

# DIMENSIONS

THE MAGAZINE FROM RHEINMETALL

ISSUE 1/2023

## SECURITY

POLITICAL AND MILITARY  
DEVELOPMENTS ARE CHANGING  
THE PARAMETERS FOR LASTING  
PEACE IN EUROPE AND THE  
WORLD.

## A COUNTRY IN EUROPE DEFENDS ITSELF

Our cover picture shows Europe by night from outer space – the lights of towns and cities twinkle in the darkness, and everything appears perfectly peaceful. But appearances can be deceptive. It has never been more important than today to stand up for democratic values and to find robust solutions in these challenging times.

The young woman in this photo – taken in Europe, in the centre of Kyiv – is Alina. She appears almost carefree – that is, if you ignore the Kalashnikov, the battle dress uniform, and the stack of old tyres she’s sitting on. Alina is 26 years old and was a dancer in her former life. When Russia attacked her homeland on 24 February 2022, she didn’t hesitate to sign up to defend her country. Alina is one of 30,000 female soldiers serving in the Ukrainian Army, which means that women comprise 15 per cent of it. Whether women or men, the courage and tenacity of Ukrainian combatants have impressed the entire world. “We will sacrifice our body and soul for our freedom,” declares the Ukrainian national anthem. For the people of Ukraine, these aren’t mere words. They are a promise to be kept.





## DEAR READERS,

Today you are holding in your hands the first issue of DIMENSIONS. We are launching our new company publication in turbulent times: Russia's war of aggression against Ukraine has irrevocably changed our world, or at least our perception of it. At this extraordinary historical turning point, things that we once took for granted – a secure energy supply, of course, but above all the longstanding expectation of peace and security in Europe – now no longer look so certain.

The word 'security' and the need to protect democratic societies, their infrastructure and their citizens have once again entered the public consciousness. As one of the largest suppliers of systems and equipment for the armed forces of Germany and all Europe, Rheinmetall is in the public eye as perhaps never before – keenly aware of its great responsibility.

At the same time, global climate change is threatening the basis of existence for future generations. To bring about a climate turnaround, our world needs new, environmentally sustainable forms of transportation and energy generation. Rheinmetall is part of this major collective effort. This deserves to be talked about.

DIMENSIONS opens a new space for discussion and contributing to debates. In this issue, we talk about our responsibility in a time of deep-running change and highlight the contributions that Rheinmetall, as an integrated technology group, is making in response to the crises facing the world today. In doing so, we also want to reach those who until now have known Rheinmetall only as it is depicted by others. But one thing we certainly do not want to be is eager to please. I invite you to engage in a dialogue. You can also find us online at [www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en).

Sincerely,

Philipp von Brandenstein  
Head of Corporate Communications Rheinmetall AG



### ABOUT THE TITLE PAGE

Nocturnal satellite image: many of Europe's major cities, including Paris, Madrid, and London, can be clearly recognised as points of light – but also Moscow in the east.

# CONTENTS

## POINT OF VIEW

- 6 A refuge for white-tailed eagles**  
Rheinmetall's proving ground harbours a unique ecosystem. Rare animals and plants thrive here.
- 8 In brief**  
News, information, and background stories from around the Group.

## IN CONVERSATION

- 10 Taking responsibility for the big issues of our time**  
Armin Papperger, CEO of Rheinmetall AG, on German defence capabilities, his commitment to sustainability, and the Group's evolving image.

## SECURITY

- 14 The world in turmoil**  
It is not only the war on Ukraine that is influencing the future of Europe and the world. An overview of the most important developments from Dr Theodor Benien.
- 22 NATO's strategic concept**  
The Western defence alliance refocuses. Defence, crisis prevention, and security form the new focus.

## RESPONSIBILITY

- 24 Sustainability – because it concerns us all**  
What was once considered 'nice to have' is now a vital factor in determining a company's long-term business success.
- 26 Women. Power. Network.**  
Bringing more women into the company – but how? Rheinmetall has a very special strategy in this area.

DIMENSIONS is also available as an online version:  
[www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en).



# 14

## The world in turmoil

Russia's attack on Ukraine has triggered a major rethink on security – among policymakers and the public at large.



## SECURITY

Dramatic political and military have ushered in a new era in Europe and the world. What is changing? Pages 14 and 22.



# 10

## In conversation

Armin Papperger, CEO of Rheinmetall AG, has been at the head of the company since 2013. In DIMENSIONS, he tells us what he is planning.



### 28 Once upon a time...

In Hamburg's Ottensen borough, a new, mixed-use district is taking shape on and around a former factory site.



## TECHNOLOGY

### 32 Racing into the future

Teleoperated driving – a make-or-break topic for the automotive industry. Düsseldorf's Derendorf district and the city's industrial port have been declared pilot regions.

### 36 15 tons of safety

The Survivor R is the best choice in high-risk situations. And now the special-response vehicle has made its TV debut.

### 40 Sparring partner for aviation

Whether cockpit or cargo bay – flight simulation technology from Rheinmetall ensures that professionals receive the very best training.

### 44 Keeping things turning

Large-scale bushings for gearboxes destined for wind turbines all over the world are being produced in Papenburg.

## INTERNATIONAL

### 46 The Scandinavian challenge

More than 650 militarized trucks for Norway and Sweden in 42 variants – a massive challenge for the contractor.

## PEOPLE

### 50 The man who landed in the Middle Ages

Rheinmetall engineer Dieter Bohn has a passion for science fiction. Now he has published his first novel.

### 51 Imprint



### Responsibility

An urgent need for action: Rheinmetall sets the bar high when it comes to sustainability.

### International

Norway and Sweden commissioned a mammoth truck project implemented by Rheinmetall MAN Military Vehicles.

## A REFUGE FOR WHITE-TAILED EAGLES

With a total area of 54 km<sup>2</sup>, Rheinmetall's test site at Unterlüss in northern Germany is the largest private-sector proving ground for weapons and ammunition in Europe. It also harbours a unique ecosystem. The company does its utmost to safeguard and develop optimum habitats for the sites's diverse flora and fauna. Many of the creatures living here are on the Red List of species threatened with extinction. New inhabitants frequently 'move in' as well.

For a long time, the white-tailed eagle – the nation's heraldic bird – was classified as extinct in Germany. But since the early 1990s, it has again found a home at Unterlüss – occasionally even posing for spectacular photos. Here, in this strictly protected area of small lakes and rivers, the white-tailed eagle – which, with a wingspan of nearly two-and-a-half meters, is the largest bird of prey in Germany – finds ideal conditions.

The pair of eagles currently in residence enjoys special protection at the Rheinmetall proving ground. During the breeding season, entering the area around the eyrie is strictly forbidden, and new trees are never planted there. Of course, the eaglets receive special attention.

The young are ringed by official experts at Unterlüss, enabling their journeys to be tracked.





The Panther KF51 main battle tank at the Rheinmetall proving ground in Unterlüss.



## GAME CHANGER: THE PANTHER KF51 MAIN BATTLE TANK

The latest member of Rheinmetall’s family of tracked armoured vehicles, the Panther, is destined to be a game changer on the battlefields of tomorrow. This innovative main battle tank concept made its spectacular debut at the Eurosatory 2022 trade fair. It sets new standards across the board – lethality, force protection, situational awareness, connectivity and mobil-

ity. With a combat weight of around 59 tons, the KF51 Panther is far more mobile than any current main battle tank. Its main armament, the 130 mm Rheinmetall Future Gun System, gives the Panther superior firepower, making it more than a match for all current and foreseeable threats. KF stands for ‘Kettenfahrzeug’, the German word for tracked vehicle.

It is one of the strongest systems of our time. Its sensors and digital architecture enhance the tank’s reconnaissance capability and connectivity and – along with passive, reactive, and active protection technologies – significantly increase the survivability of the crew.

## Green hydrogen – made in South Africa

Innovative, turnkey, mobile: the Group’s South African subsidiary Rheinmetall Denel Munition has developed a modular system for generating, storing, and transporting zero-carbon hydrogen. It ensures a secure supply of energy in a climate-neutral way – in industrial and civil settings as well as in expeditionary and other outdoor contexts. The concept is based on electrolysis technology, whereby water molecules are split into hydrogen and oxygen. The electricity required for this is generated in a carbon-free process using solar panels;



Sustainable technology for the future: Rheinmetall’s hydrogen strategy.

wind power and hydropower can also be used to generate the electricity. The green hydrogen obtained is in gas form, making it suitable for unlimited shipment worldwide. The concept was unveiled at the end of September at the Africa

Aerospace and Defence (AAD) Exhibition in Pretoria. The different components of the Rheinmetall system can be modularly combined to form stationary systems and mobile applications alike.



# ‘Ringtausch’: Leopard 2A4s for the Czech Republic and Slovakia

In a multilateral equipment exchange, Rheinmetall is supplying main battle tanks to the Czech Republic and Slovakia. The armed forces of both countries are receiving Leopard 2A4 main battle tanks. In return, they are providing military equipment to Ukraine. The ‘Ringtausch’ is a process developed by the German government in collaboration with European neighbours and NATO partners to support the Ukrainian

war effort. Under this arrangement, NATO partners are providing Ukraine with Soviet-era heavy equipment and receiving surplus Western systems in return. The tanks are overhauled Leopard 2A4s owned by Rheinmetall. The Czech Republic will also receive a state-of-the-art Büffel/ Buffalo 3 armoured recovery vehicle which is mounted on an upgraded Leopard 2 chassis. All vehicles are to be delivered by the end of 2023.



## HERO LM SYSTEMS – PRECISION STRIKES ON CALL

The strategic partnership between Rheinmetall and the Israeli company Uvision Air Ltd. is beginning to bear fruit. At the heart of this venture is the HERO family of loitering munitions. Rheinmetall is already marketing Uvision products in Europe. Plans exist for future joint development activities. Rheinmetall has thus added an ultra-modern new product to its existing range of service and practice ammunition. The term ‘loitering munition’ refers to its ability to stay aloft over the target area for a prolonged period undetected, enabling instant striking of emerging targets. Various armed forces of NATO, the EU, and other partner nations already use this ammunition. A key benefit of HERO loitering munition is its high precision, which also minimises the risk of collateral damage.



Truck transfer at Norway’s Sessvollmoen military base: (from right) Brigadier General Frode Ommundsen, Major General Øyvind Johan Kvalvik, and Michael Wittlinger, chairman of the board of management of RMMV.

## MILITARY TRUCKS FOR NORWAY AND SWEDEN

High-tech trucks made by Rheinmetall MAN Military Vehicles (RMMV) are reinforcing the Norwegian and Swedish armed forces. The first delivery for Norway comprised 109 vehicles in different variants: 24 HX 8x8 trucks with a hook lift system, 56 TGS 6x6 heavy-duty tractor trailers, and 29 multipurpose TGS 4x4 and 6x6 vehicles. The new vehicle family is precisely tailored to the requirements

of the military user. Some of the trucks feature integrated armoured vehicle cabs that protect against ballistic threats and shrapnel. They can also be equipped with state-of-the-art communication and command-and-control systems as well as remote-control weapon stations. You can read more about the complex production of the 38 truck variants on page 46.

→ You can find all the latest news, information and background stories at the DIMENSIONS website: [www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en).

# Taking responsibility for the big issues of our time

The Russian invasion of Ukraine marked a turning point in history – and for the defence industry, too. Armin Papperger has been at the helm of Rheinmetall AG since 2013. In this interview, he discusses the Group's evolving image, Germany's ability to defend itself, his commitment to environmental sustainability – and how Rheinmetall is reconciling these imperatives.



**Mr Papperger, on 27 February 2022, a Sunday, the Federal Chancellor proclaimed a historical 'Zeitenwende' (turning point) in a speech to the German Parliament. Where were you on that day?**

I was at home, watching TV. I felt very tense about what would come, but basically knew what he would say. That's why we were already well prepared at Rheinmetall and able to submit a so-called 'potential list' so quickly. It showed what we could supply at short notice – to the Bundeswehr, of course, but also to support Ukraine.

**Were you surprised by the Russian invasion of Ukraine?**

No, not really. You don't order 150,000 troops to the border for no good reason.

**Is what we're seeing also a Russian attack on Western values?**

Yes, that's my impression. It's obvious that Russia isn't willing to support a rules-based world order. And in the long run, that's the biggest problem: even if Putin is gone someday, we can't assume that whatever government comes afterwards in Russia will necessarily mean a return to business as usual.

**Which brings us to Rheinmetall and the defence sector. Do you get the feeling that the image of the industry has changed?**

Yes, I think that our image has changed for the better, but I don't know if it's going to last. In Germany, there are already clear signs of war weariness setting in, even though we're not directly

affected. I therefore worry that compassion and solidarity could soon evaporate, and with it, the will to look after our own security. That would be fatal.

**How do things stand when it comes to making sure Germany can defend itself again? A lot of gaps need plugging at the Bundeswehr, both structural and material ...**

I think politicians genuinely want to whip the Bundeswehr back into shape. This is a process that will take at least five or six years. The 100-billion-euro package is a great opportunity for the Bundeswehr, but we can't just let it be a flash in the pan. Maintaining NATO's two per cent goal over the long haul is more important. Because if we don't, we'll be ordering equipment now for our armed forces that we probably



**“We are now investing tens of millions of euros every year in the area of sustainability.”**

**ARMIN PAPPERGER**

Born in 1963, Armin Papperger has been Chief Executive Officer of Rheinmetall AG since 1 January 2013. At the same time, he is responsible for the Defence sector as Chairman of the Corporate Boards. After graduating with a degree in engineering, he began his career in quality management in the Defence sector of the Rheinmetall Group in 1990. Having held a number of further posts in this area, he became Managing Director of various subsidiaries of the Defence sector in 2001. In July 2007, he was appointed head of the Weapon and Ammunition business unit. At the beginning of 2010, Papperger assumed responsibility for the Vehicle Systems and Weapon and Ammunition business units on the Defence Corporate Board. He has been a member of the Executive Board of Rheinmetall AG since 1 January 2012.

That’s a political decision. Military cooperation is an instrument of foreign policy, and defence projects are part of it. Look, Germany tells Arab countries, “Please give us lots of your natural gas.” And here’s what they say: “Other countries were ahead of you. And unlike you, they help us out in other areas – for instance, when it comes to defence. Go to the end of the queue.” It really makes you think.

**One country that you can’t sell military equipment to is China. But you have a strong civil sector presence there, with ten locations, primarily serving customers in the automotive industry. What potential risks do you see there for Rheinmetall?**

I do indeed see certain risks in our civil operations. Most of our companies there are 50/50 joint ventures, with the Chinese government on board. On the Executive Board, we keep a sharp eye on the situation and make decisions accordingly.

**Have new orders been coming in since the ‘Zeitenwende’?**

Yes. The first major order was a contract for personal protection equipment for infantry worth almost 300 million euros. Now we’re on the verge of the second lot of Puma infantry fighting vehicles being ordered for the Bundeswehr. Decisions are coming soon on a new 6×6 vehicle and a vehicle for airmobile operations. We also expect to get a significant share of the digitalisation work currently in the pipeline.

**The Russians have lost a tremendous amount of equipment, including thousands of tanks. Does the main battle tank have a future?**

Sure, of course it does. Otherwise, our new Panther KF51 main battle tank wouldn’t have created such a stir or attracted so much attention when we recently presented it, and not just in defence circles. Russian tanks like the T72 are practically defenceless against anti-tank missiles. This requires active protection of the kind Rheinmetall has developed. The Panther is protected from drones, too, thanks to our Top Attack Protection System. With counter-measures like these, the main battle

won’t even be able to maintain due to a lack of funds later.

**Mr Papperger, as far as the media are concerned, you’re Germany’s top arms supplier. You’re also getting more political attention. How do you feel about this new role?**

I would prefer peace. Personally, I would be happy to do without this role. At Rheinmetall, we have an obligation to society, an obligation we need to live up to. Our core mission is to supply the armed forces of Germany and its NATO partners with the best possible equipment.

**There are several customer countries that are always controversial. What do you think of the governing coalition’s efforts to tighten the**

**regulations covering German arms exports?**

We’ll certainly be able to supply our partner nations in future with no problem, first and foremost NATO and EU countries. It would be helpful to have a list of other approved countries, which would give us a clear basis for doing business. I’d also like to see a uniform European regulation for arms exports. As things stand today, German industry is at a major disadvantage. Our foreign competitors even cite being ‘German-free’ as a positive attribute in joint projects, because the lack of German participation makes it easier to market defence products internationally. This can’t go on.

**Should Germany supply arms only to democracies?**

tank clearly has a future. Besides, it's plain to see from the situation on the ground in Ukraine that tanks are still a tactical necessity.

**It takes two years from the day a tank is ordered to the day it's delivered. Why does it take so long?**

Assembling a tank goes relatively quickly. The biggest problem right now is sourcing the necessary materials. If you order special steel for armour today, for example, it can take eight or even twelve months to arrive. Besides, tanks need tracks, guns, electronics ... The delivery time for electronic components can be 24 months.

**You expect your military business to grow by well over 10 per cent a year. In view of this trend, what is your strategy?**

I assume that around 80 per cent of our business will be military-related by 2025. But we don't want just to be a defence contractor – we're a tech enterprise. There are plenty of promising applications in the 'warm home' domain – by which I mean heating systems. We have new sensor technologies and are developing a concept for an electric motor for new hybrid military vehicles. And then, of course, there's hydrogen

technology. My goal is to have our five divisions so thoroughly integrated that it'll be virtually impossible to tell the difference between our civil and military business.

**How do you plan to square this increase in output with Rheinmetall's sustainability goals? After all, you want to be CO<sub>2</sub>-neutral by 2035 ...**

Year in, year out, we've been investing eight-figure amounts in sustainability. Our priority at Rheinmetall is obviously to cut our CO<sub>2</sub> emissions. We can't be completely CO<sub>2</sub>-free, but we can compensate for the greenhouse gases we emit [Cf. article on p. 24, ed.]. Ultimately, to be truly CO<sub>2</sub>-free, we need to be energy producers, and that's my medium-term goal. We're already looking for a location to set up a wind farm.

**What concrete successes have resulted to date from closer cooperation between the two parts of the Group formerly known as Automotive and Defence?**

We have solutions for automated driving and teleoperated driving. And we have power electronics that we're developing for the civil sector that can also be used for military purposes. Furthermore, we're working on sen-

sors that can determine if somebody's fit to drive, which obviously has both civil and military potential. We're also pursuing this kind of cross-linking in air conditioner compressors and mobile fuel cell systems, but also in the realm of digitalisation and guarding against cyber threats.

**The future looks bright for hydrogen technology. What does Rheinmetall's strategy in this area look like?**

I think hydrogen-based drives for mobility will play a significant role, especially for trucks. We know that the biggest challenge in establishing a global hydrogen economy is having to produce large amounts of green hydrogen as cheaply as possible. And that's exactly what our project E<sup>2</sup>NGEL aims to do: we're developing electrodes for alkaline electrolysis that perform very well. Moreover, we're going to be able to use renewable energy to produce green hydrogen. In South Africa, we've just presented a turnkey, mobile, modular solution that can generate, store, and transport green hydrogen that's CO<sub>2</sub>-free.

**You're already offering a complete system solution?**

Yes. But our technologies are also present in various other components. In the government-backed LORICA project, for example, we're working on an innovative pressure tank system for hydrogen that will be able to store hydrogen on ships, trucks, buses, trains, and cars. We're also making a decisive technological contribution when it comes to transporting and trans-shipping hydrogen. In the fuel cell systems domain, we're cooperating with well-known partners like Ballard and Cellcentric to make fuel cell systems more efficient, less expensive, and durable thanks to components like our hydrogen recirculation blower.

Our electric coolant pumps can already be used in fuel cell systems today. We're also one of the world's biggest valve makers, which lets us offer products that are vital for the safe operation of fuel cells.

Finally, we also happen to be specialists in the field of thermal management,



Round-table discussion at Rheinmetall headquarters in Düsseldorf: (l to r) Oliver Hoffmann, Chief Editor of DIMENSIONS, Dr Philipp von Brandenstein, Head of Corporate Communications, and Armin Papperger, CEO of Rheinmetall AG.

**“Hydrogen-based drives will play a major role in the future of mobility.”**



which is very important in fuel cells. As you can see, we're making a major commitment here. Things look very promising.

**So, the civil use of technology continues to play a role for you?**

Absolutely. For me, ultimately it doesn't really matter if the task at hand is civil or military. I like technology and I like our people. I want the men and women who work for Rheinmetall to have decent jobs that are as secure as possible. Our defence business is experiencing a boom now, which helps us all – and that goes for both the military and civil side of the house at Rheinmetall.

**It will soon be ten years that you've been at the helm of Rheinmetall. What decision over the course of this decade do you regard as being particularly critical for the company's development?**

The fact that I employed all the right people! A company's success is based

on teamwork. We have some highly motivated people who ultimately serve the interests of Rheinmetall and our collective responsibility. That's the most important thing for me. I'd like to express my thanks to everyone who works hard for Rheinmetall. I'm especially grateful to my long-serving companion Helmut Merch, who for the past ten years has performed a great service to the Group as CFO. He will be taking his well-deserved retirement at the end of the year 2022 after a 40-year tenure at Rheinmetall.

**The decision not to have intermediate areas for Defence and Automotive was a landmark decision as well ...**

Absolutely. Another important decision was eliminating the imaginary line between Defence and Automotive. We've succeeded in turning Automotive into an organisation capable of exploiting opportunities in other important growth sectors such as hydrogen technology.

This means that we're entering a new era in very good shape – an era of robust growth, by the way. I'm happy to say that we have a very stable, highly motivated team ...

**But you'll need reinforcements to power this growth, won't you?**

That's for sure. Anybody who's looking for a challenge should contact us at Rheinmetall! We've got lots to do and are looking for good, loyal people. Success is sexy, as I like to say, and Rheinmetall has plenty to offer these days, with secure jobs and excellent opportunities for personal development in Germany and around the globe. ●

→ Read the full interview at [www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en).

# The world



Solidarity with Ukraine: as here at the Brandenburg Gate, people in Europe and around the world are rallying to show their support for the country.



# in turmoil

Russia’s attack on Ukraine is a challenge for Europe and the world. For Germany, the EU, and NATO, the invasion represents a profound turning point – and with it, serious changes in security policy.

**AUTHOR:  
DR THEODOR  
BENIEN**

has worked as Head of Communications in various divisions of the Airbus Group for more than 30 years and was most recently Vice President of Communications in the Eurofighter consortium. Since 2020, he has been working as an independent communications consultant focusing on international security and defence policy.

Russia’s attack on Ukraine on 24 February 2022 will surely figure prominently in the history books. For the Russian invasion was not merely a flagrant violation of international law; it has also triggered a far-reaching process of change in Europe – the political, economic, and military consequences of which it is too early to evaluate in full.

NATO General Secretary Jens Stoltenberg was not exaggerating when, deeply worried, he stated that Russia’s war on Ukraine had sparked the “biggest security crisis in Europe since the Second World War”.

To be sure, however, the war in Ukraine is not the sole cause of these geopolitical transformations. On the contrary, a whole host of very different and partly diverging developments are influencing Europe’s future and will continue to do so. Here is a brief overview.

**USA AND NATO**

In coming years, close transatlantic ties to the United States and NATO membership will continue to be Europe’s – and especially Germany’s – basic life insurance policy. Yet Europe is no longer a top US foreign and defence policy priority. The fast-growing nations of the Pacific Rim and their strategic military significance in the Indo-Pacific region have for years played an increasingly important role in Washington’s geopolitical and economic calculations. The creation in 2021 of the trilateral AUKUS alliance between Australia, the United Kingdom, and the United States is just one example of this trend.

**RUSSIA**

Owing to its offensive war against Ukraine, the regime in Moscow is no longer viewed in the West as a valued strategic partner, but instead is now considered as its greatest threat. The previous credo of German governments that security could only be achieved in concert with Russia rather than by opposing it has proved to be political miscalculation. As Chancellor Olaf Scholz stated in a government declaration on 22 June: “For the foreseeable future, a partnership with Russia of the kind still envisaged in 2010 as a strategic concept is inconceivable with Putin’s aggressive, imperialist Russia.” In plain language, this means that Germany must now rethink and recalibrate its previous Russia policy.

**CHINA**

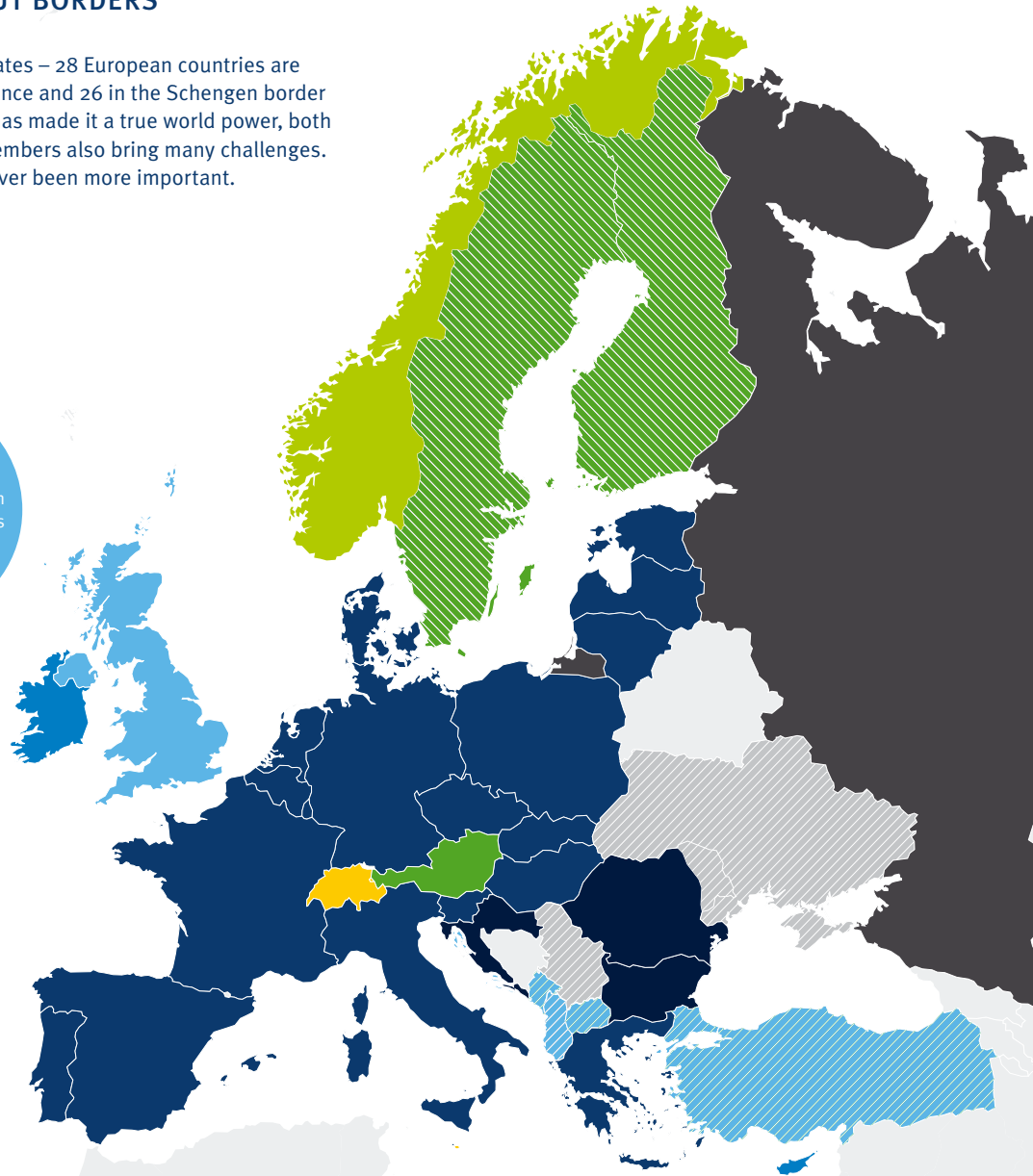
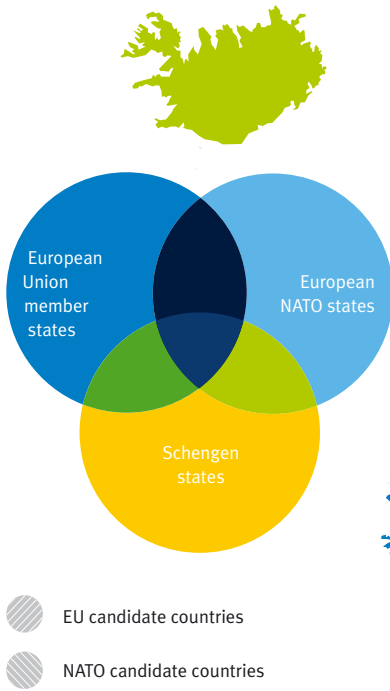
The People’s Republic of China has long since ceased to be a ‘sleeping giant’, but instead seems to be pursuing its political goals with a clear strategy. Only gradually has the realisation dawned on the West that China, while not posing a direct military threat due to geographical distance, has become a systematic competitor, engaging as discretely as possible in a consistent policy of expansion. China is therefore America’s top foreign and defence policy priority. President Joe Biden has gone so far as to speak of a global struggle between the democracies and the autocracies. And indeed, China’s ambitious Silk Road project, though ostensibly





## EUROPE (ALMOST) WITHOUT BORDERS

The EU now comprises 27 member states – 28 European countries are represented in the NATO defence alliance and 26 in the Schengen border agreement. The sheer size of the EU has made it a true world power, both economically and politically. Many members also bring many challenges. But Europe is aware that unity has never been more important.



1 Siemens Energy CEO Christian Bruch, German Chancellor Olaf Scholz, and engineer Uwe Schmiedel (from left) at the Siemens Energy plant in Mülheim an der Ruhr. The turbine for the Nord Stream 1 pipeline has been here since mid-July, awaiting its return to Russia. Germany and Russia are accusing each other of blocking the process.

motivated by economic and technological considerations, is driven even more by ideology and power politics.

### TAIWAN

The conflict over Taiwan is a textbook example of just how strongly ideology, power dynamics and history dominate China's foreign and defence policy. China's position is clear: Taiwan is and remains a province that historically belongs to the People's Republic. Equally clear is America's policy of strategic ambiguity, which consciously leaves open the question of how the United States would react to a Chinese attack on Taiwan. If the conflict now being stirred up by China through military threats and attempts at intimidation were to escalate into a war because of an offensive military manoeuvre, this would not only have a massive negative impact on the security of the nations of the Indo-Pacific

region. It would also lead to an enormous disruption of global supply chains, especially since Taiwan's IT industry produces basic systems and components for Europe's high-tech industry.

### EUROPE

The EU and NATO play a complementary and mutually reinforcing role in maintaining peace, security, and stability. But in order to overcome Europe's long-standing historic dependence on the US and to assert its own (security) interests vis-à-vis the US, Europe must do more for its own strategic sovereignty and thus for its own defence. This is even more valid given that future political developments in American harbour uncertainties and risks for the continuity of US foreign and defence policy.

Germany's former foreign minister, Sigmar Gabriel, repeatedly pointed out that Europe

should do more for its own defence, because in a world of meat eaters, vegetarians would have a hard time surviving. And it was none other than Jean-Claude Juncker, the long-serving President of the European Commission, who made it clear that Europe finally had to develop a “global policy capability” and, owing to its immense economic and technological potential, to enter the world stage as a stronger political actor. The efforts by many European nations to meet the NATO goal agreed in 2014 of spending two per cent of gross domestic product (GDP) on defence reflect this development.



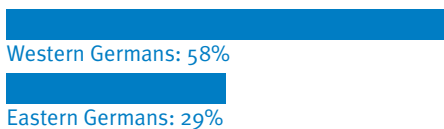
## CHANGE OF MOOD REGARDING DEFENCE

In the 1980s, the motto was ‘Frieden schaffen ohne Waffen’ (Make peace without weapons), at least for the majority of the West German population. Since the start of the Ukraine war, this attitude has changed considerably. The differences in opinion here between eastern and western Germany are dramatic.

### In favour of security through military force



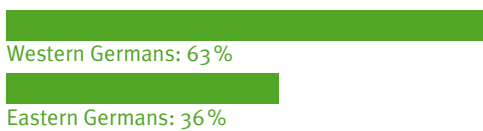
### In favour of strengthening NATO troops



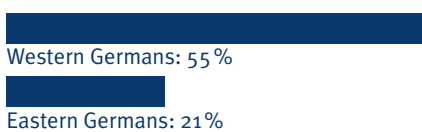
### In favour of NATO membership



### In favour of defending a NATO partner under attack



### In favour of arms shipments to Ukraine



Source: Allensbach Institute for Public Opinion Research (FAZ, 27 May 2022)

## SWEDEN AND FINLAND JOINING NATO

Prompted by the Russian invasion of Ukraine and concerns for their national security, both Sweden and Finland applied to join NATO in summer 2022. Sweden, a byword for political neutrality for over 200 years, and Finland, which shares a border with Russia roughly 1,300 km long, will – presuming the accession protocol is ratified by every NATO state – increase the number of NATO member nations from 30 to 32, as well as substantially strengthening the Atlantic alliance’s northern flank.

## UKRAINE AND MOLDOVA TO JOIN THE EU

The European Union unanimously acknowledged Ukraine and Moldova’s status as candidate countries with 27 ‘yes’ votes on 23 June 2022. Once all the criteria are met, the accession of the two countries into the EU community of nations would bind them more closely to Europe. Thus, in a few years’ time, the EU could have 29 members, up from its current 27.

## NEW ALLIANCES WITH RUSSIA

The planned expansion of NATO and the EU are naturally a thorn in the side of the political leadership in Moscow. It is there no coincidence that President Vladimir Putin’s first trip abroad since the invasion of Ukraine was to Central Asia in June 2022. He described five states (Kazakhstan, Kirgizstan, Tajikistan, Turkmenistan, and Uzbekistan) as “historically Russian”. Furthermore, at a summit meeting of nations bordering the Caspian Sea (Azerbaijan, Iran, Kazakhstan, Turkmenistan, and Russia), Putin evidently weighed the possibility of new alliances. Still difficult to assess are Russia’s attempts for a rapprochement with China, which has been notably reserved in its criticism of the Russian attack on Ukraine.

## RUSSIAN ROCKET SYSTEMS IN BELARUS

In a visit to St Petersburg in June 2022, Putin announced that Russia would be stationing Iskander-M missile systems in Belarus in coming months. These mobile launchers can fire short-range systems and cruise missiles, tipped with conventional or nuclear warheads. If the systems are stationed as planned, it would pose a new threat to Europe, especially to the frontline NATO nations Poland, Lithuania, and Latvia, all of which share a border with Belarus.

## SOMETHING NEW – NATIONAL SECURITY STRATEGY

In his ‘Zeitenwende’ (turning point) speech on 27 February 2022, Chancellor Olaf Scholz announced a special €100 billion fund and an initiative to whip the Bundeswehr back into shape



2 “Ukraine is part of the European family”: President of the EU Commission Ursula von der Leyen and President of Ukraine Volodymyr Zelenskyy in April in Kyiv.

3 The port of Odessa in October 2022: a bulk carrier docks to be loaded with grain. Now that Ukraine is once again able to export grain by sea, hundreds of ships have already used the corridor through the Black Sea.

2

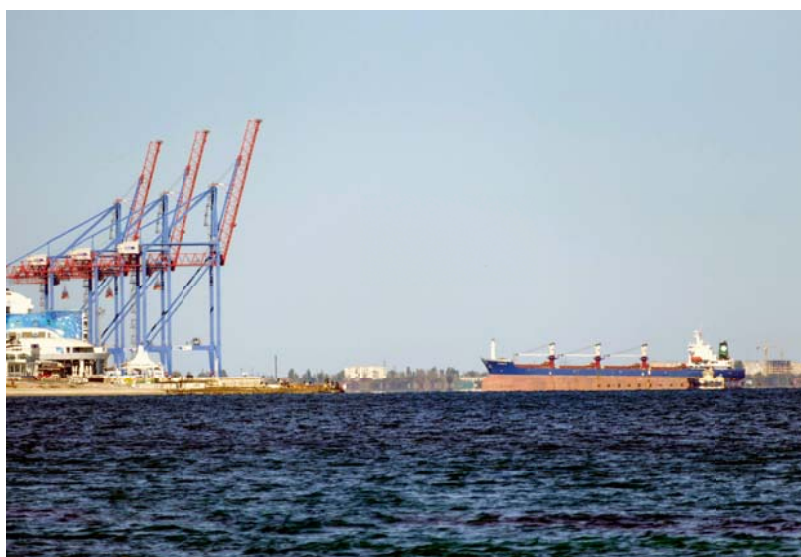
as Germany’s immediate responses to Russia’s unjustified offensive war against Ukraine.

In addition, under the auspices of the German Foreign Ministry, a security policy White Paper is currently being drawn up with the aim of defining a national security strategy for Germany. This is something new, as Germany has never had a national security strategy before.

The profound geopolitical changes that have taken place in recent decades (e.g. the reunification of Germany, the collapse of the Warsaw Pact, and the senseless war in Ukraine) make this strategy a crucial necessity. Forming the basis for this is, among other things, a clear expansion of the meaning of ‘security’. This is no longer confined to external (i.e. military) security, but now extends to internal and socio-economic security, as well as cyber-, energy, food, raw material, and supply chain security.

It comes as no surprise, then, that this multi-faceted development is also affecting public opinion. A significant change in German attitudes concerning the sensitive issues of defence and security policy is apparently underway. For instance, the majority now strongly approves of achieving security through military strength as well as Germany’s continued membership of NATO and the controversial supply of weapons to Ukraine.

3



### WHIPPING THE BUNDESWEHR BACK INTO SHAPE

The special fund for the Bundeswehr announced by the German government, coupled with a substantial increase in the investment portion of the defence budget, will make it possible to re-equip the German armed forces, enabling them to carry out their core mission of defending Germany and its NATO partners again. By 2025, every active soldier is to be kitted out with completely new battle dress uniforms and protective gear – this, at least, is the current Bundeswehr plan. The resources are also intended to turn the Bundeswehr into a European force multiplier in NATO and the EU. The special fund will be used to bridge capability gaps resulting from years of spending cuts.

4 and 5 Under the aegis of the Ministry of Foreign Affairs, a national security strategy has been drawn up for the first time in the history of the Federal Republic of Germany. Touring Germany this summer, German Foreign Minister Annalena Baerbock met with professionals and volunteers, including members of the Rehau volunteer fire department in Upper Franconia (fig. 4) and the soldiers of CBRN Defence Regiment 1 in Strausberg (fig. 5).

The economic plan associated with the special fund offers a good overview of the planned expenditure, which is divided into four dimensions:

**The Air Dimension:** The largest share of investment (€33.4 billion) is earmarked for the Air Dimension, with the Air Force, Army, and Navy all benefitting. The procurement programmes include, among other things, 35 American-made F-35 multirole combat aircraft, 15 Eurofighter Electronic Combat Role (ECR) jets and 60 Chinook CH-47F heavy transport helicopters.

**The Command and Control/ Digitalization Dimension:** The second largest share of investment (€20.7 billion) is intended to improve Germany’s command and control capabilities and

push ahead with digitalisation. In particular, the procurement of advanced radio technology will enable German troops to communicate with their NATO comrades via encrypted wireless links.

**The Land Dimension:** Around €16.6 billion has been set aside for the Land Dimension. Planned investments include, among other things, retrofitted Puma infantry fighting vehicles and successors for the Marder and Fuchs systems. Part of the resources will go to the development of a new German-French main battle tank, the Main Ground Combat System, or MGCS.

**The Naval Dimension:** This dimension is due to receive €8.8 billion, encompassing, for example, the K130 corvette, the F-126 frigate, and the 212 CD submarine, which is currently under development.

**SECURING GERMANY’S LONG-TERM FUTURE**

At present, it is still not clear whether Ukraine will be able to withstand Russia’s military hold over the long term. It would be desirable and sensible if diplomatic channels were to remain open, enabling the difficult work of trying to find a viable political solution to end the war in Ukraine through diplomacy and for dialogue to continue.

Moreover, the changes in the megatrends outlined here show that policymakers need to rely more strongly on credible military force again. Security isn’t something that can be taken for granted, nor can it be achieved without striving to achieve an independent defence capability.

For these reasons, the planned defence expenditure should be understood as a strategic investment in security, thus making a material contribution to securing Germany’s future. This is absolutely vital – for the radical transformation of Europe’s security architecture is already well underway. ●



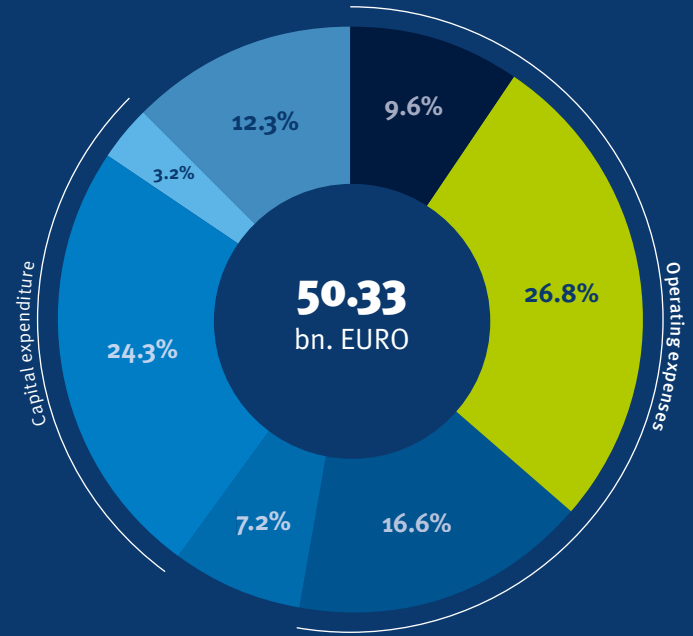
# GERMAN DEFENCE SPENDING

Two per cent of gross domestic product (GDP) – that’s how much NATO member states are supposed to spend on defence each year. But not all of them meet this target. As the second strongest economic power in the North Atlantic Treaty Organization after the United States, Germany takes a back seat here. But with the ‘Zeitenwende’, or turning point, and a special new Euro 100 billion defence fund, this is now set to change. More than half of Germany’s Euro 50 billion defence budget goes on operating expenses such as personnel costs. Capital expenditure for armaments accounts for less than a quarter of the budget.



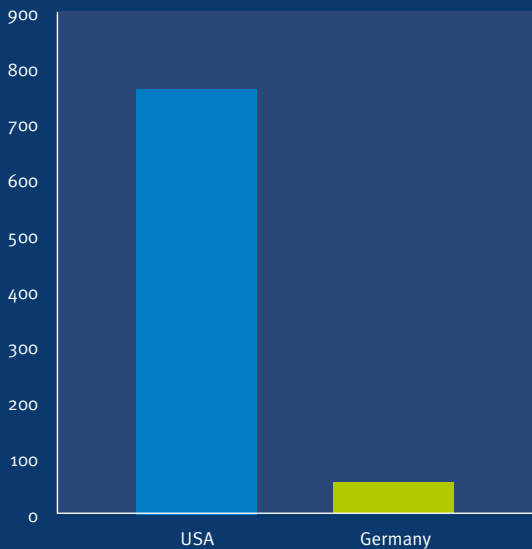
● NATO states ● NATO candidate countries

## DEFENCE SPENDING DISTRIBUTION Germany in 2022

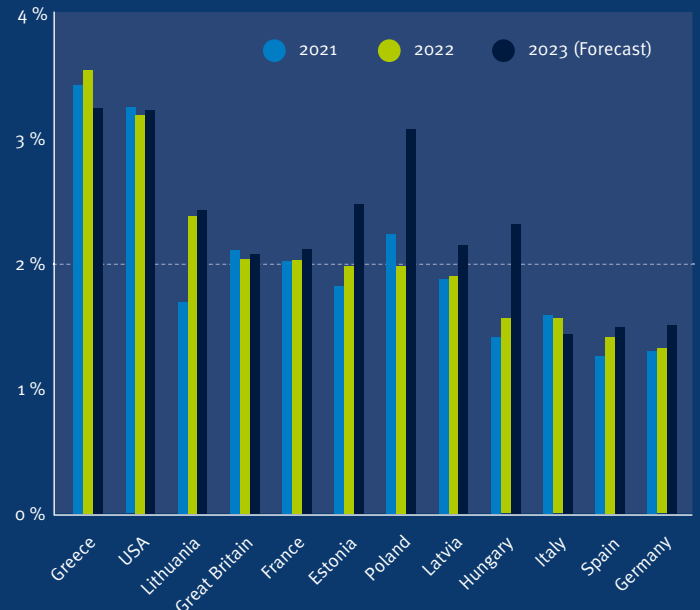


● Material maintenance ● Personnel costs ● Other operating expenses  
 ● Operating contracts ● Defence capital expenditure  
 ● Other capital expenditure ● Expenditure on supplies

## DEFENCE SPENDING COMPARISON USA and Germany in 2022 (USD billion)



## DEFENCE SPENDING COMPARED TO GDP Germany and selected NATO member states



Source reference: Janes Information Services, German Federal Ministry of Finance



# NATO's Strategic Concept

NATO refocuses: the Atlantic alliance has radically changed its policy toward Russia. At the core of the new strategy: defence, crisis prevention, and security.

1

Reacting to changing geopolitical and strategic realities, NATO has adopted a new Strategic Concept in response to the Russian attack on Ukraine, a gross violation of international law. At its Madrid Summit, held on 29–30 June 2022, the Western defence alliance made it clear that

it would not stand idly by while Russia undermines the peaceful political order in Europe.

In the face of an increasingly fragile and unpredictable world order characterised by political instability, strategic competition, and advanc-

ing authoritarianism, the Strategic Concept reaffirms “that NATO’s key purpose is to ensure our collective defence, based on a 360-degree approach”.

### THREE KEY TASKS

In plain terms, this means that from now on the Western alliance will focus on three core tasks: deterrence and defence; crisis prevention and management; and cooperative security. The Western alliance also expressly acknowledges the commitment made in Article 5 of the North Atlantic Treaty, in which the mutual willingness of the 30 NATO member states to defend one another is enshrined: an attack against one state shall be considered an attack against them all.

The Strategic Concept begins with a clear analysis of the global threats facing NATO member states and notes with concern that peace in the Euro-Atlantic area has been shattered. There is a great deal of uncertainty concerning the political and strategic world order. The concept states: “We cannot discount the possibility of an attack against Allies’ sovereignty and territorial integrity.” Unlike before, the Russian Federation is no longer considered a partner, but “the most significant and direct threat to Allies’ security”. International terrorism and conflict and instability in Africa and the Middle East are also classed as a threat and a challenge. The same is true of China, which in NATO’s view remains deliberately opaque about its strategy, intentions, and military build-up.

At the core of the new Strategic Concept are three traditional core tasks that aim to strengthen the entire Western alliance and ensure it remains fit for the future:

**Deterrence and defence.** NATO’s deterrence and defence posture is based on a mix of nuclear, conventional, and missile defence capabilities, complemented by space and cyber capabilities. This posture is to be significantly strengthened to deny any potential adversary possible opportunities for aggression. Great importance is also assigned to maritime security, digital transformation, and the use of space and cyberspace.

**Crisis prevention and management.** The 30 heads of state or government of the Atlantic Alliance have also pledged to increase their current



2

1 German Chancellor Olaf Scholz and President of Lithuania Gitanas Nausėda inspect the NATO EFP Battle Group in Rukla. The unit is led by the German armed forces. EFP stands for “Enhanced Forward Presence” and is intended to deter Russia.

2 NATO’s headquarters in Brussels.

efforts to better anticipate and prevent crises, wars, and conflicts. Crisis prevention is described as an important contribution to ensuring stability and security. Crisis management is also to be ramped up through closer cooperation with organisations such as the United Nations, the European Union, and the African Union.

**Cooperative security.** Because of this third core task, the Strategic Concept reaffirms an open-door policy for all European democracies that share the values of the Western alliance. The EU is described as a “unique and essential partner” for NATO. NATO and the EU play complementary and mutually reinforcing roles in supporting peace and security.

### THE COURSE IS FIXED

Taken as a whole, the new Strategic Concept can be regarded as a course-setting interpretive document for security and defence policy in which NATO has set out its approach to counter future threats. With the political leadership in Moscow having lost trust and credibility in the eyes of the world as a result of the invasion of Ukraine, it is unavoidable that NATO and the EU will have to radically rethink their previous policies toward Russia, refocus, and change course. It is not yet possible at this point to provide a reliable prognosis of what political changes and military power balances this will lead to for Europe in the long term. ●



NATO, the North Atlantic Treaty Organization, was founded in 1949. It has been headquartered in Brussels since 1967. There are currently 30 states in the North Atlantic Treaty Organization, and Finland and Sweden are candidates for membership.

# Sustainability – because it concerns us all

Humanity is facing immense challenges. Overcoming them requires us – governments, companies, and people – to all pull together. What was once considered ‘nice to have’ is now a vital factor in determining a company’s long-term business success.

Sustainable clothing, sustainable food, sustainable travel – seldom has a term taken off so fast. And rightly so, because one look at the news will tell you that we’re not just facing one crisis; there are several, and they all require our attention at the same time. This means we have a phenomenal amount of work to do. “Robert Swan, the famous polar explorer and environmental activist, made this point so succinctly when he said: ‘The greatest threat to our planet is the belief that someone else will save it.’ We all have a collective duty here,” notes Ursula Pohen. She heads Rheinmetall’s Corporate Social Responsibility department, under whose remit all the threads of sustainability come together. “Sustainability is not folklore, it’s not for ‘do-gooders’; sustainability is an important part of our business.”

## PASSIONATE TO BE PART OF THE SOLUTION

For some time now, customers, investors, employees, and the public have not just been interested in the hard financials. They are seeking to form a complete picture of how companies operate, how they conduct their global business activities, and

the impact these have on people and the environment. “Our stakeholders expect us to take responsibility as a company. We’ve been accepting this responsibility for over 130 years. For us, responsibility means doing our bit to help resolve the most pressing problems of our time, the most pressing of which is mitigating the effects of climate change,” declares Armin Papperger, CEO of Rheinmetall AG. “We’re not doing this just because we have to. We’re doing it because we want to! Passion for technology, passion for sustainability – we believe in both.”

## AMBITIOUS GOALS FOR SUSTAINABLE DEVELOPMENT

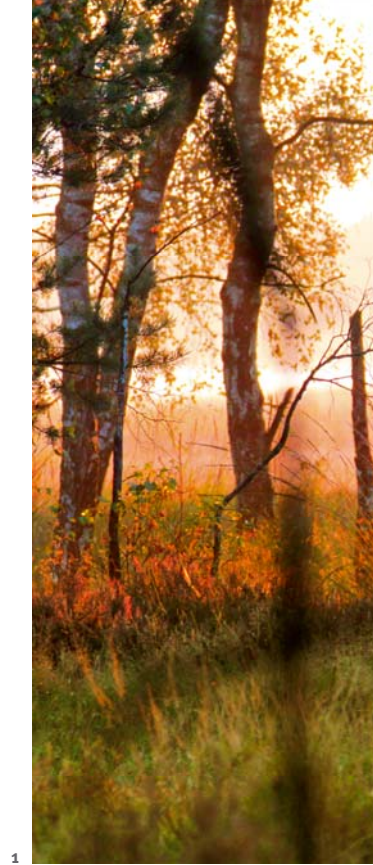
Making a commitment to sustainability means having to formulate a sustainability strategy and setting goals. This applies equally to all three areas for action: environment, social, and governance. Three categories with one aim: obtaining a complete picture of sustainability in all its facets. Sustainability has been on everyone’s lips since 2015 at the latest. It was then that the global community adopted 17 Sustainable Development Goals with its 2030 Agenda. World leaders also agreed under the Paris

Climate Agreement to limit global warming to well below two degrees centigrade, prompting the corporate sector to make considerable efforts.

## THE WAY TO CARBON NEUTRALITY

The Group is making good headway on the environment front. Rheinmetall has set itself the goal of becoming carbon-neutral by 2035. To make sure the company is making tangible progress, it has drawn up a road map. “We are holding ourselves to clear, scientifically proven standards as we move to improve our energy and climate footprint,” explains Dr Alexander Vogt, who heads the Group’s Energy Management department.

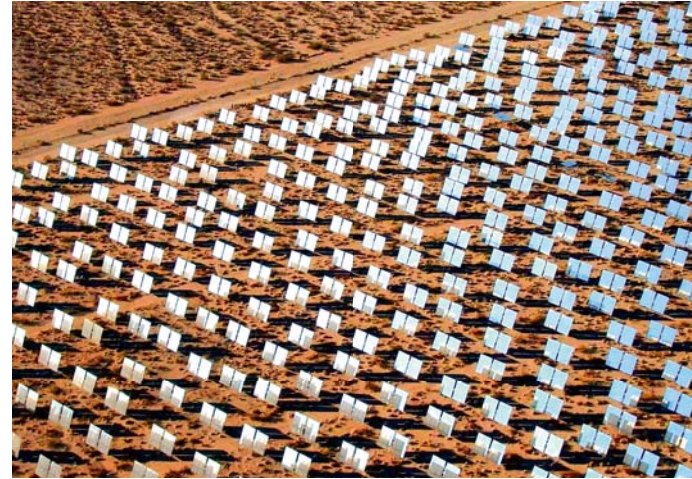
The department is now preparing the Group to join the Science-Based Targets initiative, or SBTi for short. Over 3,000 companies belong to this international network. Its science-based targets will help limit global warming to 1.5°C. “For Rheinmetall, this means cutting all the direct and indirect emissions from our business activities by 4.2 per cent a year,” explains Vogt. “It also means formulating clear reduction targets for greenhouse gas emissions throughout our entire value-added chain.”







2



Several pilot projects are currently in progress, including an energy supply project at Rheinmetall's Unterlüss site. Set to go into operation in 2023, a new heating plant there will be powered by material from the company's own forestry operation, including wood pellets. This will save 5,200 tons of CO<sub>2</sub> emissions a year. Further heating systems are planned in Unterlüss to reduce the plant's greenhouse gas emissions and make production less dependent on fossil fuels and the current limited availability of these fuels.

**THINKING ABOUT CLIMATE PROTECTION ON A GLOBAL SCALE**

"We're taking a three-pronged approach: we're saving energy, we're making ourselves more independent, and we're obtaining more power from renewable sources," states Vogt. One example of this can be seen in South Africa, home to Rheinmetall Denel Munition. The country gets most of its energy from coal. "We're working with a local partner there to build a photovoltaic system so that we can supply ourselves with renewable energy." The Group is currently exploring 20 larger-scale projects in all its divisions, with another 30 under development. Because Rheinmetall



3

1 The buffer zone around the company's proving ground in Unterlüss doubles as a unique nature preserve.

2 Building photovoltaic plants is part of the Group's climate strategy.

3 At Unterlüss, Rheinmetall is planning to build a heating plant that will run on woodchips.

thinks globally when it comes to protecting the climate, the Group is also looking into procuring green energy for all its locations worldwide.

**SUSTAINABILITY IS NOT AN END IN ITSELF**

Thus far, the strong focus on climate and environmental issues has somewhat overshadowed the social aspect of sustainability. "That's now set to change – driven not least by the increasing regulatory requirements at national and international level. Due diligence requirements on human rights, in the company itself and the wider supply chain, are increasingly important," notes Ursula Pohen. The third pillar of ESG comprises

governance, compliance, risk management and internal control systems. "If you like," she adds, "the 'G' for governance includes all the work that ensures we comply with the rules and regulations."

The green transformation of a globe-spanning Group like Rheinmetall involves far-reaching change and affects a whole host of administrative, operative and strategic processes. One thing is for sure; sustainability is not an end in itself; it's about an organisation's ability to continue creating value in the future – a task that will never be complete. ●

**MONICA WERTHEIM**

An economics graduate, Wertheim has been Senior Vice President of Recruiting and Employer Brand Services at Rheinmetall AG since March 2017. She previously worked in similar positions at E.ON/Uniper and in marketing and sales at the Kleffmann Group and Muskator Werke.



# Women. Power. Network.

Exchanging knowledge, engaging in conversation, sharing advice – Rheinmetall employees can do all this in the Women@Rheinmetall network. Connections cultivated in this forum can have a positive impact on their entire professional lives.

“This industry is simply fascinating,” says Monica Wertheim, “it revolves around human mobility and security – two topics I can totally identify with.” As head of Rheinmetall’s Global Talent Acquisition & Employer Branding department, her job is to recruit specialists and executives for the company, striving to keep the number of women as high as possible. Only a small percentage of female graduates opt to study STEM subjects (science, technology, engineering, and mathematics), and most jobs at Rheinmetall are in traditionally male-dominated areas.



Legal quotas play a minor part in the company's motivations. The greater the percentage of women, runs the argument, the better it is for the company. Studies show that the proportion of women in management positions is one of the factors that determine the success of a business. Wertheim wants to share her fascination for the industry – and not just with prospective applicants, but with the female employees who are already part of the Group. For her, recruitment isn't just about hiring, but ensuring that employees remain at the company.

**WOMEN@RHEINMETALL**  
Monica Wertheim founded the network shortly after joining Rheinmetall. Almost 600 female employees from 19 countries are now involved. The aim of Women@Rheinmetall is to promote and support the professional development of women at every echelon of the Group.

### **A NETWORK FOR WOMEN**

An Uruguayan national, she joined Rheinmetall in 2017 and recognised right away what female employees at Rheinmetall needed: a sounding board – and so Women@Rheinmetall was born. It's a forum that promotes the transfer of expertise, where women can exchange ideas and consult one another. The network comprised barely a dozen women to start with. Now there are over 600, something she is proud of: "They come from every location, all rungs of the hierarchy, all age brackets. In a way, they are the face of Rheinmetall's diversity." The connections made here and the presence of female role models in the company have the power to shape one's entire career.

Outside the Women@Rheinmetall network, the Rheinmetall Academy in Germany engages in the targeted advancement of women. It offers management development programmes and training sessions specifically for women.

### **MANY SMALL STEPS**

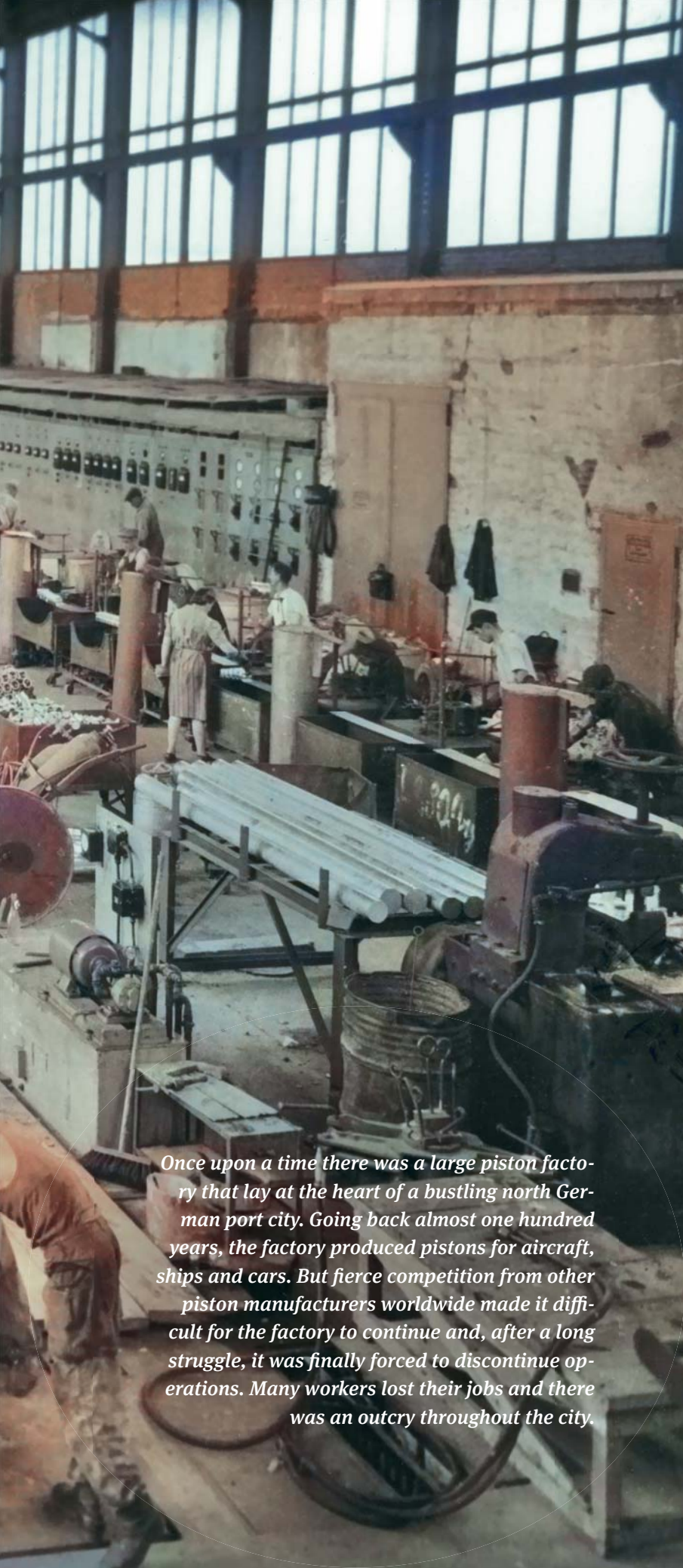
But all efforts, networks, and empowerment actions are of no avail if the corporate culture does not live up to its promise. Rheinmetall employees should have a workplace where they feel safe, a workplace that champions their talents, a workplace they can relate to. This should apply to the staff, she insists, irrespective of age, gender, or skin colour. This is because she doesn't want to see herself as a special officer for women: "Rheinmetall is an excellent employer, full stop – not just for women!" She is also critical of the quota: "Personally, I don't think it's appropriate." Support, building trust, and mentoring are much more important criteria in her opinion – in other words, everything that Women@Rheinmetall has to offer. "Every woman in the network makes the whole construct stronger," says Wertheim.

Recruitment may well be a big challenge, but the intensive work of convincing women is progressing in baby steps. The proportion of female trainees is now relatively high at just under 30 per cent. This means the company will take even bigger steps going forward. ●

In the early stages of organisation of production at the Hamburg plant on the Friedensallee was similar to that of the Neckarsulm plant.



# Once upon a time ...



*Once upon a time there was a large piston factory that lay at the heart of a bustling north German port city. Going back almost one hundred years, the factory produced pistons for aircraft, ships and cars. But fierce competition from other piston manufacturers worldwide made it difficult for the factory to continue and, after a long struggle, it was finally forced to discontinue operations. Many workers lost their jobs and there was an outcry throughout the city.*

In Hamburg's Ottensen borough, a new mixed-use district featuring rental flats, condominiums, and commercial space is taking shape on and around a factory site that is steeped in history.

By 2009, what started off as a sad tale was a painful reality for all involved. But the story of the flourishing redevelopment of the former piston factory is the closest thing you will hear to a fairy tale – and one that literally came true.

But let's tell the story in the right order and not get ahead of ourselves. A site encompassing 35,000 square metres – that's roughly five times the size of the football pitch in Hamburg's Volksparkstadion – couldn't just go unused or be left to become derelict. The initial idea was to find an interim use for the site while a new development plan was drawn up for the district. Everyone knew beforehand that this would be years in the making. The plan was to breathe life into the site without hampering necessary construction measures. The vibrant diversity this created would come to characterise the site's further development and use.

Resourceful tradespeople were the first to discover the potential of this industrial wasteland with its stylish brick buildings, which in better times even formed the backdrop of an Evelyn Hamann crime scene. In short order, part of the area along Hamburg's Friedensallee was transformed into a thriving business location, which in the years that followed served repeatedly as a cool setting for numerous cultural events. The reasonable rents attracted not just small workshops and trade businesses but also members of the arts and culture community to come and settle there. The concept took off, and the Kolbenhöfe e.V. association was established to represent the interests of the new tenants, which later went on to become a cooperative.

#### **AN EXTENSIVE CLEAN-UP OPERATION**

Use as an industrial premises for nearly 80 years inevitably left its mark, due not least to the presence of a foundry on the site. Once the site

**CENTRAL LOCATION**

The Kolbenhöfe site, which covers 8.5 hectares in Hamburg's Ottensen borough, is one of many individual projects forming the central core of the future district at Friedensallee, which will house a total of 1,200 new apartments, of which around 400 will be social housing. The area also encompasses space for small businesses, a day-care centre, and offices for upwards of 1,500 workers – not to mention the 30 or so workshops in the former factory hall, which has been renovated from the ground up.

had been inspected by independent experts, an extensive clean-up was required, which initially involved tearing down parts of the halls. During the clean-up operation, which was approved by the Hamburg government agency for environment and energy, the contaminated earth was removed and replaced with fresh soil. This literally prepared the ground for a healthy new living and working environment.

**INTENSIVE PUBLIC PARTICIPATION**

But that wasn't enough. The planning process for the site and surrounding district first had to ensure that the outcome would meet the needs not only of the city, but also its residents, and be commercially viable at the same time. A regulation in Hamburg prescribes that 30 per cent of new residential developments must consist of social housing.

“From the outset, we insisted on an intensive public participation process for the development and design of the new district. After all, to

succeed in the long term, a development project has to proceed in close cooperation with the city district,” says Holger Gradzielski, Managing Director of Rheinmetall Immobilien GmbH (RIG), which owns the former factory site in the Altona district. “But,” Gradzielski is quick to add, “the solution has to be commercially viable as well!”

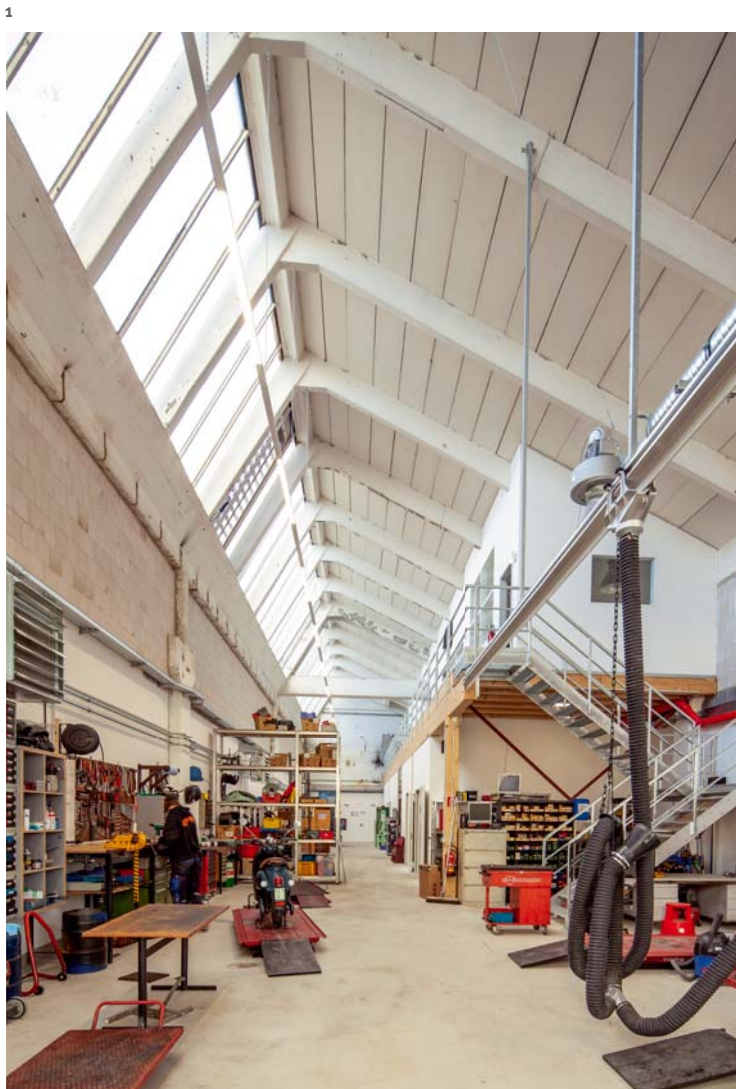
In 2013, the Dialogwerkstatt Friedensallee was founded. This “dialogue workshop” not only allowed residents to look at the potential plans, but also let them contribute their own ideas to the planning process. Regional representatives of the Altona district were also involved in the launch of an urban design competition, with ten architecture firms taking part. The areas were to be divided equally between living spaces and business spaces.

The designs were evaluated by a jury, with the public included in the whole process at every turn in a transparent workshop, not to mention special information points detailing the development planning process. The competition yielded a successful blend of existing structures with the new residential buildings, which are connected by courtyard areas. Anyone who is interested can look up the development and find out how building is progressing by going to [www.kolbenhoe.de](http://www.kolbenhoe.de), which is still active, in addition to a live webcam.

**THE FAIRY TALE CONTINUES**

Finally, in 2018, the official planning phase of the Ottensen development plan was practically complete. The plan included a property owned by the business concern Henkel through its subsidiary Schwarzkopf, which is directly adjacent to the Kolbenhöfe site. In the same year, RIG, which had meanwhile embarked on a joint venture with Otto Wulff Projektentwicklung GmbH, was able to acquire, develop, and build on these additional 46,000 square metres of land. Another player involved in the project is the Altona savings and building association (altoba), which had previously acquired two building sites totaling 13,000 square metres on the Kolbenhöfe site and is responsible for planning and building social housing there.

The expansion marked the birth of Kolbenhöfe II. This was a unique opportunity for RIG, as Gradzielski explains: “Both plots are part of the Ottensen development plan, and they went through the planning process together. This meant we were aware of the specifics of the new space, which simplified development of the entire area for us to a significant extent.”





2

As the area of the Kolbenhöfe project increased, so too did the number of flats, which grew to around 680, with roughly 200 of these earmarked for social housing. And because a proper neighbourhood needs a space where things like a weekly market can be held, the area also has a prominent local square.

### VIBRANT DIVERSITY PROVES A MARKETING SUCCESS

Good ideas spread quickly, and Kolbenhöfe is no different. Besides the already renovated Hall 7, RIG has succeeded in reselling some of the residential buildings, which are still under construction. The buyer is purchasing 163 completed rental flats, 26 of which are social housing, and 6 commercial units.

Another prominent buyer is the Hamburger Konservatorium music conservatory, which is establishing its new premises at Kolbenhöfe. This long-standing centre of musical learning will move into a converted former warehouse building, which it will use as a music school and academy, complete with rehearsal and seminar rooms. A new concert hall is also being built, which will be structurally connected to the warehouse building. A musical day-care centre will also liven things up in this blend of historical and new buildings, the hallmark of a

vibrant and diverse district development. Within the walls of the Konservatorium's music school and academy and at its many other sociocultural initiatives, 11,000 pupils, 300 students, and 240 lecturers will play music in spaces that once beat to the rhythm of casting machinery.

### SOLID GROUND

What about the craftspeople and tradespeople? They have invested in Kolbenhöfe as well, jointly purchasing their hall through their own cooperative, the Genossenschaft Kolbenwerk eG, with the help and support of RIG, which has tailored the building to meet the individual needs of the new owners, bringing it up to the latest technical standards. Nearly 30 small businesses operate there now, including a vintage car workshop, a motorcycle self-help store, a metalsmith, a joinery, a surfboard builder's shop as well as media and creative businesses. Roughly 100 people work in this building. The new owners are unanimously pleased to be able to keep working on solid ground in the extensively renovated halls and rooms. Given their shared history, this is an especially successful development, and hopefully they all live happily ever after. ●

1 A motorcycle self-help group has found a new home alongside some 30 other small businesses in an existing hall that has been completely renovated.

2 It's all in the mix: in the Kolbenhöfe, a mixed-use neighbourhood is being built along the Friedensallee in Hamburg-Ottensen, including rental flats, condominiums, and commercial space.



# Racing into the future

It looks like a scene from a science fiction movie: an ordinary car driving through the streets, braking for passers-by who want to cross the road – it's just that there's no driver.





crucial safety factor: the camera images and all the driver's decisions are implemented nearly in real time thanks to state-of-the-art 5G mobile communications technology.

Dr Peter Seggewiss is developing these and other cutting-edge technologies with a team from the Rheinmetall Technology Centre (RTC) in Düsseldorf. The interdivisional pre-developers strive to anticipate or recognise future technological trends and to design the resulting innovations to the point where they can be handed over to the relevant Rheinmetall development unit or, for example, to a joint venture, which will then assume responsibility for further development, marketing, and, ultimately, industrialisation of the project. The RTC, which forms part of Rheinmetall's central Research, Technology and Innovation unit, is headed by Heinrich Dismon and Klaus Kappen, the Chief Technology Officers of Rheinmetall's civil and military sectors.

#### A WIDE RANGE OF POSSIBLE APPLICATIONS

Due to the diverse range of potential users of teleoperated driving, Dismon sees excellent market opportunities for the new technology in the civil sector. Potential users and applications include car rental companies and shuttle services, logistics and transportation firms, local public transport, commercial and special vehicles as well as airports, ports, power plants, and mines. There are also applications in the private sphere, where drivers may not want to be at the wheel themselves or simply wish to teleoperate their vehicles and park them in the nearest parking lot. "But we also see realistic possibilities for use in the military domain," adds Kappen, "such as logistics vehicles or in particularly critical areas, teleoperation thus being the enabler for the automation of vehicles".

In addition to the necessary control and safety equipment manufactured by the Group and teleoperated movement of vehicles, the Düsseldorf-based company's portfolio also includes tele-assisted driving. For example, artificial intelligence in a fully autonomous vehicle may face a problem if it needs to cross a solid line due to a specific traffic situation, which is normally a no go for the autonomous control system. "In such cases, a teleoperator could

**1** Everything under control: the control station makes it feel like you're sitting in an actual car. For Mira development engineer and teleoperator Wojciech Stepniewski, even the mirror views from the teleoperated vehicle are transmitted in real time.

Vehicles seemingly controlled by invisible hands are by no means a distant prospect. Soon they'll be part of every cityscape – and not just in the current pilot region in Düsseldorf's industrial port, which has been approved as real-life laboratory by TÜV Rhineland, the District Council, and the capital of North Rhine-Westphalia.

Teleoperated driving technology makes this possible. The vehicle is equipped with a built-in remote-control function (steer-by-wire) and various cameras. The 'driver' sits remotely in a control station that contains all the functions and control units of a normal car. The view from the vehicle – including the side and rear-view mirror views – is shown on large monitors. A

2 All-seeing: the tamper-proof real-time vehicle vision system.

3 Barely distinguishable from a standard passenger car: with the aid of camera transmission, the Mira test car can be driven remotely in normal road traffic in the pilot region. In the current phase, a backup driver is always present.

intervene as a tele-assistant and take care of the situation,” says Dismon. “We have to have a technical supervisor who can step in as needed. Thanks to the bridging technology of tele-assisted driving, level 4 or 5 autonomous driving is quickly becoming a viable prospect,” he says.

However, this future-oriented technology should not and cannot be brought to market by Rheinmetall alone.

This is where Mira GmbH comes in. This recently founded Rheinmetall subsidiary will soon be offering a wide range of products and services related to teleoperated driving for the civilian sector, which incidentally is a precondition for bringing external partners on board.

**LOTS OF ARROWS IN THE QUIVER**

The RTC is also active in other civil and defence technology projects. Tool-based reporting and regular meetings with relevant developers on site ensure that research is not conducted in an ivory tower, but is instead linked with the operational units to the greatest extent possible. Kappen: “Potential benefits of the RTC’s developments are continuously scrutinised in the Group’s management committees.” In addition, substantial sub-developments – also for teleoperated driving – are already under way in various operational divisions of the Rheinmetall Group. These include the visual system (Electronics Solutions) and the hardware and operating software for vehicle control (Vehicle Systems).

Other activities of the RTC’s 35-strong staff include development of new countermeasure systems for the navy, improvement of charging infrastructure for electric vehicles in urban areas, and camera- and radar-based monitoring of vehicles. The latter is about to become a legal requirement in Europe and in the United States, mostly as a means of making sure children or pets aren’t forgotten or unintentionally left behind in cars. For car manufacturers, this is an important feature that earns points in the Euro NCAP test as well. Artificial intelligence is also used here, whether simply for detecting the presence of people in the vehicle, for the au-



2



**WHAT MIRA WILL OFFER**

- Tamper-proof real-time vision systems for vehicles
- Functional safety and system security of control units
- Control stations with technical supervision for autonomously operated vehicles (SAE L4/L5)
- Control stations for teleoperated vehicles
- Cyber units for video, control and personal data security
- Full installation and integration
- Commissioning/provision of required services
- Homologation and certification of driverless vehicles
- Staff training



3



4

4 Space-saving installation at comparatively low cost: the charging device demonstrated by RTC development engineer Dr Mira Schüller could help solve availability problems in inner cities.

5 Shortly before introduction of a legal obligation in Europe and the USA: camera- and radar-based interior monitoring in vehicles is becoming increasingly important worldwide.

thorisation of access, or for monitoring drivers to ensure that they are fit to drive.

This technology, which is at an advanced stage of development, is currently being handed over to the Sensors and Actuators division. The RTC will initially provide support, but the division will eventually assume responsibility for further development and, ultimately, commercialisation.

There are numerous potential uses for these applications in the civil and military sectors. These include in addition to the mentioned vehicle access control, passenger status (e.g. strapped in or healthy and fit to drive), or intrusion detection, to name but a few. Reason enough for Rheinmetall to have recently entered a joint venture with DERMALOG Identification Systems GmbH, Germany's largest biometrics company. The new company, called Rheinmetall Dermalog SensorTec GmbH, plans to offer future solutions that use camera- and radar-based systems that go far beyond simply monitoring the driver's condition or the passenger compartment.

#### PILOT PROJECTS FOR CHARGING INFRASTRUCTURE

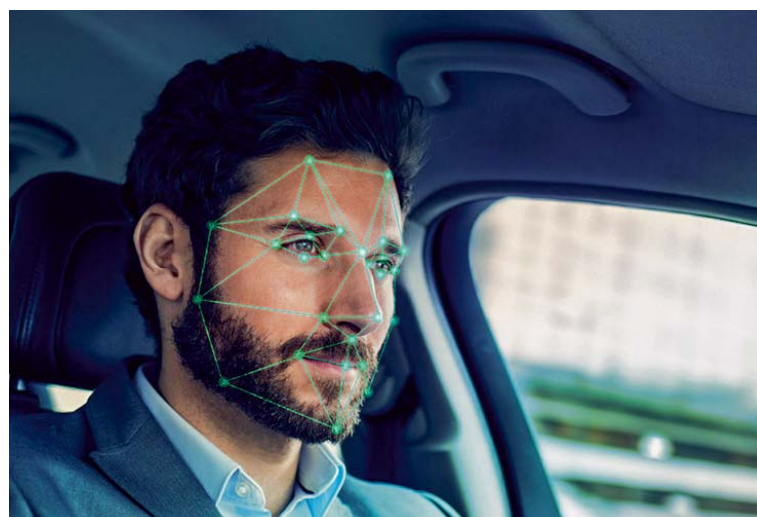
Where's the nearest charging station? Is it even available? How much farther can I drive? Anyone who's ever driven an electric car is familiar with these concerns, especially as the current number of charging options in our inner cities – though steadily increasing – is still nowhere near the level where we wouldn't have to worry

about where the nearest one was. This is where the RTC comes in with a concept for solving availability issues in inner cities – after all, lack of space means that it's often not even possible to construct enough conventional charging stations.

A kerbside charging system could provide a comparatively quick and easy remedy. The idea is to turn entire streets with on-street parking into a power source with up to 22 kW of charging power. Initial internal tests received highly positive feedback, and some cities are already interested in installing pilot charging facilities. Drivers of electric vehicles will certainly be grateful. ●

→ You can find a video about the charging process in our Online Magazine [www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en)

5



# 15 tons of safety



The Special Weapons and Tactics unit of the Saxony State Police is one of the first users of the Survivor R. The Saxony State Police received two of these heavily protected vehicles in December 2017.

Featuring superb protection, this unique all-terrain vehicle assures exceptional operational effectiveness in critical situations. No wonder Germany's public order police units are equipped with the Survivor R, which will soon be part of the German Federal Police fleet as well. And now the special response vehicle is starring in RTL's long-running TV series Alarm for Cobra 11.

A roar of engines and flashing blue lights; doors burst open, stun grenades fly. A dark-blue armoured vehicle pulls up, tyres screeching; armed officers jump out and charge forward, shouting: "Police! Freeze!" This exciting scene shows what Rheinmetall's Survivor R protected special response vehicle can do, but it is not taken from real life. It's a clip from the film Unversöhnlich (Unforgiving), part of RTL's hit series Alarm for Cobra 11, starring Erdogan Atalay as Detective Chief Inspector Semir Gerkhan.

#### FICTION AND FACTS

Nowadays, most TV crime shows bear little resemblance to the everyday reality of police work. But the Survivor R is ready for action whenever it looks like things might get dicey – for example, when officers have to arrest particularly 'violent counterparts' – officials for crooks – or rescue people in dangerous environments.

German federal and state police agencies have traditionally been equipped with specially protected vehicles – known as 'Sonderwagen' or 'SW' for short – for operations like this. Most law enforcement agencies still use the Sonderwagen 4. But this tried-and-trusted vehicle, developed at the end of the 1980s, is getting a



1

2



3



4

**1** And action! Actor Erdogan Atalay, his colleague Nina Kronjäger and extras along with the Survivor R during filming for Alarm for Cobra 11.

**2** Over three meters high, the Survivor R is one of the most imposing vehicles in the police fleet.

**3** The large doors of the Survivor R allow the crew to mount and dismount quickly, even when wearing protective equipment.



5

6





bit long in the tooth, leading Germany's federal police agency and state-level public order police units to look for a replacement. The Survivor R was selected in a Europe-wide call for tenders starting at the end of 2021. The procurement agency of Germany's Federal Interior Ministry has ordered 55 of the all-terrain, protected multipurpose vehicle in different variants for the German Federal Police and the public order units of Germany's state-level police forces, with an option to purchase further units. In a first step, Rheinmetall and its cooperation partner Achleitner will supply two sample vehicles, which will undergo extensive trials, including full certification of the protection features. Delivery of the production vehicles is expected to begin in 2023 and to be complete by 2026. Final assembly and transfer of the production vehicles will take place at Rheinmetall Landsysteme GmbH in Kassel.

#### A PROVEN SUCCESS IN MULTIPLE GERMAN STATES

While the procurement process moves forward at federal level, special ops units of the State Police of Berlin, North Rhine-Westphalia, Saxony and one other federal state as well as state law enforcement agencies in Austria all already deploy their own variants of the Survivor R. Its 4x4 MAN chassis, 340 metric horsepower engine, and high torque ensure excellent manoeuvrability, even in difficult terrain. The vehicle's mono-coque armoured steel cab, optional protective ventilation system, and other technical features provide superb protection from gunfire, bombs, and toxic gases. The extremely versatile Survivor R has already proven its mettle in numerous operations, protecting police officers on one occasion when a criminal suspect fired on their vehicle.

#### HANDS-ON EXPERIENCE

In late summer 2022, Rheinmetall hosted its first Survivor R User Day. This forum allowed the company to collect information based on operational experience and incorporate this feedback into ongoing development of the product. Users reported back on their experience in using the Survivor R in day-to-day police operations and discussed various equipment configurations. The programme included test drives of variously configured Survivor R vehicles. The attendees were full of praise for the enhancements to the vehicle system, such as the new automatic transmission and other equipment features. They also had the chance to ask questions and discuss technical aspects with Rheinmetall employees from the Sales, Project, Development, Customer Service, and Service departments.



#### TECHNICAL DATA FOR THE SURVIVOR R (BASIC VERSION)

- Crew: **Up to 11 people**
- Top speed: **100 km/h**
- Power: **250 kW (340 metric horsepower)**
- Torque: **1,250 Nm at 1,200–1,800 rpm**
- Emissions class: **EURO 6**
- Drive configuration: **Permanent four-wheel drive**
- Locking differentials: **3 x 100%**
- Chassis: **MAN TGM 18.340**
- Maximum authorized mass: **17,000 kg**
- Available payload: **>1,500 kg**
- Length: **Approx. 6,860 mm**
- Width: **Approx. 2,510 mm**
- Height: **Approx. 3,250 mm**
- Optional equipment: **Dozer blade, ladder, multipurpose turret system, weapon station, CBRN protective ventilation system**

4 The film crew checks the footage – and decides if a scene needs to be repeated.

5 Pictured here talking to lead actor Erdogan Atalay, Rheinmetall employees Patrick Franke (l) and Pascal Hoffmann (r) supervised the Survivor R during the Alarm for Cobra 11 shoot.

6 Pascal Hoffmann replaces the real number plate with a fictitious one for the film shoot.



#### ACTION!

Of course, the users reserve the right to keep private such exclusive insights into how they use the Survivor R from day to day – whereas anyone can tune in and watch the Survivor R on TV.

#### ALARM FOR COBRA 11: UNFORGIVING – THE PLOT

Semir Gerkhan (Erdogan Atalay) and Vicky Reisinger (Pia Stutzenstein) take on a criminal organization from Belgium that kidnaps people and tortures them in truck container prisons. The highway patrol detectives from Alarm for Cobra 11 must work with the Belgian police to find out where the prisons are located. When the head of the criminal organization retaliates, Semir and Vicky get drawn into a war that has been going on for years between organized crime and the police in Belgium. Unforgiving premiered on 20 October 2022 on RTL+. ●

# Sparring partner for aviation

Transport aircrafts deliver supplies to the armed forces, even in the remotest of locations. This is a vital task that hinges crucially on how familiar the operators – from the pilot down to the mechanic – are with the particular aircraft. Simulation technology from Rheinmetall ensures that these professionals receive the very best training.

1



2



## RHEINMETALL SIMULATION TECHNOLOGY

### For transport aircraft:

- Embraer KC-390
- Airbus A400M
- Lockheed Martin C-130J

### For helicopters:

- NHIndustries NH90





Whether engaged in collective defence on the outer edges of NATO or rapid response missions on faraway continents, armed forces worldwide need supplies. This is where tactical and strategic air transport, for one, comes in. European NATO countries use various types of transport aircraft for this purpose. These include the A400M, which is currently operated by Belgium, Germany, France, the UK, Luxembourg, Spain, Turkey, and Malaysia – with more nations to follow. Germany and France are also forming a joint C-130J squadron. Portugal, Hungary, and the Netherlands will soon deploy the KC-390.

Tried-and-trusted simulation technology from Rheinmetall is used to train the professionals

who fly and maintain these aircraft, and to keep them up to speed. “Realistic training systems deliver a comprehensive training experience that doesn’t depend on the original equipment being available,” says Doris Lilkendey, head of the flight simulation products unit at Rheinmetall Electronics, explaining the purpose of the cutting-edge simulators. “Training – even for complex scenarios and emergency situations – can be provided in a safe environment. This means that military personnel are well prepared and well skilled when they go out on their missions.”

Simulation technology covers a broad range, from simple tutorials that can be augmented

**1** Full flight simulator for the Embraer KC-390 transport aircraft – this highly complex pilot training simulator is the absolute cutting edge.

**2** No different from the real aircraft: inside the Embraer KC-390 flight simulator, training can be carried out under highly realistic conditions.

with state-of-the-art mixed reality technology through to true-to-scale replicas (such as the Training Rig) and complex pilot training in Full Mission Flight Simulators in the premium class. “We are the expert training partner for tactical and strategic air transport,” insists Doris Lilkendey.

**PARTNER FOR AIRCRAFT MANUFACTURERS**

A close partner of Airbus, the A400M’s manufacturer, Rheinmetall plays a key role in training the crews of the European transport aircraft. The same goes for the C-130J produced by Lock-

heed Martin. As one of the company’s official subcontractors, Rheinmetall, along with Thales France, has been tasked with certifying and operating the future training centre for the Franco-German C-130J transport aircraft squadron. Certification of the Évreux-based training centre as an Approved Training Organization (ATO/MTO) involves setting up the training organization and subsequently conducting training operations from the end of 2023 onwards with a team of highly skilled instructors.

The long-established aircraft maker Embraer of Brazil has contracted with Rheinmetall to develop and supply all the training equipment for the new KC-390 transport aircraft. This covers the entire spectrum of crew training, from Cargo Handling Station Trainers and Cockpit Procedure Trainers to the Full Mission Flight Simulator, which faithfully simulates all the aircraft’s functionalities and provides the full range of training options. “With our Full Mission Flight Simulators for the KC-390, we have hugely broadened our range of expertise to include pilot training for complex transport aircraft,” says Lilkendey.

**TRAINING IN AUTHENTIC SURROUNDINGS**

For practical training of technical cargo handlers and the air-handling staff who operate on transport aircraft, using full-scale equipment is the ideal solution – including the various cargo hold simulators that Rheinmetall has already supplied to almost all the user countries listed above, including for the A400M project. The company has accumulated over 40 years of expertise in simulation technology and is the global market leader in Load Master Workstation Trainers (LMWST) and Cargo Hold Trainers (CHT) for the A400M transport aircraft.

The systems are suitable for basic and advanced training as well as recurrent training and pre-deployment preparation. They also allow



3



4



5



6

3 For practical cargo bay training: the cargo hold simulator for the A400M.

4 Cargo Hold Trainers provide a realistic training platform for cargo-hold and ground-handling crews.

5 Every detail of the cargo hold is original.

6 Virtual reality (VR) technology is being used increasingly often for simulation applications. VR gives trainees a totally immersive training experience. The VR environment simulates motion sequences, distances and size ratios very effectively.

difficult manoeuvres such as airdrop procedures to be practiced in complete safety. “The essential purpose of the CHT-E(nhanced) – the highest configuration level – is to provide cargo hold and ground-handling crews realistic with training without having to take up valuable aircraft operating hours,” explains Doris Lilkendey. “The programme includes mission-specific reorganization of the cargo hold, preparation of cargo, loading and unloading, standard in-flight and ground tasks, as well as cooperation between multiple crews.”

The German Airborne Operations and Air Transport School at Altenstadt in Upper Bavaria took delivery of an A400M Cargo Hold Part Task Trainer (CPTT) at the end of September 2022. A second is soon to enter operation at Germany’s Air Transport Wing 62. The CPTTs are tailored to the specific missions of the training institutions. They also allow procedures and configurations for new types of cargo to be evaluated, tested, and verified.

The company has successes to report in the premium class as well. Factory acceptance testing of the first KC-390 Full Mission Flight

Simulator was successfully carried out in August 2022 at the Rheinmetall’s plant in Bremen. “The test pilots from Brazil are ecstatic,” reports Lilkendey. “Portuguese and Dutch pilots have also already flown the KC-390 in our simulator and were highly impressed – both with the aircraft and our simulators.” KC-390 pilots receive realistic training in the Full Mission Simulator (FMS), ranging from handling the aircraft and practicing emergency procedures to training for complex mission scenarios, including in-flight refuelling. The FMS was developed in line with international EASA and FAA training standards and will be certified to the highest standard, Level D. Hard on the heels of Brazil, the first customer, Portugal has placed an order for the FMS as well. ●

# Keeping things turning



Large-scale bushings for gearboxes destined for wind turbines all over the world are being produced in Papenburg, Germany, using a machining technology that is unrivalled in Europe. An important contribution to sustainable energy generation and reducing humanity’s carbon footprint.



## 220

This is the approximate rotor diameter in metres of modern offshore installations.

The cast blanks for these bushings are made at Europe’s largest continuous-casting plant for non-ferrous metals. Rheinmetall operates this facility at its Papenburg plant. The specialists in Papenburg use aluminium bronze for the bushings, which are approximately 60 centimetres long, have a diameter of 44 centimetres and weigh around 105 kilograms.

The bushings for the wind turbine gearboxes are machined using a complex method that gives them their spherical shape. But before production of the first series could start in November 2021, the Papenburg facility had to be equipped with a state-of-the-art machining centre costing nearly €2 million.

## 13-15

This is the power in megawatts supplied by modern offshore wind turbines.

This material features exceptionally high strength, thanks not least to a high percentage of copper. It is also very corrosion-resistant, making it suitable for use in various climate zones – even in the harshest environmental conditions. Each wind turbine has three large bushings and five small ones, along with twelve thrust washers; different versions of this configuration also exist.

An air-conditioned room was needed so that the bushings could be machined at a constant ambient temperature. Extremely low tolerances in the µm range make maintaining a constant room temperature of 20°C (+/-1°C) vital. Even the temperature of the cooling water in the machine tool is controlled.

## 80

This is the number of gigawatt hours produced per year by the current largest wind turbine. This is enough power for 20,000 households in Europe.

### SUBSTANTIAL INVESTMENT NECESSARY

The environmentally friendly task of the gearbox is to convert the relatively slow speed of the wind turbine blades into a very high rotational speed in the attached generator to produce power. Modern offshore wind turbines can generate up to 15 megawatts of power.

The same high-precision approach continues in the number of residual particles permitted. After machining, each workpiece is checked individually and then again following a special final cleaning procedure in the laboratory.

“Only few manufacturers in the world are able to achieve the minimal bushing tolerances that the customer requires,” declares Dr Frank Buschenhenke, head of Industrial Engineering.



2



3



4

Forming the curvature of the bushings in the  $\mu\text{m}$  range was the biggest challenge the team faced, even though the staff at the plant have a wealth of machining experience. “Our customers can confirm that we’re the only supplier in Europe able to manufacture this product,” adds Buschenhenke.

#### DEVELOPMENT IS ONGOING

The Industrial business unit of the 130-year-old Papenburg company won the order from a well-known German manufacturer of gearboxes for wind turbines. Rheinmetall entered the segment years ago, with the aim of reducing its dependency on automotive plain bearings. Today, in terms of sales, it represents a comparatively small but steadily growing area of business for the plain bearings plant, which forms part of Rheinmetall’s Materials and Trade division. The Industrial segment plans to double its share of sales in the coming year alone.

Although its production capacity for large bushings is in the four-digit range, the Papenburg plant is already working on the next generation of gearboxes for wind turbines. Another aim

here – and this comes as no surprise – is to achieve the lowest possible weight in the smallest possible installation space. The world – or should we say the blade – continues to turn for wind turbines, too! ●

**1 and 2** After machining, the bushings are individually inspected by plain bearings worker Andreas Zobel to ensure that they exhibit the required dimensional accuracy.

**3** After machining, all bushings first undergo thorough cleaning to remove residual particles.

**4** Even during machining, the dimensions of the bushings required by the customer are continuously rechecked.



# The Scandinavian challenge

1

## ABOUT RMMV

Founded in 2010, Rheinmetall MAN Military Vehicles GmbH, or RMMV for short, is a joint venture company in which Rheinmetall AG holds a 51% stake and MAN Truck and Bus SE 49%. The company is headquartered in Munich and manufactures its vehicles at its site in Vienna.



2



Two nations, one contract: Norway and Sweden ordered 650 trucks and trailers from Rheinmetall Military Vehicles. The challenge wasn't so much the large volume – it was the need for 42 different variants that turned this into a mammoth production and processing project.

**1** State-of-the-art truck systems: on a bright, sunny day on 23 August 2022, the first vehicles were delivered to the Norwegian Army in a handover ceremony.

**2** The handover took place at the Sessvollmoen military base near Oslo.

**3** A 44M Hookloader is inspected by a Norwegian soldier.

Two countries, one customer: this clearly involved a lot of bilateral consultation. Although Norway and Sweden are bound together by many ties, ultimately each country has its own needs. While Sweden largely relied on proven standards, Norway had numerous special requirements.

When the contract was first signed, it originally called for 23 different kinds of trucks, two types of trailers and one flat-rack variant. Over the years, however, the numbers grew to 38 different truck types and four trailer variants – sometimes in extremely small numbers. “As a company, we had to learn along the way,” reports Dr Alexander Abeler, Senior Vice President Programs at Rheinmetall MAN Military Vehicles (RMMV), who has accompanied the project ever since the end of 2015, noting that “stipulations in the contract covering the development process meant that we basically had to start from scratch when developing new vehicle variants”.

The contract has a long prehistory: back in 2008, a project group from the Norwegian armed forces drew up a catalogue of requirements for new military logistic vehicles. RMMV was awarded the order, though not before Norway pulled Sweden on-board as a co-customer. Finally, on 31 March 2014, the Norwegian procurement agency NDMA and its Swedish opposite num-



4 Extensive testing for each vehicle variant: A TG MIL 04M is exposed to a temperature of  $-42^{\circ}\text{C}$  in the cold chamber.

5 A 45M Recovery during the deep fording test in the water channel.

6 Electromagnetic compatibility is an important property. The vehicles were also put through their paces in this respect.

7 The TG MIL 03 M has to cope with a 62% gradient in the test.



ber, the FMV in Stockholm, concluded a framework agreement with RMMV for the supply of military logistic vehicles through to 2025. The first call-off from the framework agreement was for 335 HX high-mobility trucks and TGS-Mil militarized trucks, plus trailers.

#### A GENUINE CHALLENGE

The models all had one thing in common: highly elaborate technical requirements had to be met and milestone documentation prepared before production could start. From cold test chambers to electromagnetic compatibility, there were some 600 or 700 technical requirements for every vehicle. A single example – for a truck with a crane – goes to show just how different the approach of the two contracting nations could be. “Norway needed the crane up front, Sweden wanted it in the back. What’s more, the Norwegians required protected and unprotected versions of the same vehicle,” recounts Alexander Abeler. Thus, what began as one vehicle turned out to be four, some of them armoured per customer requirements.

What makes Alexander Abeler’s tasks so rewarding isn’t just overcoming

the technical challenges. It’s the intercultural cooperation with international customers: “Negotiations or decision-making processes in an international setting never evolve along uniform lines. Understanding these differences and taking them into account while processing a project is what makes my job so exciting.” Some customers are simply interested in the most expedient path to an optimum solution, while others want to be able to choose from several proposed concepts.

One of the biggest challenges in the project for Norway and Sweden was preparing the ILS package. Standing for Integrated Logistic Support, the ILS is an operator and maintenance manual that delves into the smallest details of each vehicle type. “Usually, the final ILS package is prepared once the vehicle has been finalized, thus enabling inclusion of possible changes following trials with the pre-series vehicle or during production,” explains Abeler. In this order, the final operator and maintenance manual had to be supplied ahead of the vehicle, meaning that “the ILS documentation had

to be amended whenever the vehicle was modified – and that cost time”. In many cases, the delivery of finished vehicles was delayed because the final ILS package was still in preparation.

This meant that RMMV officials from Project Management, Engineering, Production, Purchasing and Quality Management were often all in action at the same time – practically with a dedicated hotline to Scandinavia. Integration of customer equipment took place in Norway and Sweden at facilities specially qualified by RMMV.

Compared with these requirements, the transport logistics were a snap: the trucks were driven to Scandinavia straight from the RMMV plant in Vienna. This not only saved costs, but also doubled as a practical road test. To date, 323 vehicles have been delivered to Sweden and 109 to Norway. Call-offs for an additional 220 trucks have already come in (95 for Norway, 125 for Sweden) and will be delivered in the next few months. Prior to expiration of the framework agreement in 2025, RMMV expects to see additional vehicle call-offs in the high three-figure range.





4



5



6



7

Other Group companies are also benefitting from this welcome order inflow. Rheinmetall Waffe Munition is supplying the protected vehicle cabs, fabricated at a plant in Unterlüss in Lower Saxony jointly operated with Rheinmetall Landsysteme. Elsewhere in Germany, Rheinmetall Technical Publications is preparing the ILS documentation, while Rheinmetall Norway is developing and supplying parts of the cab equipment (C4I).

**ALL GOOD THINGS ...**

The first TG trucks reached Sweden at the end of 2017, the first HX trucks in autumn 2020. Norway took delivery of its first vehicles in August 2022. Michael Wittlinger, chairman of the board of management of RMMV, personally transferred the HX and TGS-mil

trucks to the Norwegian Army at an official handover ceremony (see report on page 9). In a speech marking the occasion, he described the programme as “the most demanding project ever undertaken by Rheinmetall MAN Military Vehicles”.

“All good things take time” – this German proverb has proven equally true for Norway, Sweden and Rheinmetall. The results of the Scandinavian challenge are first-rate – and for this reason alone well worth the wait. Everyone involved in the project knew that they were heading into uncharted territory. The challenges were great: cooperation built on mutual trust and true teamwork ultimately triumphed. ●



**MILESTONE PROCESS**

- **SRR (system requirement review)**  
All contractual requirements were reviewed with the customer and with the involvement of all disciplines.
- **PDR (preliminary design review)**  
For each technical requirement, a concept is presented to the customer on how the requirement is to be met technically.
- **CDR (critical design review)**  
A multidisciplinary technical review designed to ensure that a system is suitable for manufacture, demonstration, testing and that it meets specified performance requirements –, taking into account cost, schedule and risk.
- **TRR (test readiness review)**  
Together with the customer, it is determined how a system will be tested during the trial phase. This also includes a detailed description of the test procedures.
- **ATC (acceptance test complete)**  
Completion of the trial phase. Evidence proving compliance with contractual and technical requirements is available.
- **FCA (functional configuration audit)**  
An audit of the system’s functional status based on SRR, PDR and CDR baselines in conjunction with the change history and test results.
- **PCA (physical configuration audit)**  
Audit of the first production vehicle to confirm that the manufactured products comply with the development documents of the overall design process.

DIETER BOHN,  
BORN IN TRIER IN 1963

He studied aerospace engineering at RWTH Aachen University. A mechanical engineer, he has been working at MS Motorservice in Dormagen since 2002. Science fiction series including Raumpatrouille Orion (Space Patrol Orion) and Star Trek fascinated him as a child. He has guest-authored six Stellaris novels starring another of his childhood heroes, Perry Rhodan, and has written around 40 stories that have featured in various anthologies. An avid science fiction fan, he loves classic writers like Robert A. Heinlein, Arthur C. Clarke, and, especially, Isaac Asimov, but also drew inspiration for his novel from the drawings of the great universal genius Leonardo da Vinci.



# The man who landed in the Middle Ages

Imagine waking up one morning and finding yourself in the year 1022, without electricity, sewage systems, or modern medicine – and, as a modern human being, exposed to all the dangers and threats of that era. Would you survive? Rheinmetall engineer Dieter Bohn – a passionate amateur author in his spare time – created an entire novel based on this idea.

“Der Zef’ihl, der vom Himmel fiel” was published in 2021 by p.machinery publishing house.



Civilised in a distant future and trapped in a world of the past: in the sci-fi novel *Der Zef’ihl, der vom Himmel fiel* (The Court Magician Who Fell from the Sky), protagonist Adriaan Deneersen finds himself in this very predicament following an emergency landing on the planet Shi’ialla, where progress, habits, and customs are all stuck in the Middle Ages. As a ‘Zef’ihl’, a kind of court magician, he is forced to mount a military defence of his new homeland – armed with lots of superficial knowledge but no exact instruction manual. All he has is the knowledge in his head that he learned long ago. It’s no surprise, then, that the heroes of the novel fail spectacularly. For example, when ‘Project Cannon’ literally blows up in their faces.

But ultimately, of course, the novel is all about working things out, meaning that many things are reinvented – from the water pump to the catapult. “When I was writing the novel, to begin with I would deliberately avoid looking up any technical issues,” says Dieter Bohn. Instead, he asked himself how he would approach a particular problem if he were in his characters’ shoes before going on to do the research. Despite all the make-believe, someone like him would never want technical inconsistencies in his novel. After all, the author is too wedded to his engineer’s ethos for that – every bit as much as in his full-time job at

Rheinmetall subsidiary MS Motorser-vice in Dormagen, where the aerospace engineer is responsible for information services and technical videos.

Dieter Bohn created a whole new world with Shi’ialla, one with its own unique geography, flora, fauna and, not least, its own language – and all after hours. It wasn’t easy to keep to track of his own imaginativeness: “I created several dossiers and data collections with timelines, glossaries, lists of names, maps, and plans,” the author reveals. And unlike his protagonist, Bohn of course had recourse to digital tools. He had a character database running in the background while he was writing – one click on a name and all the information would be displayed.

It took Dieter Bohn 15 years to complete his first novel. But – perhaps for this very reason – shortly after publishing, the author plunged straight back into the universe of his fiction. He found his work progressed much more quickly after that. The Court Magician Who Took to the Sky is currently being edited and is expected to be released 2023. The protagonist Adriaan Deneersen fares well in Shi’ialla. For his creator, however, this only partially holds true. Dieter Bohn laughs: “Let’s be honest: how high was life expectancy in the Middle Ages? Filth, disease, draconian punishments – I don’t think I would survive for very long there.” ●

## IMPRINT

### DIMENSIONS 1/2023

#### Publisher

Rheinmetall AG  
Rheinmetall-Platz 1  
40476 Düsseldorf  
www.rheinmetall.com

#### Responsible

Dr. Philipp von Brandenstein

#### Editor-in-Chief

Oliver Hoffmann

#### Contributors and Authors

Dr Theodor Benien, David Ginster, Birgit Görtz, Folke Heyer, Elke Röhling-Kampmann, Dr Jan-Phillipp Weisswange, Publik. Agentur für Kommunikation GmbH

#### Production

Publik. Agentur für Kommunikation GmbH, Mannheim

#### Printing House

ABT Print und Medien GmbH, Weinheim

#### Photo Credits

Rheinmetall; Gettyimages: Stocktrek Images (p. 1), picture alliance: abaca/Lafargue Raphael/ABACA (p. 2), dpa/Michael Kappeler (p. 22); Henning Ross (pp. 3, 4, 10, 11, 12, 13, 26, 50); istockphoto: shapecharge (p. 4), ChakisAtelier (p. 40); FOJANA Unterlüß (pp. 6, 25), Joey Ingelhart (p. 25), claudiio Doenitz (p. 25); UVision (p. 9); IMAGO: Bianca Otero (p. 14), Christoph Reichwein (crei) (p. 16), Yulii Zozulia (p. 19), Florian Gaertner (p. 20), Gorm Kallestad (pp. 46, 47); NATO (p. 23); Kolbenschmidt (p. 28); MIRA GmbH (pp. 32, 34); DERMALOG (p. 35), StMI Sachsen (pp. 36, 37); Innenministerium NRW (p. 39); benntec Systemtechnik GmbH (p. 43); Ralf Grothe, zeit-licht.de 2022 (pp. 35, 44, 45)

#### Editorial deadline for this issue: November 15, 2022

DIMENSIONS was printed on FSC-certified uncoated paper with eco inks. Production is carried out using green electricity. Rheinmetall offsets 100 percent of the resulting CO<sub>2</sub> emissions.



## EXPERIENCE DIMENSIONS DIGITALLY

Has this issue made you curious to learn more? We'd be happy to help. The online edition of DIMENSIONS features in-depth interviews, lots of background information, interactive graphics, and moving images to accompany the stories in this magazine – stories like the one on the new Panther KF51, which heralds a new era for main battle tanks.

But news, information, and stories from and about Rheinmetall AG are constantly being updated and supplemented. Stay up to date and take a look – it's worth it!

[www.dimensions-magazin.de/en](http://www.dimensions-magazin.de/en)