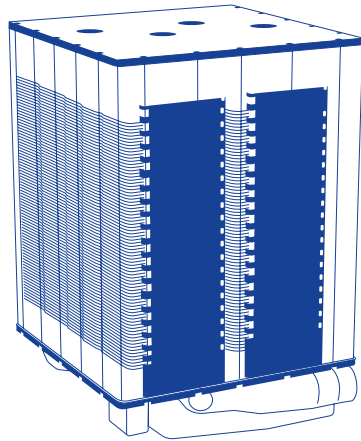
As an innovative technology group in the battery technology segment, ElringKlinger was one of only eleven German companies chosen to be part of this European value chain. ElringKlinger's project is geared toward the development and industrial-scale production of innovative battery cell housing components and stands to receive a total of EUR 33.8 million in funding. ElringKlinger's innovative design for the cell lid allows fewer and less complex components to be used and reduces the need for energy-intensive raw materials such as aluminum and copper. To this end, the Group is putting its core skills to targeted use, such as forming, injection molding, coating technologies, and tool-making. "Our innovative concept lets us do away with up to a quarter of the components," Deichmann explains. "This means less manufacturing work and, combined with the reduced amount of material that's required, shrinks the cell lid's carbon footprint by some 40%." With fewer components and an efficient assembly line, the reject rate is also much lower. ElringKlinger is thus making a sustainable contribution to climate-neutral battery cell manufacture in Europe.



The IPCEI – which stands for Important Project of Common European Interest – marks a further step on ElringKlinger's journey toward securing a key position in the battery value chain. The Group has laid the right groundwork for achieving this objective over the past decade. Investments in its strategic, forward-looking areas and its many years of research and development work are thus paying off. Today, ElringKlinger is one of the few automotive suppliers that is ideally equipped for the technological transformation and as is the case in battery technology already has a mature, transformed product portfolio at its disposal – from single components through to the complete system.



Concen- trated power



598

cells in EKPO Fuel Cell Technologies' NM12-twin fuel cell stack generate 205 kW of power.

The debate over the mobility of the future is frequently presented as a straight choice: batteries or fuel cells. Often, statements are put forward in support of only one of the two technologies. However, this approach is short-sighted: backing both batteries and fuel cells makes logical and economic sense.

The fuel cell harnesses the benefits of hydrogen as an energy source, primarily its ability to be consumed at a different time and in a different place to when and where it was produced. Via its subsidiary EKPO Fuel Cell Technologies, ElingKlinger supplies complex components as well as high-powered stacks, whose high performance density generates concentrated power.

The next few pages explore the major contribution that the fuel cell can make to the mobility of the future.

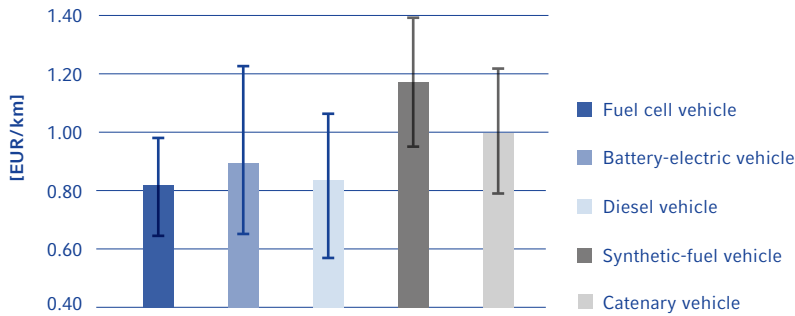
The mobility transformation is well under way. A key question is how and what the transportation sector can contribute to a cut in greenhouse gas emissions. After all, road passenger and freight transport is responsible for some 20% of global CO₂ emissions. A raft of regulations have been imposed in recent years in a bid to lower these emissions significantly. For instance, passenger cars will need to emit 37.5% and light commercial vehicles 31% less CO₂ in 2030 than in the reference year (2021). Meanwhile, heavy-duty commercial vehicles weighing more than 12t will be required to reduce their CO₂ emissions by 15% by 2025 and by 30% by 2030 compared with the reference year (2019).

These targets stand no chance of being met just with vehicles powered by a combustion engine. Instead, alternative drive technologies must be embraced as well in order to achieve the objectives. If one compares the total costs of various alternatives, both vehicles fitted with overhead wires and those powered by synthetic fuels will cost more over the long term according to a recent study by the VDI and VDE.¹ Thus, battery-electric and fuel cell vehicles are more cost-efficient. Both technologies offer benefits and have a role to play in the mobility of the future. Contrary to popular belief, the two technologies are actually complementary and will be best placed to handle the transformation if they work together. Rather than an "either/or," therefore, it is a case of "both/and."

If you look at the registration figures for commercial vehicles, battery technology is ahead by a nose compared to fuel cell technology, as it is in the passenger car segment too. While there were as many as 435,000 battery-electric light-duty commercial vehicles on the world's roads by late 2020, there were only 3,160 fitted with a fuel cell drive. And it is a similar situation with buses. This is because battery technology is more market-ready than its fuel cell counterpart according to the VDI/VDE study (85% as against 73%).

One frequently cited argument revolves around efficiency, which is usually measured using the "well-to-wheel method," i.e., from the energy supplied as electricity through to consumption within the vehicle. Viewed solely from this angle, the electric drive is superior.

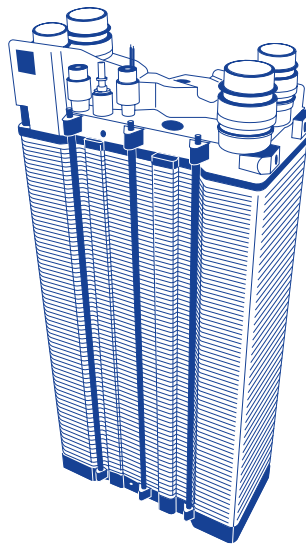
Total cost of ownership for 40t long haul truck at the reference year 2030



Source: VDI/VDE (2022), p. 27

Focusing just on efficiency does not give the full picture, however: mobility means more. For this reason, cost-effectiveness must instead be considered across the board and the overall costs (“total costs of ownership”) of the different vehicle versions have to be compared accordingly.

Doing so reveals no significant difference in acquisition costs between battery-powered and fuel cell vehicles, e.g., in heavy-duty transport.² Whether one or the other is more beneficial over long distances depends on whether the variable costs can be kept low. However, it only makes sense to consider cost-effectiveness if – and this is a big if – the necessary charging or refueling infrastructure is also in place, ideally across the board but at least along the routes being traveled. As far as fuel cell vehicles are concerned, the existing network of gas stations can be converted. Although this would cost over EUR 1 million per station, only around 1,000 are expected to be needed in Germany to secure nationwide coverage. There are currently more than 14,000 gas stations for fossil fuels in Germany. The existing power grid would have to be substantially expanded to handle battery-electric vehicles. At the same time, solutions need to be found for the centers of big cities, where vehicles cannot be charged at home in the garage but spend the night out on the street. Both alternatives will require correspondingly high investments in infrastructure.



6.2

kW/l is achieved by the EKPO stack range inside the cell block. This performance density makes EKPO Fuel Cell Technologies the market leader.

In addition, both technologies are likely to become even more efficient in the future. At the same time, mass production is set to reduce the acquisition costs per unit, which should benefit the fuel cell more in view of its degree of maturity. The production costs of hydrogen are also expected to fall, because the hydrogen industry is not yet fully developed and extensive plans such as the German government’s National Hydrogen Strategy have yet to really take effect.

Generating hydrogen requires energy – energy that, in a battery-electric vehicle, can be used straight away for the drive without having to be stored via hydrogen in the interim. In that case, however, the electrical energy also needs to be used straight away, because storage capacity is limited. But hydrogen offers the major advantage of being storable – once it has been generated. This means that it can be stored as an energy source, in tanks or caverns for instance, until it is needed for mobility. This breaks the link between the times at which the energy is generated and consumed. Hydrogen can also be transported along existing pipelines. Overall, this is an advantage in terms of the time and place it is consumed





EKPO Fuel Cell Technologies has access to state-of-the-art production facilities including cleanroom manufacturing at its Dettingen/Erms site.

Hydrogen is to become established as an energy source in Germany in order to make energy supply secure, environmentally friendly, and more self-sufficient.

mation and the onward march of technology. Unless hydrogen is incorporated into the energy policy measures, all that will be left to cover the huge demand will be renewables such as solar, wind, and hydropower.

The German government has sketched out the path ahead with its National Hydrogen Strategy:³ Hydrogen is to become established as an energy source in Germany in order to make energy supply secure, environmentally friendly, and more self-sufficient. France and many other industrialized nations have launched similar initiatives. Sector coupling envisages the widespread use of hydrogen to close the gap in energy supply while driving forward the decarbonization of industry. As well as the production of hydrogen, the import of so-called green hydrogen is also expressly part of the strategy. Only recently, the German government announced new terminals at the mouths of the Weser and Elbe rivers for importing liquefied petroleum gas first of all, followed later by hydrogen.

The National Hydrogen Strategy also goes one step further: the transportation and distribution infrastructure for hydrogen is to be upgraded by developing and expanding existing networks. Germany is also ploughing significant funding into projects to create a European value chain for the hydrogen industry (the "IPCEI on Hydrogen"). And, incidentally, ElringKlinger's subsidiary EKPO Fuel Cell Technologies has already been preselected by the German government to be part of this project for developing a new generation of fuel cells. The preselection still needs to be rubber-stamped at European level.

as well as the time it is produced, because peaks in demand through the day, week, and year can be smoothed and periods of underutilization used to generate hydrogen. In other words, where and when the hydrogen is produced is irrelevant, and neither does it matter where or when it is used.

Making hydrogen part of an energy policy strategy will enable the availability risk to be mitigated. In Germany, for instance, the energy transition has three if not four different priorities: the (1) phase-out of coal has been decided alongside (2) the discontinuation of nuclear power. At the same time, (3) mobility is to run on electricity. In addition, the (4) demand for energy is continuing to increase as a result of auto-

Fuel cell stacks from EKPO Fuel Cell Technologies guarantee a high performance density coupled with a compact design and low weight.



In summary, comparing the total costs of battery and fuel cell technology reveals two things:

(1) Looking at the individual drive types, fuel cell vehicles are the cheapest alternative in certain applications, such as heavy-duty traffic, and considering a time horizon to 2030.⁴

(2) With regard to total energy costs including infrastructure, backing both battery and fuel cell technology will generate synergy effects. For instance, charging a large number of battery-powered trucks and cars at the same time at a highway service area requires a similar amount of energy as a small town.⁵ Meeting such a demand would require expanding the network at significant expense.

However, this will cost less overall if hydrogen is used on a complementary basis and the charging infrastructure does not need to be designed with such peak loads in mind. A study by the Hydrogen Council suggests that this would save Germany investments worth some EUR 36 billion viewed over the economy as a whole.⁶

The mobility transformation is clearly posing new challenges. Picking the right technology is one of them. Homing in on just one too soon is short-sighted, because batteries and fuel cells in combination are proving to be more cost-effective overall and, in view of the risks posed by new technologies, the sensible option as well. Ultimately, both batteries and fuel cells are efficient ways of achieving the common aim of significantly reducing CO₂ emissions and making mobility environmentally sustainable.

»EKPO Fuel Cell Technologies is headquartered in Dettingen/Erms, Germany, where up to 10,000 fuel cell stacks a year can already be manufactured to automotive industry standards – and that number is set to rise.«

Dr. Gernot Stellberger, General Manager of EKPO Fuel Cell Technologies GmbH

Comparison of incremental recharging vs. refuelling investment

Capex to serve 1,000 passenger vehicles, USD millions, 2050

Illustrative scenario

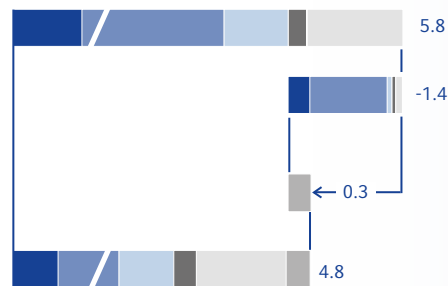
- Substation
- Cabling
- Home chargers
- Slow chargers
- Fast chargers
- HRS

BEV-only scenario

Cost savings to serve only 90% BEV

Fuelling station costs for 10% FCEV (hardest-to-abate segments of road transport)

Combined scenario



Source: Hydrogen Council (2021), p. 23

¹ See VDI/VDE: Climate-friendly commercial vehicles. A comparison of various technology pathways for carbon-neutral and zero-carbon drives, January 2022, www.vdi.de/ueber-uns/presse/publikationen/details/klimafreundliche-nutzfahrzeuge, retrieved on March 3, 2022.

² See VDI/VDE (2022).

³ See BMWi: National Hydrogen Strategy, Berlin, June 2020, www.bmw.de/Redaktion/DE/Publikationen/Energie/die-nationale-wasserstoffstrategie.pdf?__blob=publicationFile&v=12, retrieved on March 3, 2022.

⁴ See VDI/VDE (2022).

⁵ See Hydrogen Council: Roadmap towards zero emissions. The complementary role of BEVs and FCEVs, Brussels, September 2021, <https://hydrogencouncil.com/wp-content/uploads/2021/10/Transport-Study-Full-Report-Hydrogen-Council-1.pdf>, retrieved on March 3, 2022.

⁶ See Hydrogen Council (2021).



Dr. Gernot Stellberger has been one of the three General Managers of EKPO Fuel Cell Technologies since it commenced business activities on March 1, 2021. Besides finance, purchasing, and HR, he is also responsible for strategy, risk management, and predevelopment.

Dr. Stellberger, why is fuel cell technology so important for the future?

Dr. Gernot Stellberger: Battery-electric vehicles cannot carry the mobility transformation on their own. Taking all the costs into account, neither synthetic fuels nor vehicles fitted with overhead wires are as economical as batteries and fuel cells. Fuel cells will start by conquering the market wherever, for instance, there's high energy demand and having downtime for charging batteries is costly from a "total costs of ownership" perspective.

Where would that be?

Stellberger: Particularly in heavy-duty and long-haul road transport, i.e., including long-distance buses and coaches. The kind of frequent charges that a battery-electric drive needs on a long journey means that it's fairly often at a standstill. And downtime costs money.

Up until now, however, many more battery-electric vehicles have been manufactured and registered. Demand for fuel cell vehicles remains low.

Stellberger: This is because battery technology is still slightly ahead in terms of its technological and industrial market-readiness thanks to all the funding

that's been pumped into it in recent years. However, this gap will close when more vehicles fitted with new drive technologies are registered, since larger volumes significantly reduce the price per unit, particularly with fuel cell drives. And, the lower the unit price, the more attractive and competitive the technology.

We're expecting fuel cells to become popular for commercial vehicles, buses, and logistics applications first of all. From 2026 onward, you'll also see more heavy-duty SUVs and passenger cars designed for long distances as well as maritime applications, for instance, being equipped with the technology. And don't forget that we'll also be heading into the "third dimension" with our partner Airbus toward the end of the decade. The fuel cell now has momentum.

What does that mean for EKPO Fuel Cell Technologies?

Stellberger: We're going to be steadily increasing our revenue from fuel cell stacks and components to reach somewhere between EUR 700 million and EUR 1 billion in 2030. Our advantage is that we can now offer the right market-ready products at the right time – powerful stacks and technologically sophisticated components such as the bipolar plate, manufactured in a professional industrial environment.

What markets are you looking to serve with this?

Stellberger: Our products already meet the market requirements for many different applications, including both on-road commercial vehicles and logistics. However, you'll also find our stacks on water, in forklifts, or in aviation. And we're reinforcing our position as a technology leader with a performance density of over 6.0 kW/l.

When will we be seeing EKPO stacks and components in series production?

Stellberger: Our first series order, with a total volume in the high double-digit million euro range, is set to get under way as early as 2022. Our 20-year incubation at ElringKlinger, one of our two parent companies, has given us a lot of skills and significant expertise. It means that we're already able to manufacture on an industrial scale, something that others have yet to achieve. We can already make up to 10,000 stacks a year to automotive industry standards and are poised to harness the fuel cell's momentum, both in the automotive sector and for other non-automotive applications.

Dr. Stellberger, thank you very much for talking to us.

Strong performance

The ElringKlinger Group launched a global efficiency stimulus program in early 2019 geared toward strengthening its finances over the long term. Three years down the line, the Management Board's verdict is more than positive: ElringKlinger now boasts a more efficient setup and, armed with all this added strength, can continue to shape the ongoing process of transformation. Read more about the program in the following article.

The sketch for the model, with numerous key financial and earnings indicators and their various interdependencies, seems complex – like a tree branching off in many different directions. And, just like the branches of a tree, the numerous individual measures in ElringKlinger’s global efficiency stimulus program form a single system in which all the elements rely on one another. Management and staff act as the trunk, ensuring stability through their expertise and dedication. Outside influences such as the price of materials, supply chains, and market developments are to the program’s progress what wind and weather are for the tree. Although the roots are hidden from the observer on the surface, they hold the plant in position and keep it supplied with nutrients – similar to how money flows around a company: cash and cash equivalents lay the financial foundation for its operating activities, which in turn generate funds so that it can grow further.

Before ElringKlinger launched its global efficiency stimulus program in early 2019, it had already completed the first step in a long-term strategy: a multi-year cycle of worldwide investment that readied the Group for the impending transformation in the automotive industry. New plants were built in Hungary, at two US sites, in the UK, and in Turkey, while existing premises were kitted out with state-of-the-art manufacturing technology. Capacity was increased significantly at the Suzhou site in China and the plants in Mexico and Brazil. Today, ElringKlinger is geared up for a market that reached a peak of some 95 million new cars and light commercial vehicles in 2018. Customers in all the vehicle markets around the world are served by ElringKlinger’s local production facilities – getting cutting-edge products at a high standard of quality.

So ElringKlinger was ready for the next step: a targeted efficiency stimulus program to increase its liquidity and profitability over the long term. In this process, CFO Thomas Jessulat focused primarily on improving the company’s financial strength as a key factor in its future success. The program consisted of measures that ultimately formed two main branches: optimizing operating free cash flow¹ and increasing EBITDA². Both were essential steps in significantly reducing net financial liabilities.

Optimizing operating free cash flow

Operating free cash flow is a true indicator of a company’s self-financing capabilities. It results from the company’s operating activities and indicates what financial resources it has generated through its own value creation over a certain period and has at its disposal after deducting investment expenses.

Even as recently as the 2018 financial year, ElringKlinger’s operating free cash flow was still well into negative territory, due primarily to the cycle of investment mentioned above. The efficiency stimulus program tackled both indicators so effectively that ElringKlinger was able to post an impressive operating free cash flow of EUR 176 million as early as the end of the 2019 financial year – followed by a further EUR 165 million in 2020 and another EUR 72 million in 2021. “Our main priority was a sustained improvement to our processes and structures in order to have as long-term an impact as possible,” sums up Thomas Jessulat, looking back.

¹ Cash and cash equivalents from operating activities left over after deducting expenditure on investments

² Earnings before interest, taxes, depreciation, and amortization

» Financial strength is a key factor in the company's lasting success «

Thomas Jessulat, CFO of ElringKlinger AG

What specific measures brought about this success? "If you want to unlock liquidity, then your net working capital is a good place to start," explains a member of the project team from Finance. "If these items on your balance sheet are fluctuating, it will have a direct impact on your financial flows." Net working capital comprises inventories and receivables due from customers less liabilities due to suppliers.

To tackle the inventories, Supply Chain Management adopted a clear methodology, which started with an ABC XYZ analysis. A specific inventory target, expressed in terms of revenue, was set for the Group and broken down right to the tiniest branches – plants and products – on the basis of a top-down approach. This was followed by bottom-up planning, which determined the ideal amount of raw materials and semi-finished products to hold in stock for each production site and its individual portfolio. The teams also defined upper limits as targets for overall local stock levels. Staff from Supply Chain Management helped their colleagues all round the world to implement this target structure, which was managed in the global IT system. Signs of progress gradually began to emerge. "The Swiss plant started out with its net working capital at 27% of sales," the project specialist adds. "By the end of the program, this had been reduced to 18%."

ElringKlinger deployed additional financial instruments to optimize its receivables, while Sales opened discussions with customers in order to shorten payment

terms on existing contracts. The payment conditions for new contracts were made correspondingly strict as well. The Purchasing team also went into negotiations with renewed focus. The hard work that everyone in Purchasing and Sales put in paid off. Although Group revenue in 2021 roughly was on a par with 2018's, it was nonetheless possible to reduce receivables down to a lower level and keep them there, while liabilities due to suppliers were expanded steadily.

On the investment front, the lower expenses from 2019 onward benefited operating free cash flow, while ElringKlinger also continued to improve the corresponding processes: the introduction of a monthly rolling investment plan enabled the disciplined investment approach to be fine-tuned on an ongoing basis. This plan made it possible to react faster and more expeditiously to changing circumstances such as new orders and market developments. "For us, being disciplined essentially means being focused. We haven't been neglecting new technologies or highly promising projects for the transformation in our core business in the slightest," Thomas Jessulat underlines.

18%

The Swiss plant entered the efficiency stimulus program in 2019 with its net working capital at 27% of sales. The measures helped bring this down to 18% in three years.

Improved EBITDA

Profitability, the second main branch of the program, gives the company greater opportunity to develop since it is the main source to generate additional liquidity. To improve profitability, four areas were analyzed in a first step: material costs, work processes, non-personnel costs, and contractual issues.

Owing to ElringKlinger's high degree of vertical integration, material expenses amount to over 40% of its revenue. Any percentage decrease in this cost item thus has a significantly positive impact on earnings. It can be adjusted by pulling two levers – quantity and price – and both were scrutinized as part of the program. The degree of influence that could be exerted on individual groups of materials was investigated in more detail. Corresponding starting points for action were identified and followed up. This produced two areas for targeting improvements: first, procurement and, second, operating processes and systems that had an impact on quantities.

The Purchasing team focused its strategy more clearly on a total cost of ownership (TCO) approach. In other words, the total costs of a material, i. e., its unit price, transportation costs, and other ancillary procurement costs, were incorporated into the relevant purchasing decision. The origin of materials was also analyzed in detail, allowing more use to be made of regional sources and transportation costs to be reduced. In addition, special circumstances that had generated additional sorting and transportation costs in the past were tackled intensively. The project managers developed stable solutions and standards for issues caused by system-related errors. The various measures have had a positive impact on both a large and a small scale. However, what might sound "small" is not necessarily so. For example, the reject rate has decreased by

0.8% over the past three years. If one considers that it is calculated as a percentage of total production costs, the scale of the improvement becomes clear. Taken together, the effect is considerable: the Group's materials ratio fell to 42% in 2020 compared with 46% in the 2019 financial year. The savings made also had an effect in the 2021 financial year just ended. However, the headwind on the markets caused by price rises and supply bottlenecks had a disproportionately large impact, pushing the ratio up again to 44%.

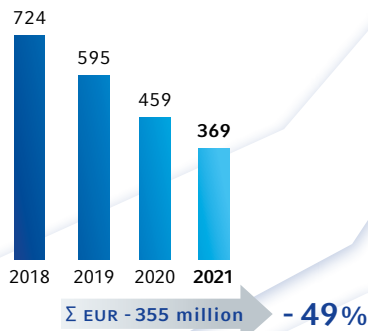
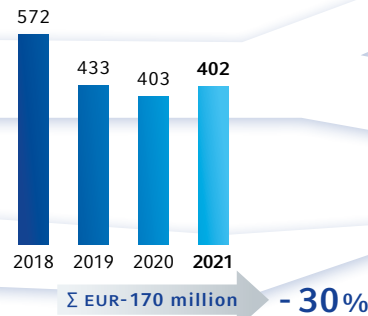
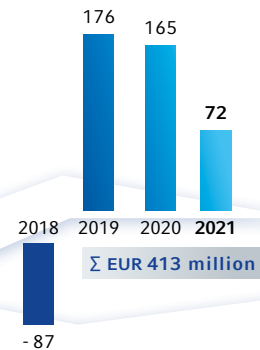
More savings were also made by optimizing processes, particularly in Production. In Administration, too, workflows were further improved and tasks made more efficient with the help of improved software.

The staff responsible devised an ideal cost structure for non-personnel costs. This was used to produce targets at Group, plant, and cost type level that were reviewed on an ongoing basis and adjusted if required.

The fourth field of action was chiefly a job for the Sales team. Costings, including for existing contracts, were reviewed using a clear methodology and areas for action were determined. Any necessary amendments were made wherever the circumstances had changed, particularly in the case of long-term contracts.

"Dimensions of efficiency stimulus" model

1. Cost savings	2. Disciplined investment approach	3. Optimizing net working capital	4. Amending contracts
Material costs, personnel costs, and non-personnel costs were targeted by the cost-saving program and were reduced through numerous measures.	Having built up a powerful global production network in the preceding years, ElringKlinger began investing in specific forward-looking projects in a targeted and highly focused way in 2019.	A combination of process improvements and strategic measures brought about a lasting reduction in inventories and customer receivables and optimized liabilities due to suppliers.	Changing circumstances call for flexibility in long-term contracts. Necessary amendments were undertaken following in-depth analyses.

Net financial liabilities
(in EUR million)**Net Working Capital**
(in EUR million)**Operating free cash flow**
(in EUR million)**Cross-company working basis creates transparency**

A uniform basis for everyone working on the project was key in order to improve efficiency across the board. The belief that financial figures such as EBIT, ROCE, and cash flow can be influenced in a targeted way by operating parameters helped ElringKlinger to devise a program-specific system of key performance indicators (KPIs). To this end, all Vice Presidents – who occupy the level of management below the Management Board – were actively involved, and the operating processes were scrutinized from top to bottom. This produced 45 KPIs divided into five categories: finance, operations, HR, sales, and innovations. For each individual KPI a certain Vice President took responsibility. The interdependencies between individual KPIs within the various areas of operations but also between operational progress and financial impact were illustrated in a structured and transparent way. This allowed the progress made to be visualized and measured. However, the decisive factor with regard to the success achieved was that the individual measures were integrated into day-to-day business.

Taking stock after three years

At the end of 2021, management delivered a very positive verdict: key financial indicators have improved considerably, and liquidity has increased significantly over the past three years. Within this period, ElringKlinger has generated over EUR 400 million in operating free cash flow, enabling net financial liabilities³ to be cut by EUR 355 million – i. e., by more than half – in the same timeframe. Having totaled EUR 723 million at the end of the 2018 financial year, net financial liabilities fell to EUR 369 million by the end of 2021. The debt ratio⁴ improved from 3.7 to 1.7.

Profitability also rose gradually, as reflected in the results. Posting revenue of EUR 1.6 billion in the 2021 financial year, ElringKlinger achieved an operating result (EBIT) of EUR 102 million, or 6.3% of revenue. In 2019, it had still stood at 3.5%. Even in 2020, an unprecedented year due to the coronavirus pandemic, ElringKlinger managed a positive margin of 1.9%.

The positive effects become even clearer when net working capital (inventories plus trade receivables and trade payables) is considered: although Group revenue was only four percent below 2018 levels in 2021, net working capital was successfully reduced by 30% or EUR 170 million. ROCE (return on capital employed), an important indicator for Group management, increased from 5.5% in 2018 to its current level of 6.4%.

³ Financial liabilities less cash and cash equivalents, also known as net debt

⁴ Ratio of net financial liabilities to EBITDA

» We now have much more strategic room for maneuver. So we'll be able to continue playing an active, key role in helping to shape the ongoing transformation.«

Dr. Stefan Wolf, CEO of ElringKlinger AG

The Management Board's assessment strikes a quite satisfied note. Dr. Stefan Wolf, CEO of ElringKlinger AG, summarizes the situation thus: "The success we've had with the program has given us much more strategic room for maneuver. Today, the Group is strong enough to continue its active role in helping to shape the ongoing transformation both in our traditional fields of business and with the new technologies." Thomas Jessulat adds: "We're in a position to make strategic investments under our own steam at any time. So we've achieved a great deal, but we won't be resting on our laurels, of course."

While e-mobility and non-automotive components are becoming a growing part of its business and its portfolio is continuing to evolve with the addition of new components, the company is also changing. Just like a tree, it is striving for growth. There will be periods of regeneration and harvest, accompanied by constant change. Dr. Wolf is in no doubt: "The next few years are going to be exciting. Whoever wants to assert themselves on the market will need to have done their preparations a long time ago. ElringKlinger is more ready for the future than it's ever been."

Outlook

After completing the efficiency stimulus program, the Group is moving on to a new chapter, which is based on four areas of great relevance to the future: e-mobility players, a focus on the KPI system, process excellence, and digitalization. The Group intends to keep on evolving toward an ambitious target structure. It will be focusing on digitalization and process excellence internally, while keeping its outward-facing eye even more closely on its customers, the markets, how they are developing, and what potential they hold. "In Sales, we'll be acquiring a larger number of innovative projects that'll allow our traditional business to showcase its transformation expertise," says a member of the project team.

6.4%

The program's success lifted the ElringKlinger Group's ROCE (return on capital employed, an indicator of profitability) up from 5.5% in 2018 to 6.4% in 2021.

MATERIAL FLOWS



When staff at ElringKlinger's German plants are starting work, their colleagues in China are already getting ready to go home for the evening, while the US is just coming to the end of a night shift. ElringKlinger is always on the move, and the company's global flows of goods are a good example of this. If you take a look inside the world of the raw materials that are currently feeding into the design for CO₂-friendly vehicles, you will find a lot of metals and plastic granulates being used. But how is it even possible to maintain material flows within a global group of companies when supply is strained all over the world?

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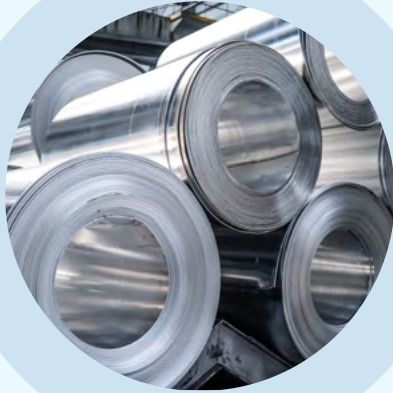
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Container ships can accommodate up to 24,000 20-foot standard containers. They transport valuable raw materials and goods across the oceans and are an elementary part of global supply chains. During the pandemic it became clear that it is not only goods that are becoming scarce, but also containers themselves.



The automotive industry is one of the largest customers of the steel industry. Steel is usually delivered in coils weighing several hundred kilograms. Delivery problems in the steel industry hit the automotive industry hard.

The coronavirus pandemic has literally slammed the brakes on the global economy over the past two years – a virus that started by crippling people’s mobility before its far-reaching consequences very soon made their presence felt in the economy as protective measures were imposed. Bottlenecks emerged when the global economy started up again after the hard lockdown of spring 2020, which caused many companies – ErlingKlinger included – to halt production entirely. Besides impacting the general availability of goods and raw materials, these also led to marked price rises and massive delays to deliveries.

Demand for plastic, steel, sheet metal, and wood increased significantly at the start of the pandemic, at a time when capacity was falling and could not be expanded fast enough. Production volumes were down in many places, causing delays right at the start of the value chain. The problem was exacerbated by a shortage of shipping containers hitting world trade.

Ships handle 60% of global goods traffic. Many of these transporters, some true behemoths, load up on goods and raw materials from China and ship them past India, through the Suez Canal, and over the Mediterranean to Europe in the space of 48 days. When only China imposed a strict lockdown at the start of the pandemic, empty containers were not being sent back there. This led to a major container shortage when the Chinese lockdown was lifted, pushing both transportation costs and prices for containers up sharply. In addition to the higher transportation costs and the restrictions on the labor market resulting from the coronavirus, the export ratio of raw materials and industrial goods from China and the US also increased due to the high demand for such items. And there was another relevant factor too: with interest rates being

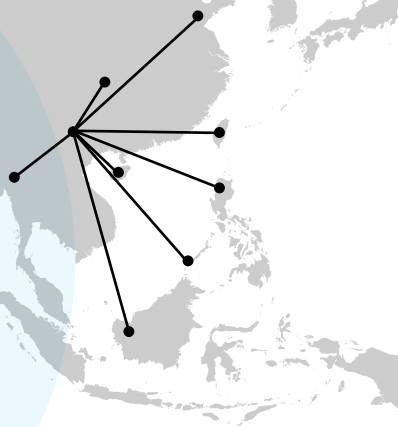
Local and global – from our origin in Germany we have positioned us globally to serve our customers on a local basis.

kept persistently low, demand in the construction industry especially was also very strong across the world. This sector needs wood and steel in particular – raw materials that quickly became much more expensive.

Steel is a crucial raw material for the automotive industry, which is one of the steel sector’s biggest customers. In the early days of the coronavirus pandemic, production lines across the world had to be shut down, forcing many steelworks to curb their own production or scale back their capacity, sometimes drastically. The raw materials shortage that this produced was considerable. It was and remains a similar story for other key raw materials such as aluminum or plastic granulates, i. e., pellets, such as PA6.6. The availability of raw materials was disrupted and demand was rising, pushing what were already high prices up even more.

This availability was further restricted by an increasing number of cases of “force majeure” caused by extreme weather events, among other things. Supply contracts could no longer be adhered to, something that would have seen suppliers pay penalties to their customers under normal economic circumstances. The French term “force majeure” (literally: “superior strength”) describes an external event that causes damage or loss and that cannot be avoided even by taking due care. Many international supply contracts contain a force majeure clause. This clause has been invoked very frequently over the past two years since the start of the coronavirus pandemic. Suppliers have been unable to fulfill their supply contracts on time for a variety of reasons, and the amount of economic damage that this has caused is enormous. And, ultimately, this fraught situation persists to this day.

Last year saw an unprecedented event: when the container ship “Ever Given,” passing through the Suez Canal on its way from Shanghai to Rotterdam, ran aground on March 23, 2021, with its bow stuck on the canal’s eastern bank, ended up diagonal, and thus blocked traffic through the canal in both directions, the chaos was complete. Even though there had been fears that this global logistical bottleneck would be out of action for much longer, it still took six days for the damage to be fixed. Hundreds of ships had to wait before they could resume their journeys. And the consequences went on for much longer than it took to rescue the ship: although the line of waiting ships gradually delivered cargo to their destinations, the facilities there were unable to handle this pile-up of arrivals, causing traffic jams outside all the ports.



The logistics experts and production planners at ElringKlinger always strive to find the shortest and most efficient route for all material flows within the group. For this, state-of-the-art software is used to coordinate delivery dates on the goods receipt side and to achieve deliveries to customers on the sales side.

This incident shows just how complex and even fragile global supply chains are. Companies that base their production at a single site or on a single continent were particularly badly hit. If they have customers all over the world, they have to shoulder the price fluctuations on the logistics markets in order to honor their supply contracts. Just like with raw materials, prices have also shot up here too. Whereas sending freight in a 40-foot shipping container on the eight main east-west shipping routes – i. e., from China to Europe or the US, for example – cost an average of USD 1,780 in early January 2020, the price had risen as high as USD 9,340 by December 2021, a staggering 425% increase.

Looking at this trend in particular reveals how ElringKlinger's globalization strategy has paid off. ElringKlinger supplies customers in 62 countries all over the world and has 39 production sites on all the continents of relevance to the automotive industry. ElringKlinger's approach is "local and global" – from its origins in Germany, the supplier from Swabia has built up a global operation to keep its customers supplied locally. This means that, besides being closer to the customer, the Group also understands them better, can give them better support, and can drive forward development projects in partnership with them. The past two years in particular have shown that the ability to supply customers on time is a valuable commodity. For instance, ElringKlinger does not need to ship many raw materials from China to Germany to be turned into products here and then sent back to customers in China. Besides being costly and susceptible to delays in delivery, such an undertaking also, and in particular, has an adverse impact on our environment and climate. Adopting a global approach to local production also allows CO₂ emissions to be significantly reduced.

The logistics experts and production planners at ElringKlinger are always looking for the shortest and most efficient path for all material flows within the Group. This calls for a nuanced approach,

because there is no one-size-fits-all solution that will work best for all production sites and that can simply be imposed on all the others like a template. Instead, various factors need to be considered from an early stage – specifically, from when production is being planned and designed. Several elements play an especially important role here: material prices and properties, freight costs, availability levels, CO₂ emissions caused by suppliers' manufacturing and shipping activities, and storage capacity. Once suitable suppliers have been selected, it is up to ElringKlinger AG's central Purchasing department to negotiate delivery deadlines and terms. Choosing suppliers carefully is essential for long-term production reliability due to the long-term nature of many supply agreements. Only if this reliability is guaranteed will ElringKlinger be able to meet its own delivery obligations. The experts thus have a lot of responsibility on their shoulders, which they fulfill day in, day out and thus help ensure that the Group, with its globalization strategy built on local production, is fast, flexible, reliable, and environmentally friendly.

Trucks deliver raw materials and goods to the warehouses and plants of ElringKlinger AG and collect finished goods. In all regions relevant to the automotive industry, ElringKlinger AG produces its products locally so that they can be delivered directly to the customer by truck.

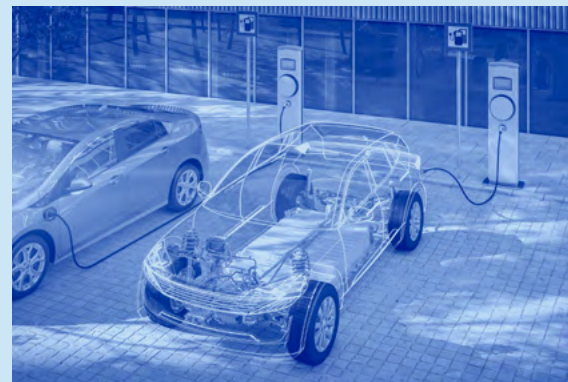




AT THE CUTTING EDGE

The automotive production cell in Bietigheim-Bissingen. A large part of the parts for the automotive industry are produced here by around 120 employees.

The increasing number of vehicles with electric drives requires a widespread charging network.



The megatrend of environmentally friendly power is increasingly shining the spotlight on alternative technologies in the automotive industry. Conventional technologies are gradually being forced to give way. In response to the high levels of CO₂ emissions, for example, the EU Commission has issued regulations for mobility. Besides strict specifications on emissions, this also includes a plan to outlaw the combustion engine by 2035. To prepare for this ban and revamp their own product range quickly, carmakers have stepped up efforts to develop alternative drives. See for yourself how ElringKlinger Plastics Technology is helping to make the e-motor more efficient.



The ElroSeal™ E rotary shaft seal meets the increased requirements of the automotive industry and exceeds the usual market requirements in terms of rotational speed and total mileage by 50%.

Many of these use a so-called electric drive unit, or EDU, an electric motor and gear unit that is attached directly to the axle. The much higher rotational speeds in electric motors call for particular material properties in the requisite components. With the ElroSeal™ e-shaft sealing ring, ElringKlinger Kunststofftechnik GmbH has developed a unique solution that significantly reduces the load acting on the sealing system where it meets the lubricant-filled gearbox. The percentage of vehicles with an alternative drive unit being manufactured globally is already increasing considerably. While only 3.4% of newly registered cars in Germany were equipped with alternative drives in 2017, for example, the figure had jumped as high as 41.2% by the end of October 2021. Alternative drives are thus rapidly gaining market share. Looking a little closer at the different types of drive reveals that so-called mild-hybrids, i. e., vehicles powered by a combustion engine that supplies energy to an electric motor, are the most popular type of alternative drive. These are followed by “plug-in hybrid” vehicles, which have a

combustion engine as well as a battery-powered electric motor. Instead of being generated solely by the combustion engine, the electricity required to run the electric motor also comes from a battery that is recharged via an external electric power source. The combustion engine will only charge the battery when it is short on power. However, it is the pure solution that would appear to have won the most people over: sales of battery-electric vehicles, i. e., those without a combustion engine, rose by 120% in 2021 – more than any other type.

Manufacturing vehicles with a battery-powered electric motor poses particular challenges to a carmaker. Electric vehicle development is currently focusing on the faster rotational speeds inside the motor, combined with minimizing power loss and maximizing running performance. What does that mean specifically? Unlike a conventional combustion engine, an electric motor is powered by electricity, meaning no gasoline or diesel needs to be burned. Most electric vehicles are



» Our commitment in the service of our customers is underpinned by our role as a technology partner in demanding industry sectors. Our solutions meet the toughest day-to-day requirements and will continue to do so in future – cost-effectively, sustainably, and reliably.«

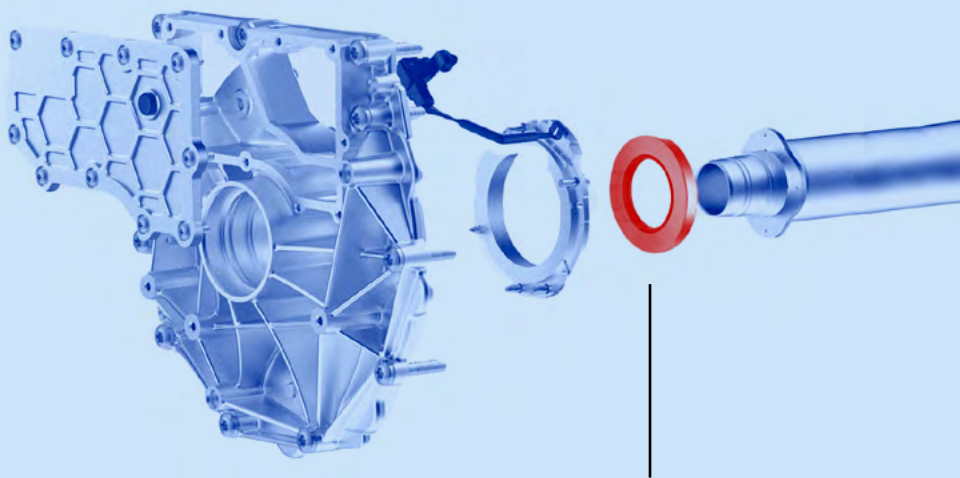
Raik Lüder, General Manager of ElringKlinger Kunststofftechnik

supplied with energy from a rechargeable lithium-ion battery consisting of four storage cells and forming the "traction battery" – individual accumulator cells connected up to make an energy storage system. This system delivers electricity to an induction motor, which is made up of two parts: the alternator and the rotary cylinder. Direct current is thus converted into alternating current. A rotating magnetic field is generated that produces the mechanical energy required to get the wheels moving via a gear system. A one-speed gearbox is usually used, whose sole purpose is to reduce and multiply rotational speeds.

Another component inside the gear system is a differential, which provides power transmission and can drive two wheels in such a way that they can rotate at different speeds in corners but with the same propulsion. The speed can be adjusted by changing the frequency of the power supply, which is determined in the inverter – the electric car's "brain," so to speak. The electrical drive axle itself has to be sealed using a high-performance gasket. This is where manufacturers set the pace: for instance, those involved are challenged to exceed the values for rotational speed and overall running performance that are standard on the market by 50%. Although this task may seem highly ambitious at first, ElringKlinger Kunststofftechnik GmbH found a solution: a new generation of PTFE-based radial shaft sealing rings developed by product, material, and process specialists working closely together. Besides the key performance characteristic described above, this new product family is capable of overcoming even more challenges set by

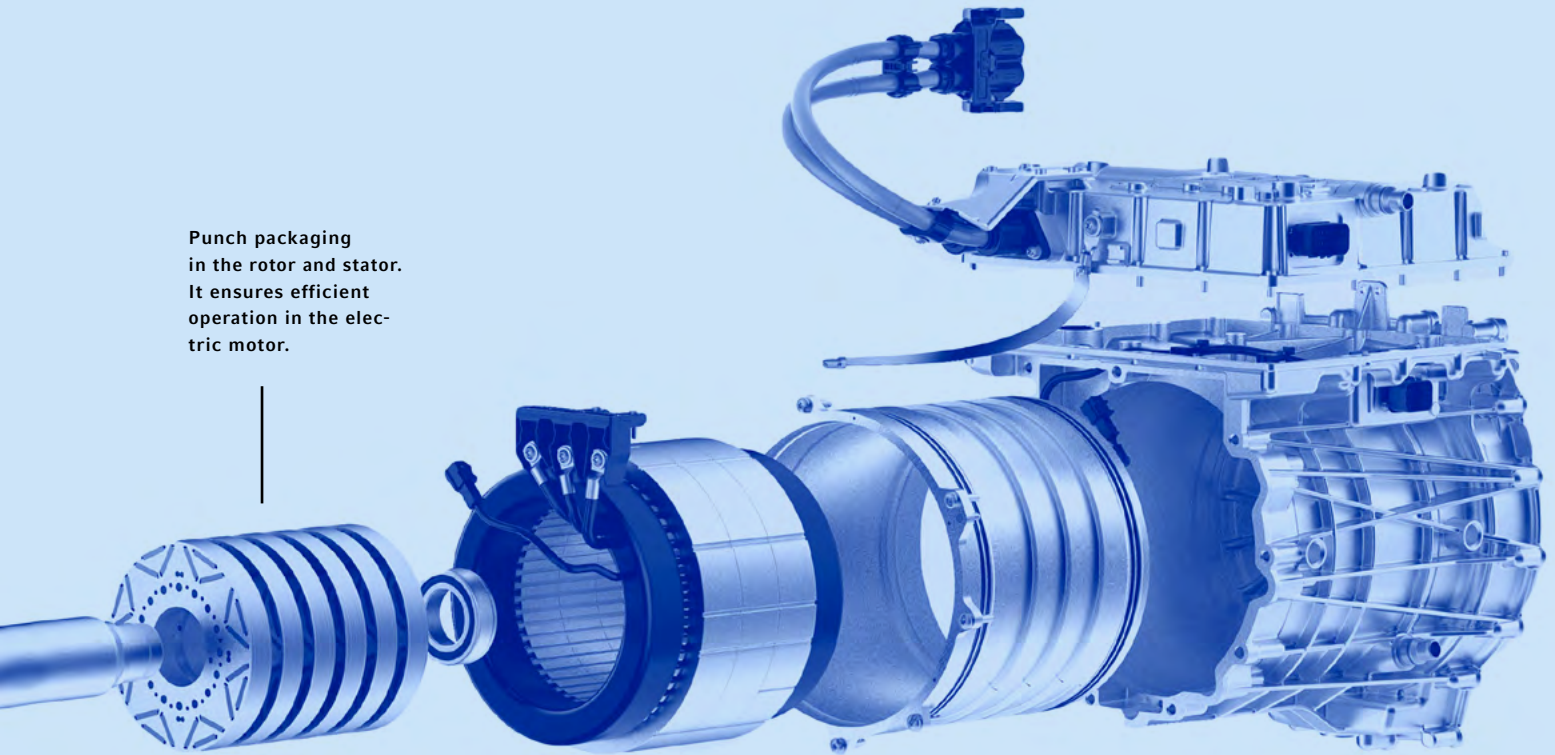
the customer. Radial shaft sealing rings are used in the gear system, which contains a number of shafts. The rings "sit" on a shaft, e.g., in front of a gearbox housing, where lubrication takes place. This new, more powerful product family is available for the e-axle under the name "ElroSeal™."

The ElroSeal™ E technology is based on an optimum combination of materials, geometry, and functional properties, all centered around the sealing lip made from ultra-hard-wearing PTFE compound. "PTFE" stands for polytetrafluoroethylene, an unbranched, linear, and partially crystalline polymer of fluorine and carbon. The PTFE compounds made from it boast many outstanding characteristics, which offer precisely the right solutions to specific technical problems. Their high continuous operating temperature and their virtually universal chemical resistance



ElroSeal™ E shaft seals for the highest demands on wear and service life at very high speeds, as are possible in electric drives. Also suitable for dry running. Special forms with charge dissipation are also available.

Punch packaging
in the rotor and stator.
It ensures efficient
operation in the elec-
tric motor.



» The ElroSeal™ E is application-specific, i. e. trimmed for optimum performance at different speeds and circumferential speeds. This is how ElringKlinger Engineered Plastics manages to increase the running performance of electric motors. «

Raik Lüder, General Manager of ElringKlinger Kunststofftechnik

allow them to be used in extreme conditions. The sliding and friction behavior of Polytetraflon® PTFE is unique and is far superior to that of conventional materials.

The benefit for the automotive industry is obvious: by adopting an innovative design and using pioneering materials and manufacturing techniques, the customer can achieve up to 50% faster circumferential speeds while reducing power loss even more. This enables the efficiency of “e-axles” to be increased further and running

performance improved. With these sustainable product properties, ElringKlinger Kunststofftechnik GmbH – one of the technological pioneers in the field of high-performance plastics – is making an active contribution to environmental considerations in the mobility sector. The ElringKlinger AG subsidiary is thus aligned seamlessly with the focus of Group, which is helping to shape the root-and-branch transformation under way in the automotive industry and can offer its customers solutions for sustainable mobility in every respect thanks to its extensive product range. The Group has been conducting research for 20 years and has been a series supplier of battery components for the past ten. Staying true to the motto “We want to get stuck in, not watch from the sidelines,” the successful development of the ElroSeal™ E – a fairly small product in physical terms – is a step in the same direction. It is yet another product that can help meet the demanding requirements of next-generation mobility and offer innovative, technologically sophisticated solutions to new challenges.

11 QUESTIONS TO SITES

ElringKlinger considers the diversity, the creativity, and the multiple talents, interests, and skills of its employees to be a particular strength. Discover the true scale of diversity by reading the responses given to 11 questions directed at team members working at 11 ElringKlinger sites worldwide.

1 What is driving progress in China?

I have been living in Changchun for 19 years, and working as a finance controller for Changchun ElringKlinger Ltd. for 18 years. In recent years I moved house to the south-east of the city. Doubling in size, CEK moved to the north-east of the city. In Changchun, we are experiencing rapid development. Last year, an extended highway was built near my residence; a new highway to the southernmost point of Changchun is currently under construction. A highway network 84.5 km in length has been completed within two years and eight months, while a new National Wetland Park spanning 12 km² was also established in the north of Changchun within three years. Travel time from Changchun to Beijing has been cut by more than five hours. Only in China can you see such a speed of development. The economy means a great deal to people here: our children are getting a more diversified education while our parents and grandparents are benefitting from improved pensions and medical care. Domestic consumption and investment in capital construction, and the manufacturing industry are playing important key roles in the development of the economy.



Changchun: Sonia Li, Senior Controller



Nantiat: Nabil Fekroun,
Health and Safety Engineer

2

‘Savoir vivre’ can be interpreted as a French approach to life which is both positive and life-affirming – something we can all use in these challenging times. So what do you think – has this way of thinking helped you to cope with the difficulties caused by covid-19?

The thing that has really impressed me in the two years since the outbreak of covid has been the fighting spirit of all employees of ElringKlinger France, not just in terms of integrating new products and processes at the Nantiat and Chamborêt sites, but also in keeping them operational. All of this had to be achieved in a highly complex public health environment involving lockdowns, part-time hours and so forth. We regarded these projects as an opportunity – one which we seized in order to bring about improvements. To do this we exploited as many existing processes as we could, especially in the flow of materials to workshops, workstation ergonomics, safety and working conditions in general. Team members displayed great solidarity in sticking to project timetables; they had the courage of their convictions to perform everyday tasks aimed at minimizing the risk of infection for the good of all – daily disinfecting of shared equipment in production areas and offices, testing, isolation. In short, people drew on a well of French-style creativity and solidarity to reconcile and achieve their goals with maximum effectiveness.

3



Sevelen:
Heinz Greinix,
Maintenance
Engineer

Ambition and passion have seen you (as a mountaineer) climb a number of peaks. What parallels can you draw in the mountains to your everyday work at ElringKlinger?

Whether in my hobby or my job, ambition and passion serve the same goal: to be successful. To get there, you need expertise, will-power, leadership qualities, precise planning, and flexible implementation in the goals you set. But the most important thing is to have a proficient group in which everyone can trust the others 100 percent. Repairing a plant is no different: the dangers to life and limb are considerable in both cases and require expertise and care. When a tour is rewarded with a summit reached together in spite of adverse conditions and effort, the sense of achievement cannot be greater. In the same way, I rejoice with my team when a job is successfully completed. But the mountains also make you humble, opening your eyes to great expanses and new goals.



4

Bursa: Semra Eren,
Production Operator

The life of a site depends on its employees. What is the main factor behind the strong sense of togetherness in Bursa?

I am 26 years old and I was born in Bursa. My parents are originally from Bulgaria; they still have a house there and often visit their home country. I have been working at ElringKlinger Turkey since 2018 and regard the company as part of my family.

A good team recognizes, appreciates, and harnesses the strengths of each individual. Everyone must be willing to do something outside their area of responsibility. This is the only way to achieve overarching goals and develop team spirit. Effective communication among employees is very important, too. A sense of belonging to the company increases in a collaborative working environment, not a competitive environment. Shared responsibility also means tackling problems together. Doing and acting together in harmony, on the basis of common goals and visions, helps to create a sense of togetherness. Joint activities, joint projects, joint tasks, joint responsibility.



Ranjaneon: Chaitali Wajage, Program Manager Plant

India is a large and populous country with great opportunities in a changing and challenging world. What factors will enable us to exploit these chances, particularly in the automotive industry?

5

Given that millions of people are expected to relocate to cities by 2030, rapid urbanization is one factor driving the demand for mobility. Rising income also plays a major role as more young people and women enter the working and consuming class by 2025. An increasing working population and an expanding middle class have also been the key demand drivers for automobiles in India. Government initiatives aimed at promoting manufacturing in India, production-based and design-linked incentives to extend financial support to manufacturers, and gradual increases in road development to improve connectivity between the country's cities, towns, and villages have all combined to boost demand for cars and other vehicles. Other government schemes include the transition to electric vehicles, a voluntary vehicle fleet modernization program, reductions across the cost structure of the Indian automobile industry, a target reduction in the carbon footprint of 33–35% by 2030, and more. Given the huge population, there are numerous opportunities in various industrial sectors – and particularly the automotive industry.

Based in Japan, ElringKlinger Marusan has a very long history within the ElringKlinger Group. What motivates you to work for a Europe-based automotive supplier?

As regards our internal policy, we encourage diversity and the work-life balance. Many employees of ElringKlinger Marusan are from other Asian countries. We also provide environments such as entertainment events and a wide range of training options. Our motto is to “take chances by challenging, without fear of change.” As we enter a new era of great change, ElringKlinger Marusan in Japan is facing up to the mega trend of the transition from the internal combustion engine to the electric vehicle, thereby focusing on new ElringKlinger products manufactured through innovations in AI/Cobot technology.



Tokyo: Fumiaki Ishihama,
Supply Chain
Manager

6



Suzhou: Sarah Zhang, Assistant to General Manager

7 What does “sustainability” mean to you?

Sustainability means not only environmental protection but also social responsibility and community. At the age of 45, I got my job opportunity in this industry. Despite the communication difficulties – we are ten deaf colleagues – I perceive the effort of the whole company to incorporate us. The deep concern of others, as in the way the workstation is kept clean and organized for the next shift, is also apparent. Consideration and respect is another form of sustainability to me which I learned from Elring Klinger do Brasil Ltda. I really like working here! I would therefore stress that sustainability is meeting the needs of the present without compromising future generations. This also means social diversity and equality, especially so that historically underprivileged people can be included in a more egalitarian social environment.



Piracicaba: Adriana Santos,
Machine Operator

8

How does mobility in China differ from other regions of the world?

It is well known that China has quickly emerged as the world’s largest mobility market. Automotive, technological, and e-commerce innovations are rapidly converging in unexpected ways. More and more people are opting for private cars for their daily transportation, partly out of safety concerns in view of covid-19. The average commuting time is nearly one hour each way during the rush hour, which causes significant automobile exhaust pollution. The government has introduced a series of policies, including improvements to the public transportation infrastructure, subsidies, and zero plate restrictions for new energy vehicles, well-equipped charging stations, support for 5G technology development, and so on. To save on fuel costs, and attracted by the implementation of these policies, more new energy vehicles are appearing on the road. Speaking of which, a few words on payment methods for urban public transportation. Today passengers can simply swipe smart phones to take a bus or metro, share a bike or car by scanning a QR code, and use a sophisticated e-hailing platform – which means goodbye to wallets, cash, and bank cards. This trend has revolutionized and facilitated mobility for people in China.

9

Can you imagine driving only with an all-electric vehicle (EV) in your region today?

Absolutely. There are more and more all-electric vehicles on the road, especially in cities and tourist areas. With raising environmental awareness, cities are offering more public spaces to recharge EVs, and some businesses offer this service for their clients. At Elring Klinger, S.A.U., we have a charging station for visitors who drive an EV to the site. At the same time, technological improvements to long-range batteries are boosting the use of EVs. The



main challenge is the infrastructure outside of cities, where more charging points are needed. It's challenging to change public opinion, where the reliability of EVs in everyday life is constantly questioned. Given the growing interest in EVs, however, we are moving closer to large-scale use.

Reus: Alina Iuliana Leva,
Purchasing Officer

11



Toluca: Jose Juan Gallegos Delgado, General Manager

10

What will mobility in the US look like in ten years?

Do you expect to see regional differences?

I am really curious to see how mobility in the US changes over the next ten years. Many expect the large cities on the east and west coasts to move towards public transportation driven by electric or solar power; there will be ride sharing, and families in these areas will likely own electric vehicles. More rural areas may take longer to convert because the infrastructure outside the cities will require major investment and more time to adapt to mobility changes. We are already experiencing the transition to electric vehicles across the country, a trend that will gather pace as new technologies, applications, and vehicles continue to evolve. This also has the potential to revolutionize the way goods are moved from A to B throughout the supply chain. New products and innovations will create both opportunities and challenges for the industry.



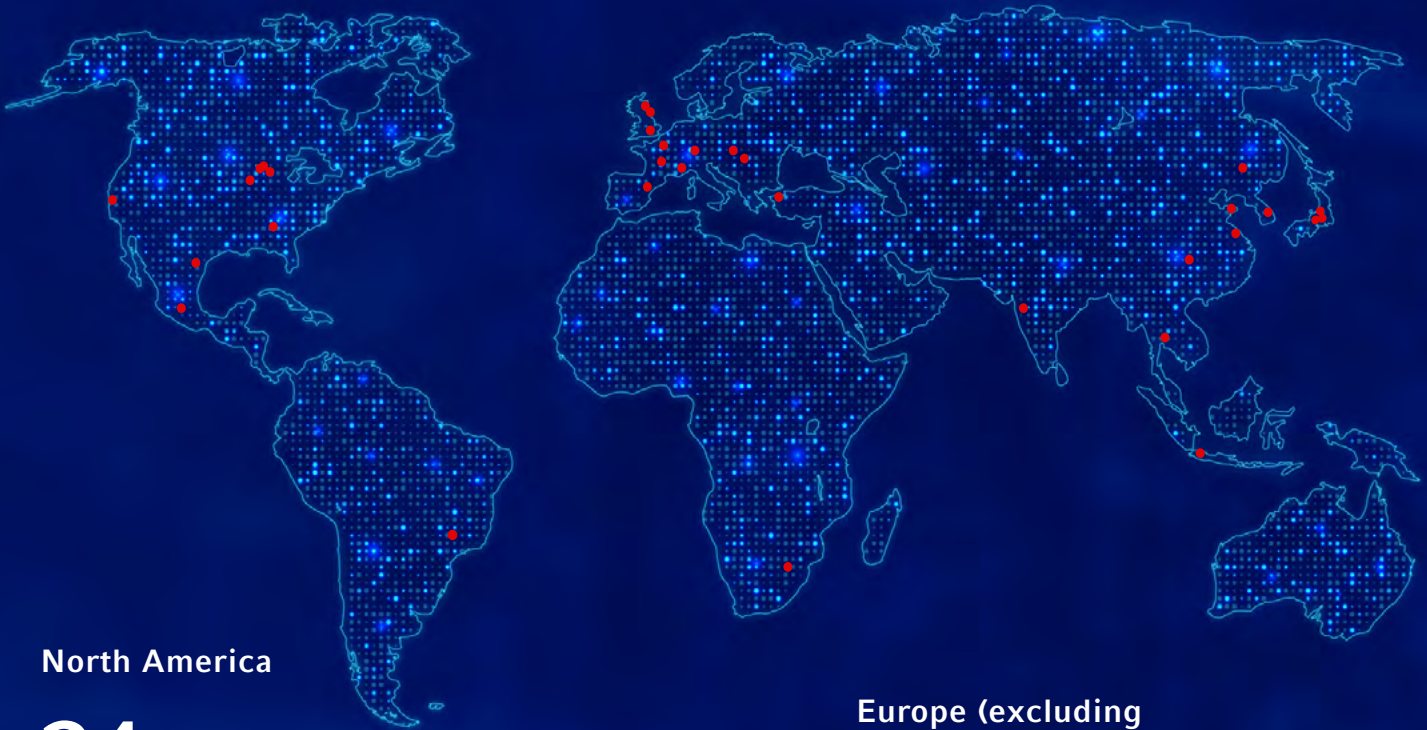
Buford: Kristen DeLiso,
Supply Chain Manager

Global supply chains are coming under greater pressure year after year. What does that mean for your site?

Here at ElringKlinger Mexico, where we have a high percentage of imported material from outside of the Americas, we are disadvantaged in the form of freight and container shortages. There is a risk to the on-time material supplies needed to accomplish our corporate and customer commitments. We have reached the stage where digitalization and mobility are the keys to finding the ideal formula to adapt in a new environment that demands speed, flexibility, and efficiency. The question is: are we prepared? Our supply chain strategies must focus on teamwork and collaboration with EK facilities to share key inventories. We need to adopt a solid strategy of supplier relocation, flexible commercial agreements, and exchanges of best practice. The way to face these challenges is to seek out different strategies involving our immediate environment and explore alternatives where the talent and experience of our supply chain and foreign trade team come into play. One such strategy will be the implementation of consignment warehouses; inventory localization and freight cost reduction will be a key focus. We have the team with the talent and experience needed to confront this challenge together!

Global presence

45 sites



North America

24%

SHARE OF SALES

1,766

EMPLOYEES

8

SITES

South america and rest of the world

4%

SHARE OF SALES

384

EMPLOYEES

2

SITES

Europe (excluding Germany)

30%

SHARE OF SALES

1,739

EMPLOYEES

12

SITES

Asia-Pacific

20%

SHARE OF SALES

1,541

EMPLOYEES

11

SITES



Germany

22 %

SHARE OF SALES

4,036

EMPLOYEES

12

SITES

Imprint

pulse

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The background is a dark blue field filled with a complex pattern of glowing lines and dots. Several prominent, bright cyan lines stretch across the frame, some parallel and some intersecting. A dense field of smaller, multi-colored dots (red, orange, yellow, and white) is scattered throughout, creating a sense of depth and digital activity.

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