The Magazine of the WIRTGEN GROUP www.wirtgen-grag n2-6



Progress from Experien

Wirtgen is turning 60, which means that the Wirtgen Group's product brands have a total of more than 660 years of experience - and the resulting expertise to play a leading role in shaping the future.

Dear Partners, Customers, and Friends,

In 2021, Wirtgen is turning 60. From the perspective of a 184-year-old company, 60 years isn't that much. But Wirtgen is also more experienced than the mere number suggests. In total, the Wirtgen Group and its product brands – each with their own unique history – contribute over 660 years of experience to the John Deere Group. The Wirtgen Group has always been at the forefront of development of road construction solutions, and as such, is a company driving innovation in the expansion of global infrastructure. It's this wealth of experience and the resulting innovative power that impresses John Deere.

Progress from Experience

The Wirtgen Group's progress also undoubtedly stems from its own history. But experience alone is no guarantee that a company will deliver leading technology solutions. Wirtgen has managed to remain firmly connected to the earth and its own history, yet has always succeeded in surpassing itself – setting the pace for an entire industry with newly developed technologies and services. In this context, change and evolution have always been part of the company's history and success story. Thinking ahead, thinking in new directions, and at the same time staying focused on the core business – grounded by its sturdy roots. The Wirtgen Group's products, from its earliest beginnings through to the present day, reflect the fast-paced evolution of our technologies.

Smart Industrial

The Wirtgen Group has always been more than just a manufacturer of products made of steel and iron. We offer our customers complete solutions for road construction from a single source - from machines to application consulting to service and spare parts to financing solutions. With this extensive range, our customers can implement road construction projects in a cost-effective and sustainable manner. In this process, we view ourselves as our customers' long-term partner, offering lifecycle solutions to effectively manage their equipment, service, and technology needs



across the full lifetime of a Wirtgen Group product and fundamentally enhance their ownership experience.

Production Systems

The Wirtgen Group's customers can always count on one thing: premium technologies and leading application expertise. Today, individual products work together as part of system solutions, can be digitally connected, and help users manage construction site processes. State-of-the-art products are capable of documenting and providing reports on their own job performance. They can even independently inform the machine operator of their condition.

The Wirtgen Group and its product brands are cooperating with John Deere under the banner of the "Construction Execution System," to improve technologies in order to make the overall road construction process safer, more efficient and more sustainable. In this context, digitization and connected system solutions are key focal points driving our activities. To help us achieve our objectives, the Wirtgen Group has access to John Deere's extensive technology stack. This competitive edge will help us effectively advance road construction applications and methods and provide targeted support to Wirtgen Group customers during the execution of construction projects.

Best regards,

Domenic G. Ruccolo

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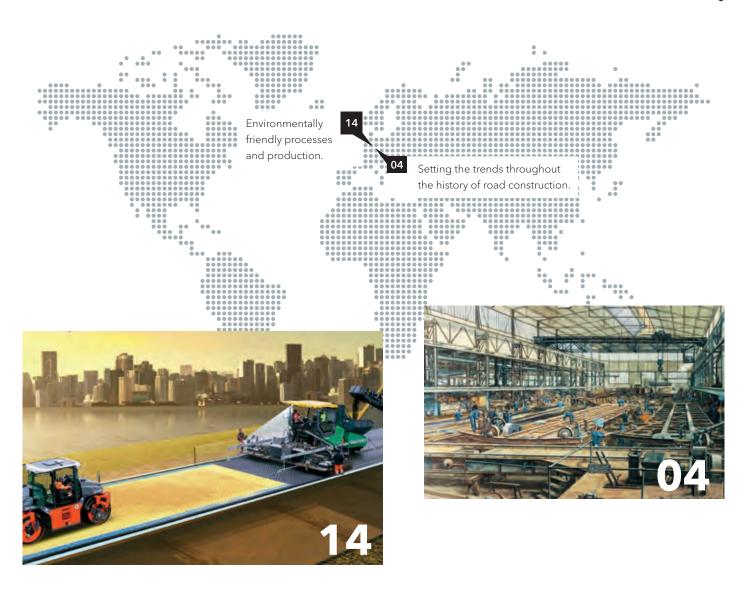
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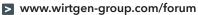
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The coronavirus pandemic is hitting the poor population of the Global South particularly hard. The Children in Need charity group is working to alleviate extreme suffering through its aid projects.

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You can easily download the current issue in PDF format or share Forum 60 with a friend by scanning the QR code to the right.







660 Years of Road Construction Experience





In 2021, the Wirtgen Group will celebrate 60 years of Wirtgen. Time to take a look back and a look ahead. Vögele, Hamm, Kleemann, and Benninghoven have also played a leading role in shaping the industry's technologies. Together, the Wirtgen Group stands for more than 660 years of experience – and has always set the trends throughout the history of road construction.



SUCCESS STORIES

60 Years of Wirtgen = 660 Years of Experience

The Wirtgen Group's brand headquarters in Germany are among the most cutting-edge production facilities in the industry. Lean production processes, clear workflows, and ergonomic workstations come together to ensure that these locations deliver premium technologies. The basis for this success is a continuous development process that stretches far back into the past.

Reinhard Wirtgen's first workshop was built in the span of a just a few months on the commercial property in Windhagen.



Wirtgen's Path

Wirtgen's success story is well known in the industry. Here's the short version: In **1961**, Reinhard Wirtgen launched his career as a trucking contractor for road construction companies. A few years later, he built his first two concrete shattering machines in an empty chicken coop. That was in 1965 – and even then, the young founder demonstrated vision and courage beyond his years. He recognized the advantages of his design over the crawler excavators common at the time. And sensed the opportunity to gain a foothold as a service provider in road construction. Innovations in road rehabilitation are the hallmark of Wirtgen's path, and this is how the company evolved into a manufacturer of road construction machinery – a vision became reality. Today, the Wirtgen Group



What started as a workshop soon developed into a production hall.



SF 3800 hot milling machine in operation at Düsseldorf Airport in 1973.



Wirtgen brand headquarters in Windhagen today.

encompasses five brand headquarters in Germany, production facilities in Brazil, China, and India, and its own sales and service companies. And is proud to be a strong part of John Deere.

1996 Vöq

Vögele becomes part of the Wirtgen Group.

Joseph Vögele

Vögele's beginnings reach far back into the past. In 1836, Joseph Vögele founded a small blacksmith's shop in Mannheim, near the Heidelberg Gate. The timing was ideal, because just one year earlier, the first German train had completed its journey from Nuremberg to Fürth. Joseph Vögele recognized the opportunities that were opening up as a result of the growing rail network. Vögele's product range soon included everything from railroad switches and turntables to transfer tables and shunting systems. Starting in 1890, the company began receiving its first major orders from the Prussian state railways, including for the construction of Frankfurt's main train station. When Heinrich Vögele, the son of the company founder, took over management of the company with his children Joseph and Wilhelm at the beginning of the 20th century, Vögele was one of the most prominent railroad switch manufacturers in the world. When World War I broke out, business - particularly international business - ground to a halt, causing Vögele's sales to decline.



In this drawing from 1916, workers are building turntables that were used to rotate locomotives and other rail vehicles.



In this photograph from 1925, a transfer table from Vögele at the port of Mannheim connected two parallel train tracks, making it possible to swap locomotives.



Vögele brand headquarters in Ludwigshafen today.

1938: As a selfpropelled machine, the automatic spreader paved asphalt evenly at exactly the right height.



spreader paved asphalt or gravel road surfaces. It was pulled by a truck that simultaneously supplied it with material.

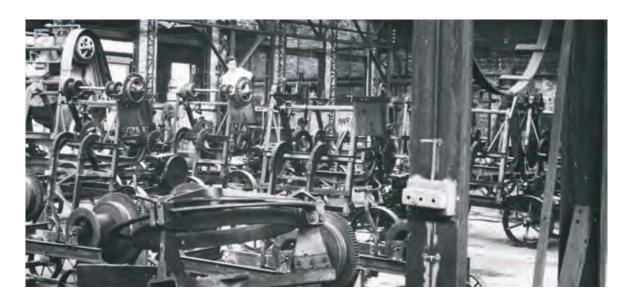


The Vögele factory in Mannheim in the 1930s.

Vögele Becomes a Manufacturer of Road **Construction Machinery**

In the 1920s, Vögele discovered road construction as a new area of business. The use of engines was increasing, bringing more and more cars and trucks onto the roads. Construction companies were covering the roads with tar or concrete pavements. Since plans for two-lane highways were already underway, contractors and manufacturers of construction machinery expected to receive many large orders. After 90 years as a manufacturer of railroad equipment, Vögele entered a new era as a manufacturer of road construction machinery.

In addition to concrete mixers, the company developed its first asphalt paver, the towed spreader, in 1929. In the 1930s, the product was expanded to include an automatic spreader as well as a medium-frequency vibratory compactor and the later high-frequency vibratory compactor for concrete road construction.





The Early Days of the Hamm Brothers Machine Shop

The gunsmiths Franz Hamm and Anton Hamm founded the Maschinenfabrik Gebrüder Hamm ("Hamm Brothers Machine Shop") in Tirschenreuth, Germany, in 1878. In their workshop on Schmellerstrasse, they initially produced agricultural equipment such as mobile threshing machines. The company also participated in major construction projects, such as the construction of the water pipeline in Tirschenreuth in 1900. They soon ran out of space, so in 1908 the Hamm brothers – who at this time already had 21 employees – expanded their workshop for the first time. In addition to agricultural machinery, they also manufactured portable engines.

As industrialization advanced at the turn of the century, the road network grew. Construction companies used steamrollers to compact road surfaces. Hamm also saw road construction as a

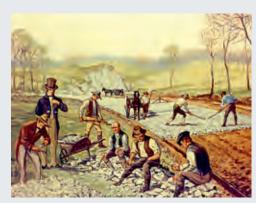
1999
Hamm is integrated into the Wirtgen Group.



The motorized road roller attracted a great deal of attention and soon became Hamm's flagship product.

THE EVOLUTION OF ROAD CONSTRUCTION

At the beginning of the 18th century, the old road construction techniques used by the Romans were revived and specifically advanced. Until then, roads were usually entirely made of dirt, which in rainy weather then turned into muddy, impassable thoroughfares. Gravel and cobblestone roads improved the situation and therefore came into fashion and were systematically built. Thomas Telford and John Loudon McAdam laid the foundations for modern road construction during this period. Their insights into a tiered layer structure (known as macadam construction) and effective drainage of roads



1822: The first road built using the macadam method in the United States linked Hagerstown and Boonsboro, Maryland.

continue to apply today. In order to transport people and goods as quickly as possible, the number of superregional road connections increased steadily in addition to roads within city limits. Paved highways created a network of long-distance roads stretching right across Europe, and they only lost their importance with the advent of railroad construction.

The emergence of motorized vehicles brought about a fundamental change in road construction. This new means of transportation required further reinforcement of the road structure and a completely new way of thinking about how roads should be laid out. The roads built up to that point were too uneven and curvy - far too unsafe for faster vehicle traffic. Another issue was the widespread problem of dust generated by vehicles driving over unbound surface layers. Consequently, surface layers were bound with tar, bitumen, or cement. This was the birth of modern asphalt and concrete road construction as it is still in use today.

Hamm brand headquarters in Tirschenreuth today.



promising new business segment that had already been developed in England, but was still in its infancy in Germany. When the Royal Bavarian District Office decided to purchase a roller for road construction in 1911, Hamm saw its big chance. After 30 years as a manufacturer of agricultural machinery, the Hamm brothers entered the road construction business. Without ever having designed a roller before, Hans Hamm developed the world's first road roller in 1911, which was much more precise and faster than steam rollers. After initial successful operations, Hamm soon built further road rollers. Up until the beginning of World War I in August 1914, four motorized road rollers were in use around Tirschenreuth alone.

The Great War didn't stop the machine manufacturer's upward trend, and between 1915 and 1918, Hamm manufactured a total of twelve motorized rollers on behalf of the German Army. In the 1920s, the company focused entirely on road rollers and withdrew from the agricultural machinery sector. Over the following years, the company developed a wide range of asphalt rollers. Another milestone followed in 1932: Alois Hamm, a son of Anton Hamm, patented the world's first tandem roller with all-wheel drive and all-wheel steering. The subsequent model developed in 1940 also set standards. The crab steering system meant that the drums were staggered, allowing one machine to compact a wider lane at once.



A small family business: Hamm was already manufacturing road rollers of various sizes in a small factory in the 1920s.



A world premiere in 1932: Hamm's all-wheel-drive tandem roller exhibited superior traction and compaction characteristics. This photo shows the unfinished first prototype.



A look inside Kleemann's brand headquarters in Göppingen today.

2006
The Wirtgen
Group began to
develop its second line of business with the
successful integration of Kleemann
GmbH, a longestablished
German manufacturer of processing plants.

The Early Days of Kleemann GmbH

In 1857, Ferdinand Kleemann founded a file cutting workshop in Obertürkheim, near Stuttgart, Germany. He expanded his product range early on, initially to include forage harvesters and other agricultural equipment, and later also eccentrics. In 1878, his descendants purchased a plot of land on Augsburger Strasse and built a new workshop and foundry there. Heinrich, one of Ferdinand's four sons, established a business relationship with a manufacturer from Göppingen-Faurndau by marrying his daughter, and soon took over management of the company Hildenbrand & Söhne.

Kleemann discovered rock processing in 1902. After Heinrich Kleemann's death, Friedrich Kleemann and Wilhelm Kleemann merged the



"Kleemanns Vereinigte Fabriken Obertürkheim und Faurndau" was founded in 1902.



Kleemann had about 40 employees in 1870.



Kleemann developed the first wheeled mobile jaw crushers with drum screens in the 1950s.

Hildenbrand company with Kleemann's company to form the "Kleemanns Vereinigte Fabriken Obertürkheim und Faurndau" ("Kleemann's United Factories in Obertürkheim and Faurndau"). In the same year, they started building stationary stone processing plants, thereby taking a first step into the market for processing technology. This area, however, remained only a secondary line of business for the company for many years. Up until World War I, Kleemann not only manufactured stone crushers and ball mills, but also, among other things, wine press machines, elevators, and sorting drums.

Focus on Processing Technology

After World War II, production at Kleemann was slow to get going again. It wasn't until 1952 that the company was able to build on its old successes. Its main products remained machines for stationary processing systems and hydraulic lifting platforms. After the death of Hans Kleemann, his sons Fritz and Johannes Kleemann took over management of the company in 1966. Under their leadership, Kleemann now also produced hydraulic elevators and special hydraulic systems for town halls, gymnasiums, and swimming pools.

In 1976, the company introduced an innovation in processing technology - Kleemann built the first wheeled mobile crusher for a customer in the United Arab Emirates, which was based on the wheeled mobile jaw crusher it manufactured back in the 1950s. Customers in the Middle East remained the main purchasers of the mobile plants for many years; in Germany, Kleemann gradually evolved into a specialist for stationary processing plants.



Benninghoven brand headquarters in Wittlich today.

2014

Another leading technology company joins the Wirtgen Group: Benninghoven GmbH & Co. KG. a successful and highly respected manufacturer of asphalt mixing plants that perfectly complements the existing product range.

The Early Days of Benninghoven

In 1909, Otto Benninghoven started a company in Hilden, Germany, that manufactured gears and special machines. The company entered the field of industrial combustion technology a few decades later, in the 1950s. In the following decade, the asphalt industry became increasingly important area of business for the company. In 1970, the company moved into a new, state-of-the-art production facility in Mülheim, Germany, which simultaneously became its new headquarters.

A newly built electrical and final assembly hall has been in use there since 2007. A second facility was operated in nearby Wittlich, where mainly steel construction and the assembly of screens and drying drums took place.

In 2016, Benninghoven held the groundbreaking ceremony for the construction of its future brand headquarters in Wittlich-Wengerohr. Today the company conducts all of its manufacturing processes at this location.

Strong Values for the Future

Collectively, the companies of the Wirtgen Group bring their full strength to bear wherever our custom-

ers need it and as a unit that benefits from its diversification.

Our success is based on the trust placed in our employees and the satisfaction of our customers. In order to complete a job on time, Reinhard Wirtgen was never above working on the machines himself late into the night. Similarly, today we still strive to offer our customers products of the highest quality, the most advanced technologies, and the most comprehensive service. This aspiration is reflected in our value proposition "Close to our customers." And this tradition lives on under John Deere as well.

Our management believes in flat hierarchies, rapid decision-making processes, and giving employees significant autonomy when carrying out their day-to-day work. A single idea transformed a company with a long tradition into a global corporation.

Partnership, reliability, specialization, and innovative strength still characterize our company today. These are values that will continue to guide and inspire us in the future, that will lead us to new innovations and ensure that we never lose sight of our customers' long-term success. This is a tradition we are extremely proud of.





spirit in combination with groundbreaking technology has always been the hallmark of Benninghoven's activities. 1960: Industrial burner.

FORUM COMPANY MAGAZINE

A New Concept after 60 Issues

It isn't just Wirtgen turning 60 this year - FORUM is also celebrating its 60th issue.

he first edition of FORUM was published in December 1986 - at the time merely a simple newsletter for the Wirtgen workforce that was also popular with customers, which is why its circulation significantly exceeded the number of employees. FORUM then officially became a customer magazine for the first time with the publication of issue 31. At the time, it was printed in the classic Berliner newspaper format. With the publication of issue 42, FORUM became a true customer magazine in the modern magazine format you know today, both in terms of its content and appearance.

Digital Magazine Format in the Future

FORUM has always covered the rapid development and transformation of the company throughout its history, but has also

undergone constant change itself. And now we're systematically continuing this trend and will soon be relaunching FORUM as a new Wirtgen Group digital magazine that will also include our user magazine Road News. The first issue of the new magazine will be published in October 2021.

So you can continue to look forward to news from around the Wirtgen Group, to job site reports, innovative product developments, and even a look behind the scenes from inside the Wirtgen Group.

FORUM magazine's editorial team would like to thank you for being such faithful readers over the years - and we'll you soon in the new format!

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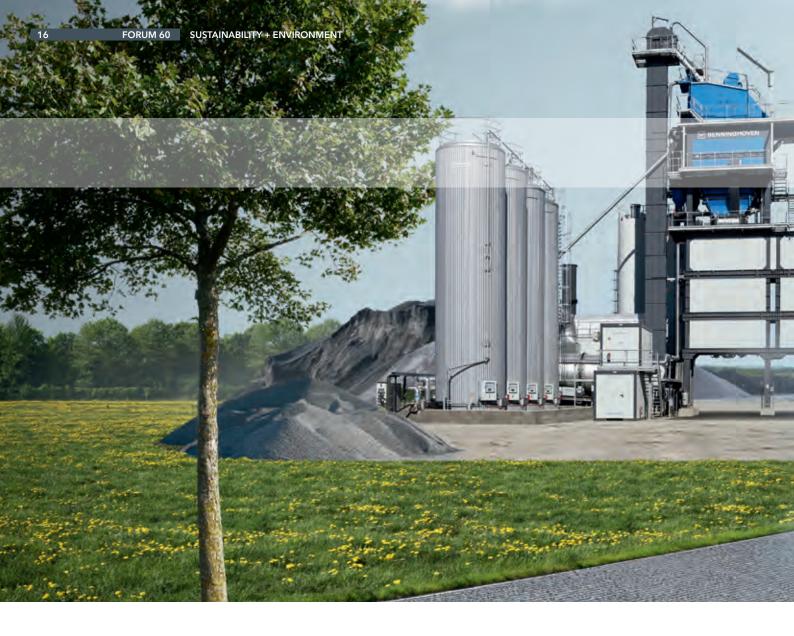




ENVIRONMENTALLY FRIENDLY PROCESSES AND PRODUCTION

In Harmony with Nature





PROCESSING REDUCED-TEMPERATURE ASPHALTS

Reducing Energy Consumption

Energy-saving potential is one of the key drivers, and reduced-temperature asphalt is a road construction material that is currently becoming increasingly popular as a result. Technologies and solutions from the Wirtgen Group are the perfect response to this trend - and help ensure that the production and processing of lower-temperature mixes can be carried out virtually in the conventional manner.



Reduced-temperature asphalt is a topic that is currently at the top of the road construction industry's agenda, and the Wirtgen Group has the technological solution.

educed-temperature asphalts - also known as low-temperature asphalt, warm asphalt, or warm mix - are mixes that have a production temperature of 110 °C to 130 °C. In contrast, conventional hot-mixed asphalts are produced at 140 °C to 180 °C - typically with 160 °C hot bitumen as the binding agent. There are numerous reasons for the growing trend toward the use of this building material in many countries and regions.

Significant Potential to Save Energy and Reduce CO₂ Emissions

Reduced-temperature asphalt offers financial benefits, as these mixes require much less energy to produce. Lower energy consumption always means a reduction in emissions, especially CO₂ emissions. Increased environmental friendliness is an important issue, which is why reduced-temperature asphalt ranks high on the agenda of authorities worldwide.

According to the German Asphalt Association, a temperature reduction of 30 °C alone saves 0.9 liters of heating oil (or a fuel equivalent) per ton

of finished asphalt. At a daily production rate of 2,000 tons of mix, this corresponds to a savings of 1,800 liters of oil - or up to three-quarters of the energy required to heat a single-family home for an entire year. In addition, this corresponds to a reduction in CO₂ emissions of 6,000 kg per day. The

"When it comes to lowtemperature asphalt, foamed bitumen is the binding agent of choice. Benninghoven knows its way around this material and can also integrate the technology into existing plants."

Matthias Lenarz, Team Lead Bitumen Systems, Benninghoven

"Vögele technology is perfect for processing reducedtemperature asphalts. The heater effectively prevents the material from sticking - and **WITOS Paving Plus optimizes** the processes."

Bastian Fleischer, Product Manager, Vögele

figures that can be achieved in the real world are even higher - primarily because the reduction in temperature often reaches 50 °C or more.

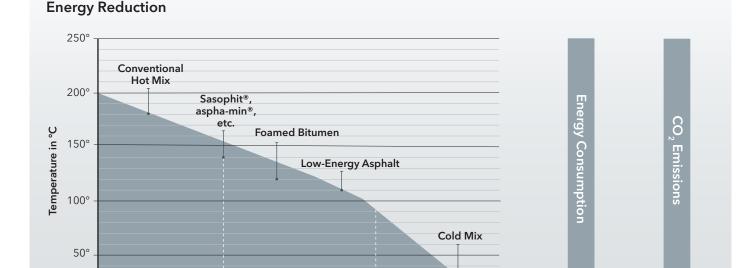
Benninghoven Mixing Plants with Optimal **Technology for High-Quality Production**

Systems from the Wirtgen Group's product brands already demonstrate their outstanding value during the production of reduced-temperature asphalts above all, those from Benninghoven. This is because the production process is where the greatest potential to save energy and reduce emissions lies, i.e. in one of Benninghoven's asphalt mixing plants. In this context, the specialist for the production and recy-

Hot-Mixed Asphalt



High-tech from Vögele supports job site logistics and documents the paving temperature - with WITOS Paving Plus and RoadScan, paving teams can manage the supply of mix and contractors have documentation showing that paving was carried out within the correct window of time.



Overview of temperature levels in the production of hot-mixed asphalt, reduced-temperature asphalt, and cold-mixed asphalt. Foamed bitumen is the binding agent of choice in the production of low-temperature asphalt, ensuring mix quality remains high even in the range between 110 °C and 130 °C.

Cold-Mixed Asph



cling of asphalt mixes of all kinds can draw on decades of experience - especially when it comes to the use of eco-friendly technologies.

Reducing bitumen viscosity is a basic requirement for a reduction in temperature during asphalt production. This is because the binding agent bitumen actually requires a temperature of at least 140 °C to coat the mineral. Below this level, it remains too thick. As a result, Benninghoven has developed and successfully implemented various solutions to temporarily reduce its viscosity. This includes high-precision metering systems for the addition of liquid or solid additives as well as the Benninghoven foamed bitumen module.

Low-Cost Foamed Bitumen Also Offers Benefits during the Production Process

Foamed bitumen is particularly attractive as a binding agent for the production of reduced-temperature asphalt because it only requires water as an additive, which is available at every asphalt mixing plant anyway. Mixing hot bitumen with water increases its volume many times over - this is also known as bitumen foaming. Due to the surface energy released, the binding agent covers the rock extremely well during the mixing process - even at low temperatures - and results in smooth paving properties.

The technology behind the foamed bitumen module offers a key benefit for asphalt mixing plant operators. In this context, the mix weighing section is only extended by this plant option. It consists of a bitumen pump, an expansion chamber, pipework,

and injection bars as well as a water metering system. Thanks to Benninghoven's "plug & work" concept, the foamed bitumen module can also be retrofitted to existing plants at any time - simply remove the blind cover from the mixing chamber and bitumen scale and install the foamed bitumen module - that's all there is to it. In combination with Benninghoven's gentle and high-quality material processing, this results in reduced-temperature asphalts that can easily compete with conventional mixes.

Solutions from Vögele for Paving Reduced-Temperature Asphalt

Many contractors who have almost exclusively worked with conventional hot mixes up until now often ask themselves how reduced-temperature asphalt behaves during paving by road pavers. Vögele has been exploring this subject for a long time, researching and testing the paving of various such mixes – and providing real-world solutions.

With Vögele, the benefits gained during the paving process start even before turning on the paver. The mobile feeders in the PowerFeeder series the MT 3000-3i Standard and the MT 3000-3i Offset are essential when processing reduced-temperature asphalts. This is because they can unload a complete truck with 25 tons of mix in just 60 seconds. In conjunction with an additional container on the paver, it's possible to hold up to 45 tons of material ensuring that paving can continue without interruption. This lays the foundation for the largest possible time window for compaction, which is particularly



"The HCQ Navigator shows which areas have already been sufficiently compacted and which have not. This means that fewer passes are necessary - a real advantage when you only have a small window of time."

Dr. Axel Mühlhausen, Product Manager Digital Solutions, Hamm

critical when using low-temperature asphalt. An effective conveyor heating system also contributes to this, keeping the asphalt at the right temperature during transport to the paver.

Vögele technology also plays a decisive role in producing unparalleled paving results. The SUPER pavers feature a patented innovation that is particularly noteworthy in this context: the heated auger unit. "The component is located exactly at the point where the material falls onto the distribution auger and is distributed laterally. Heating it effec-

tively prevents the material from sticking," says Bastian Fleischer, product manager at Vögele, explaining the benefits of the exclusive and low-maintenance solution.

In addition, the components of every Vögele screed that come into contact with the material are also heated electrically. The use of Vögele's high-compaction technology has proven to be particularly beneficial during paving. In this context, pressure bars powered by pulsed-flow hydraulics achieve a high degree of precompaction, which also extends the window of time for the rollers. In addition, Vögele has also developed and is already using specific technologies that greatly improve the processing of reduced-temperature asphalts – namely WITOS Paving Plus and RoadScan.

WITOS Paving Plus: For Extremely Reliable Logistics and Paving Processes

When processing reduced-temperature mixes, job site logistics play a particularly important role. This is because the greatest challenge on the job site is the window of time available for compaction - low-temperature asphalts, in particular, become increasingly resistant to compaction as their viscosity increases, so it is essential to complete the process at the highest possible material temperature. Because these asphalts are produced at a lower temperature, however, the gears during transport and on the job site need to mesh with each other perfectly in order to give the rollers as much time for compaction as possible.



WITOS HCQ makes it easy to measure, monitor, document, and manage compaction processes.

WITOS Paving Plus offers valuable tools to successfully manage these complex processes and thus achieve high-quality results. WITOS Paving Plus is an integrated process optimization and documentation system solution from Vögele consisting of five complementary modules for the various individuals involved in the process – from the mixing plant operator and truck driver to the site manager.

Connected System Solution Ensures Just-In-Time Delivery

The Materials and Transport modules are of particular importance on low-temperature asphalt job sites. WITOS Paving Materials integrates the mixing plant into the system, allowing mix to be ordered dynamically - the system sends a notification when a mix truck is due to leave for the job site. The delivery documents are also sent digitally to the site manager in advance.

If a mix truck is on its way to the job site, the WITOS Paving Transport module reports its expected arrival time. Site managers receive this and other information in the WITOS Paving JobSite module. As a result, they always know how many tons of mix are currently on the road and can react quickly to the current logistics situation. This makes it easy to keep the paving process flowing – and with it, compaction.

RoadScan Monitors and Documents the Paving Temperature

Another Vögele solution, RoadScan, is now widely used to monitor and maintain a constant temperature range of the mix. In the process, an infrared camera measures the temperature of the entire area behind the road paver's screed across a width of 10 m with extreme precision. The benefits are especially clear when using reduced-temperature asphalt – the system makes paving quality measurable and verifiable by measuring and documenting the temperature immediately after paving, which can be important, for example, in the event of an inspection by the client.

Hamm Rollers Compact Asphalt Quickly and Dynamically

The compaction of reduced-temperature asphalts also needs to meet exacting requirements. After all, the final result has to be achieved in a shorter window of time compared to hot-mixed asphalt. In order to introduce the required compaction energy into the material as quickly as possible, the tandem rollers used in this case generally operate dynamically, i.e. with active vibration or oscillation.

Hamm also has another technology in its portfolio that is ideal for low-temperature asphalt job sites: the HCQ Navigator. The system increases both efficiency and quality. This is possible because the roller operators are shown a live compaction map on a panel PC in their cabin. It shows which areas have already been sufficiently compacted and which have not. In addition, environmental data such as the asphalt temperature and stiffness are also logged and displayed. All in all, this solution reduces the number of passes required.

Digital Compaction Solutions Optimize the Process

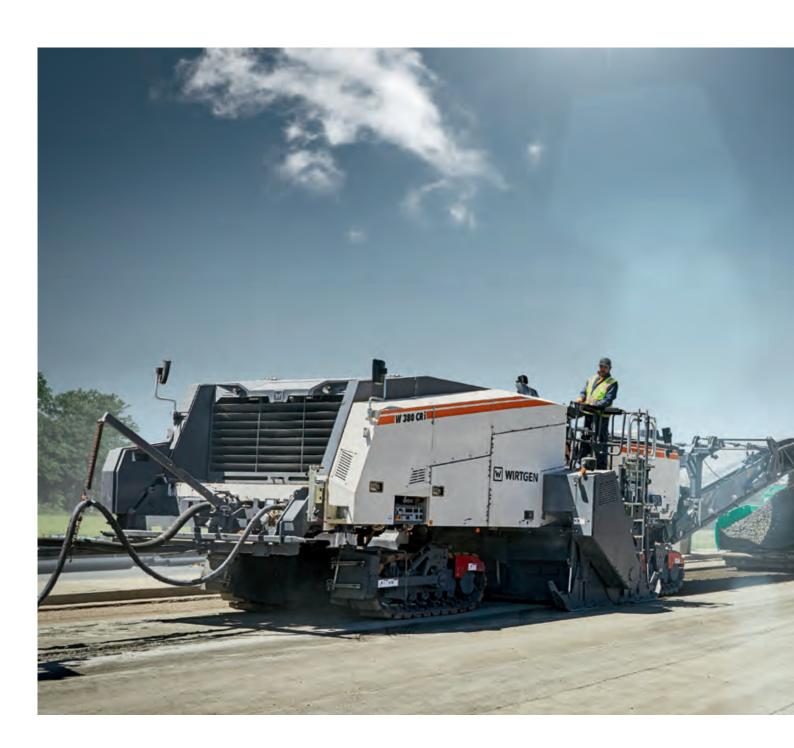
In addition to the HCQ Navigator, Hamm's WITOS HCQ offers the ability to remotely monitor the entire compaction process live. In this context, WITOS HCQ users have real-time access to the captured process data via the Wirtgen Group's WITOS portal. In addition, this data can later be used for analysis and documentation.

Collectively, the plant and system technology from the Wirtgen Group makes it easy to begin using the promising construction material of reduced-temperature asphalt and ensures that the processes are extremely reliable.

PRODUCTION SYSTEM FOR STRUCTURAL ROAD REHABILITATION

The Cold Recycling Train

Due to the rapid increase in heavy-duty transport, the global road network is showing visible signs of aging in many places. In order to ensure that the road infrastructure remains functional over the long term, roads are increasingly requiring structural rehabilitation. The Wirtgen Group's recycling train is the ideal solution for meeting these requirements.



oad rehabilitation projects all have to meet the same requirements, regardless of where they are being carried out: they must be cost-effective, eco-friendly, and above all, finished quickly - because time is of the essence. Patchwork repairs are neither sustainable nor do they address the root cause.

A New Lease on Life

The cold recycling process - which at a minimum recycles the surface layer material - is already popular today, and demand for this solution will continue to grow in the future. In the in-place cold recycling process, for example, the asphalt surface is removed

either in full or in layers, depending on the level of damage, by a series of machines operating across the entire width of the pavement in a single pass, mixed with binding agents on site, and then paved again immediately.

Comprehensive Process Solution

Tracked cold recyclers such as the new W 380 CRi from Wirtgen form the heart of the recycling train. In most situations, the recycler mills the pavement between 100 and 300 mm deep. At the same time, it granulates the material and transforms it into a new, homogeneous material mixture by adding binding agents such as cement, bitumen emulsion, or foamed bitumen. With a mixing capacity of up to 800 t/h, the cold recycler can feed enormous quantities of recycled material to a Vögele paver. Final compaction is carried out by Hamm tandem and tired rollers.

Extreme Durability

Roads rehabilitated using the cold recycling process also have to meet the same durability requirements as roads designed and built using conventional methods. With the development of its own laboratory equipment, Wirtgen has created solutions which guarantee that the rehabilitation measures will be cost-effective and sustainable even before they are carried out. As a result, the recycler not only makes it possible to define the ideal composition of the mix, but also to directly analyze its quality and properties using test specimens in triaxial and splitting tensile strength tests. The quality of the foamed bitumen can also be precisely defined in the materials laboratory before starting the rehabilitation project.

Low Life Cycle Costs

Another advantage of the cold recycling process that cannot be understated is the considerable energy-saving potential during materials processing. The raw materials do not have to be dried or heated, which means that 10 - 12 liters of fuel can be saved per ton compared to conventional rehabilitation methods. By almost completely recycling the surface layer, it's possible to reduce the number of trips needed to transport building material to the site by up to 90%. At the same time, companies can cut resource consumption by 90% and completely eliminate the need to dispose of materials. This results in significantly reduced fuel consumption and lower CO₂ emissions. Most importantly, the cold recycling method makes it possible to reduce the use of binding agents by up to 50% - making this the area with the greatest potential savings, since binding agents still represent the largest cost factor in road rehabilitation. Thanks to the special properties of BSM (Bitumen-Stabilized Material), cold recycling technology results in very low costs over the entire life of the roads.









Intelligent and sustainable production processes ensure that operations at Hamm's brand headquarters are efficient and conserve resources

ince its introduction in 1996, ISO 14001 has been the globally accepted and applied standard for environmental management systems. Its main focus is on defining internal processes as well as competencies and responsibilities in order to improve a company's environmental performance.

Following the Wirtgen Group's early implementation of environmentally friendly, cost-effective, and future-proof production processes at all of the brand headquarters in Germany and international production locations, the Hamm facility in Tirschenreuth is now the first German location to receive the coveted certification. "We systematically pursued this approach early on, and by joining John Deere, have now visibly accelerated the documentation of our long-standing commitment," explains Bernd Krahl. As a plant manager at the Wirtgen Group, he leads the collective integration activities with John Deere in the field of production, which include environmental, health, and safety issues. As a result, all of the Wirtgen Group's other production locations will be certified by 2024 at the latest.

Reduced Costs, Increased Legal Security

Certification not only provides companies with increased legal security by ensuring that the applicable legal requirements and conditions are fulfilled. The resulting savings in terms of waste, materials, water, energy, and material flows also pay off. These are benefits that are also well-known at the Tirschenreuth site thanks to the facility's efficient and resource-friendly operation. "Through the use of geothermal energy, we save 70 tons of CO₂ per year alone. By generating heating energy from renewable sources, we can also save around 60,000 liters of oil," says Production Manager Dirk Pressgott, citing two successful projects. Hamm is already laying the foundation for sustainable operations with its own junior staff. This is also reflected in the "Energy Scouts of the Year" award presented within the scope of the SME initiative "Energy Revolution and Climate Protection." This award recognized the efforts of the vocational trainees who completed a project that succeeded in identifying and eliminating compressed air leaks, thereby improving energy efficiency at the Tirschenreuth site. The award goes on to say that they are making "a valuable contribution to climate protection in the German industrial sector."

Customers and Manufacturers Increase Competitiveness

Climate-friendly solutions are also in greater demand than ever on the customer side, as they are playing an increasingly important role in the competitive bidding process for road construction contracts. In order to meet the requirements necessary to successfully secure these contracts, an increasing number of customers prefer to work with manufacturers who furnish documentation of the use of an environmental management system. By doing so, the road construction contractors increase their competitiveness in the market. And the same applies the other way around to the construction machinery manufacturer that, as a strong partner, fully meets the needs of its customers.



The digitization of logistics and manufacturing processes significantly reduces paper consumption at every plant.

Inquired



Bernd Krahl, Plant Manager, Wirtgen Group

M

r. Krahl, has the Wirtgen Group suddenly discovered its "green conscience"?

Environmentally friendly operations are by no means new to the group of companies – quite the opposite is true, in fact. "Green technologies" have long been an integral part of the Wirtgen Group's solutions, and this applies to the entire road construction material cycle. This is something that our customers have always valued highly.

Perhaps less well known to the general public is the fact that here at the Wirtgen Group, sustainability begins during the very early stages of product development and continues through the design phase and subsequent manufacturing at our plants. Sustainability is an integral part of our corporate philosophy, we just haven't really actively communicated it to the outside world.

So why are you publicizing the group's efforts and activities now?

There are a number of reasons. One of them is the certification of Hamm AG. This is a fitting occasion to communicate our commitment to sustainability to the general public. Moreover, sustainability as an economic and sociopolitical issue has finally moved into the spotlight for all of us. For example, consider the European Green Deal. Among other targets, its initiatives aim to reduce greenhouse gas emissions in the EU by 50 to 55 percent by 2030 compared to 1990 levels.

Through its innovative solutions, the Wirtgen Group is doing its part to achieve this. As the well-known German saying goes: do the right thing and left the world know. We've always done the right thing - now we're letting the world know. Furthermore, our strong relationships with our customers play an important role.

What do you mean by that?

Customers always receive a complete package of solutions from us that enables them to complete their jobs cost-effectively, with excellent quality, and in an environmentally friendly manner. This not only includes the ideal product or production system, but also our application experts' knowledge and assistance as well as customer support. True to the Wirtgen Group's value proposition "close to our customers," there is no question that we also want to fully meet the new requirements with respect to the implementation of an efficient environmental management system. Through the ISO 14001 certification of our specialized factories, our customers know that they can rely on the Wirtgen Group as a strong partner in this area as well.

Fit for the Future

While the Wirtgen Group's history is certainly quite interesting, there's also a lot going on in the present day as well. We're equipped for the future.



Power for Large Job Sites

Ludwigshafen, Germany. Vögele feeders - as powerful as always and as easy-to-use as never before. The MT 3000-3i Standard and MT 3000-3i Offset are now also available with the latest

Dash 3 machine concept, including an optimized conveying and maintenance system. All of the details can be found here:

www.wirtgen-group.com/powerfeeder-voegele

Two World Records!

Doha, Qatar. Thanks to PWA Ashghal, the public works authority in Doha, the State of Qatar can be proud of two entries in *Guinness World Records*. After reliable and high-performance machines from the Wirtgen Group had produced the longest piece of asphalt concrete laid continuously in the world - more than 25 kilometers in 242 hours nonstop - the company's premium products also produced the world's longest continuous bicycle path. The Olympic cycling track is almost 33 kilometers long and allows bikers to reach speeds of up to 50 km/h. Further information can be found at **www.guinnessworldrecords.com.** Just type "Ashghal" into the search field and prepare to be amazed!





Fan Store

Online, Europe. Listen up, Wirtgen Group fans! Our new online merch store has launched just in time for the holiday season. Now you can bring the Wirtgen Group into your home with just a few clicks. It goes without saying that there's something available from all of our product brands – whether T-shirts, stuffed animals, or the popular machine models. A gift from our store is sure to make your employees' hearts leap as well. And who knows – maybe you'll find something that is the perfect way to say "thank you" at the end of the year. Simply select the product, place your order, and have it delivered to the desired address. The store is currently only available in the EU countries as well as Liechtenstein, Iceland, Norway, and Great Britain. Have fun browsing!

shop.wirtgen-group.com

State-of-the-ART Design

Windhagen, Germany. Everyone knows that Wirtgen milling machines are extremely innovative and also cut a fine figure visually. But with the new film coating concept, customers now have even more options available to give their machine a unique look. In this context, customers can select virtually any image or pattern. Whether a more traditional, elegant appearance, slightly playful, or especially eye-catching - Wirtgen milling machines also set standards when it comes to their design.





An Historic Moment

Langfang, China. After manufacturing the 8888th machine for the Asian market, the Wirtgen Group factory in Langfang celebrated a very special milestone in its long-standing presence in China. This is because in China, the number 8 is a very special lucky number. At the celebratory ceremony, the new owner proudly took delivery of his cold milling machine to the cheers of the entire local Wirtgen Group team.



Smart Trainees

Windhagen, Germany. First place in the overall and individual ranking – in the "Reading the Paper Gets Trainees Fit" competition, Wirtgen's vocational trainees demonstrated their excellent general knowledge. With 888 points, the team consisting of Malcolm Ikuobolati, Pauline Reifenhäuser, Nick Marquardt, and Patricia Simic took the lead after 10 quiz rounds and 12 questions each in various categories. With 100 of 118 possible points, Pauline Reifenhäuser also came out on top of all 265 participants, rounding out the Wirtgen team's outstanding result as the best company. Congratulations!





Social Trainees

Windhagen, Germany. A creative project organized by the "Bonn Support Group for Children and Young People with Cancer" (Förderkreis für krebskranke Kinder und Jugendliche Bonn e.V.) called on supporters to collect bottle caps and "turn them into donations" - so Wirtgen trainees built a "showcase" in the training workshop to collect them. The donations will be used to fund games, arts and crafts, recreational activities, etc. for the young patients in Bonn University Hospital's oncology ward.

Customized Training

Worldwide. Would you like to make the most of your Wirtgen Group machine's innovative features? Or maybe you're interested in valuable tips and tricks from our application technology experts? Or would you like personalized training on a topic that is particularly important to you? Our current 2020/2021 training program is the perfect solution in all three cases. For further information, please contact your local Wirtgen Group representative or visit the following website to learn more:

www.wirtgen-group.com/training



Langfang, China. The Wirtgen Group's premium products are extremely popular in China. So popular, in fact, that the company soon plans to expand the capacity of the Langfang plant by 9,000 m² of additional production space. We are delighted that the Wirtgen Group's customized solutions for the Asian market are so well received.



Ready for Immediate Use

Worldwide. Even when secondhand, Wirtgen Group products are always the first choice. Our MachineFinder is the perfect tool to help you find the right used machine. It exclusively searches through the best deals offered by the Wirtgen Group's brand headquarters, subsidiaries, and authorized dealers worldwide - and now in even more countries.

www.wirtgen-group.machinefinder.com



Winter Deals

Europe. Wintertime is workshop time. In order to return to the job site in perfect shape for the new season, the Wirtgen Group has put together an optimized care program for construction machinery. From November 1, 2020 to March 31, 2021, custom-

ers will be able to purchase many Wirtgen Group original spare parts at extremely attractive prices. The deals in the participating European countries can be found at:

www.wirtgen-group.com/special-campaign

A Strong Partner for 25 Years

Pune, India. The Wirtgen Group is also "close to our customers" in India. Now with 20 nationwide sales and service locations, we have been a reliable partner on the Indian market for a quarter of

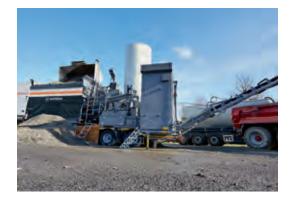


a century. Reason enough to celebrate the anniversary together with our customers on the factory premises at our head office in Pune.

www.wirtgen-group.com/inauguration

A Recycling Powerhouse

Paderborn, Germany. A mixing capacity of 240 tons per hour and a RAP recycling rate of 100% - these are just two of the parameters of Wirtgen's new KMA 240i cold recycling mixing plant. The machine's use at the airport in East Westphalia produced outstanding results.





Customized

Taicang, China. A successful machine purchase always includes the appropriate financing. As a reliable partner, the Wirtgen Group offers attractive financing packages worldwide that are perfectly tailored to our customers' individual needs. Customers in China recently benefited from particularly lucrative financing solutions during the "Golden Deal Weeks." It culminated in an exciting open house day for customers at the sales and service center in Taicang - including a machine exhibition.

www.wirtgen-group.com/financing

Ripe for a Museum

Antigo, USA. The year was 1965. Company founder Reinhard Wirtgen was still working as a subcontractor for road construction companies at the time - and not yet with milling machines, but with a concrete shattering machine (abbreviated BTZ in German). In the 1980s, five BTZ 7000 models were shipped to Antigo Construction



in the United States alone. The last one, with serial number 9, still works today. Now, according to CEO Matt Shinners, it will be given its place of honor in the company's mini-museum in Wisconsin. Incidentally, it was his father George (pictured above) who imported the BTZ models to the USA some 40 years ago. Wow! We are incredibly proud of our history:

www.wirtgen-group.com/historie

A Logistics Powerhouse

Göppingen, Germany. Even though modern crushing and screening plants control material flows within the plant largely automatically, machine operators still have a major impact on quality and daily output rates. For example, they coordinate the end products through stockpiling, temporary storage, and loading, among other activities – and with Kleemann's new MOBIBELT stockpile belts, they can now do this in an extremely flexible manner and adapted to the situation. Learn more here:







Silverstone, England. Tight corners with rapid changes in slope over short distances - the new profile of the legendary Formula 1 circuit in Silverstone inspired drivers and motorsport experts alike at the British Grand Prix. Cold milling machines from Wirtgen's new F series laid the foundation for the top-quality pavement by milling an extremely even surface over an area of

87,000 m² with extreme precision, thereby creating the ideal base for asphalt paving by Vögele pavers and Hamm rollers. The contractor, Tarmac, did a fantastic job. Local hero and world champion Lewis Hamilton knew how to best take advantage of the quality of the new track, once again winning his home Grand Prix with track and lap records.

Now That's Steep!

Zandvoort, Netherlands. For the return of Formula 1 to the Netherlands in 2021, the legendary "dune roller coaster" - Circuit Zandvoort - is being be modernized and given two steep curves. While completing the project, the contractor needed to deliver outstanding quality. The



steep curves have an extreme cross slope of up to 32%. Contractor Royal VolkerWessels N.V. solved these and other challenges in close cooperation with the Wirtgen Group's subsidiary in the Netherlands and experts from Vögele in Ludwigshafen. Learn more about the project in RoadNews 10.



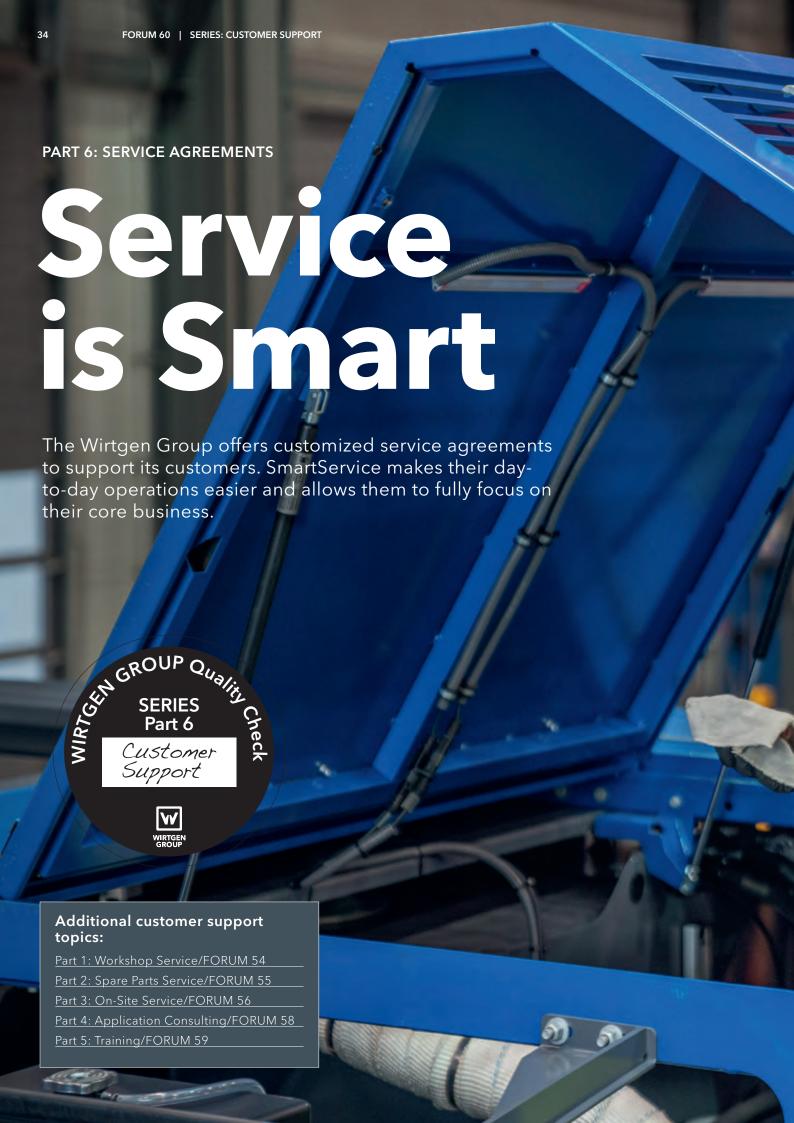
Formula 1 in the Algarve

Portimão, Portugal. For its first appearance in the Formula 1 racing world, the organizers gave the Autódromo Internacional do Algarve, built in 2008, a new look and the 4.635 km circuit a new asphalt surface. The contractors relied on tried-and-tested Wirtgen Group machines for the paving and compaction operations, as they reliably meet the extremely high standards of quality required on race tracks.

High Voltage in the Rain

Istanbul, Turkey. Just in time for the start of the Turkish Grand Prix, Wirtgen and Vögele machines rehabilitated the Intercity Istanbul Park race track. The rehabilitation of the 5.3 km long circuit was carried out using Wirtgen's latest generation of cold milling machines, the W 200 F, SUPER 1900-3 pavers, and high-performance MT 3000-2 Offset mobile feeders. In just two weeks, the project team paved around 11,000 tons of asphalt, getting one of the world's most demanding race tracks ready for action. The combination of fresh asphalt mixed with heavy rain proved extremely challenging for the drivers.









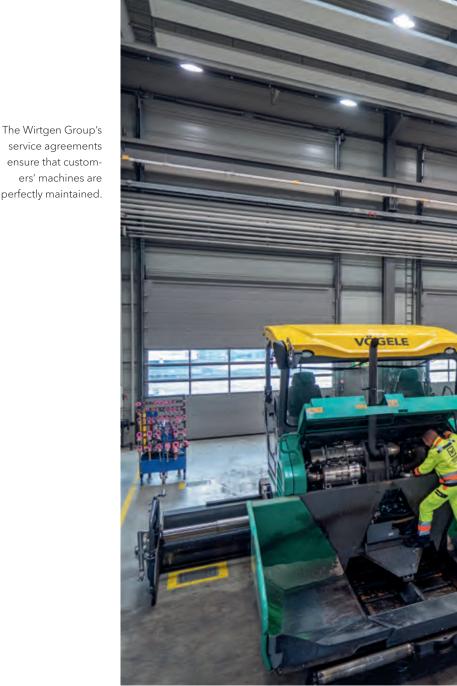
t's Monday morning at 8 a.m. in Bamberg. The telephone rings in the office of the road construction company Meier.

A friendly Wirtgen Group employee is on the line, calling to schedule the upcoming 500-hour maintenance for the company's paver under its SmartService agreement. As a partner to the construction industry, the Wirtgen Group knows what it takes to best make its customers' lives easier.

The complete range of maintenance activities, including the necessary administrative and organizational work, is carried out automatically by the relevant sales and service subsidiaries and dealers of the Wirtgen Group, including without requiring the customer to lift a finger, if so desired. This ensures that no inspection is overlooked or forgotten. Since different requirements call for different approaches, the SmartService service agreements have a modular structure and are therefore tailored to the specific needs of the respective customer. In selected countries, for example, the WITOS FleetView fleet management system can be added to the service package as an additional option. This allows contractors to keep track of the condition of their fleet of machines at all times. Faster response times in the event of malfunctions as well as more efficient scheduling of service calls are the positive result, which can minimize down time, among other benefits.



Wirtgen Group machines and systems with a full service history will retain their high value.

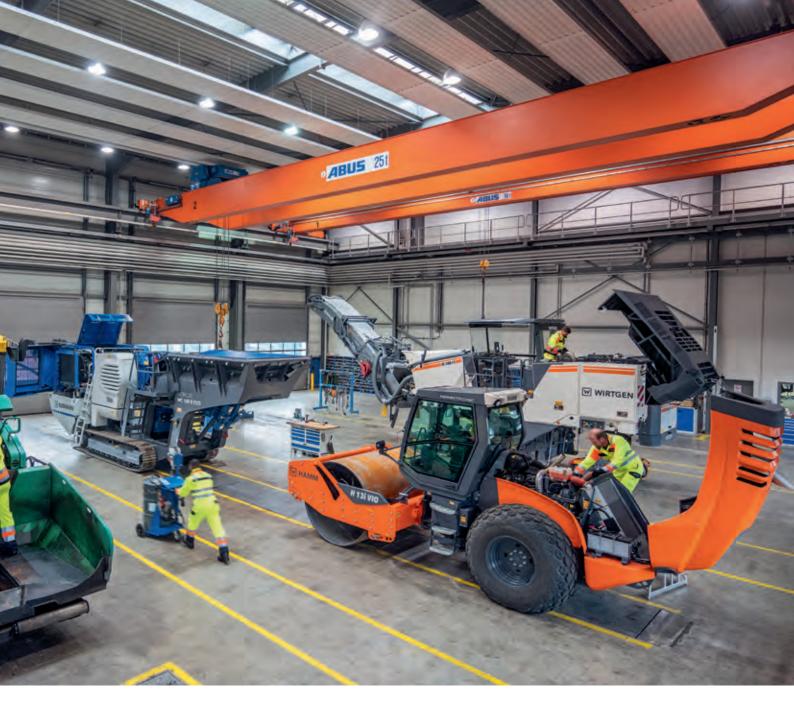


Comprehensive Range of Services with the SmartService Service Agreements

In the meantime, the paver from Meier Road Construction has arrived at the Wirtgen Group's workshop. Encompassing a comprehensive range of services, SmartService covers all the key points necessary to ensure that the machine enjoys a long service life. In addition to professional maintenance by specially trained workshop staff, SmartService's comprehensive range of services also includes extensive visual inspections and wear inspections as well as technical checks and safety updates. And the best part is that customers of the Wirtgen Group don't have to worry about a thing.

Increased Cost-Effectiveness Thanks to Regular Maintenance Intervals

Nearly done. The workshop employees continue to work at full speed. Fast but meticulous is the name of the game here.



Cost-effectiveness is one of the issues that matter to companies. So it's a good thing that the Wirtgen Group's service agreements pay off. Regular maintenance increases the profitability of the machines and reduces operating costs. Regularly updating the machine's software helps keep performance levels constant, and the service costs can be calculated on a fixed basis, which allows the Wirtgen Group's customers to plan with a high degree of certainty. But minimizing downtime is also an advantage of Smart-Service. After all, the continuous maintenance intervals also help keep unplanned downtime to a minimum. The use of original spare parts also extends the service life of the machines. In addition to regular maintenance intervals, efficient machine control and detailed documentation of all service activities ensure that the machines retain their value as effectively as possible, thereby increasing their resale value. And what about the machine operators? In the end, everyone knows what it feels like to pick up their car

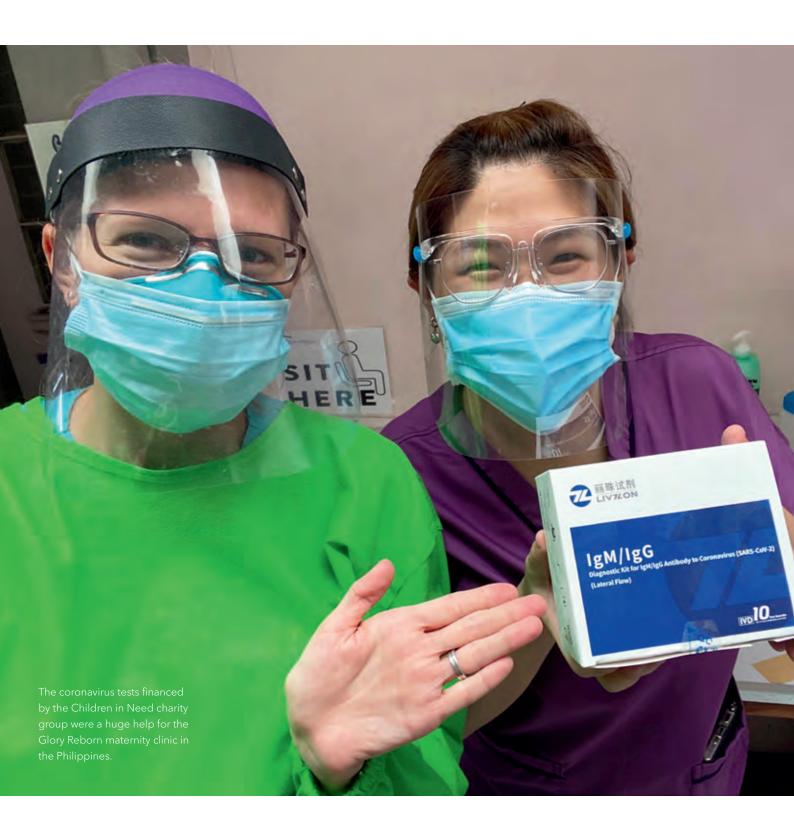
from the shop after an inspection. Everything feels as good as new – and it's the same with construction machinery. The operator's appreciation for the machine entrusted to them increases, as does their confidence in the technology. Everything has been thoroughly checked by experts, the software is up to date, and the wearing parts have been replaced, if necessary. In other words, the Wirtgen Group's SmartService also makes operators happy. And being able to talk shop with the workshop technicians is the icing on the cake.

Success! The only thing left is to document the maintenance work in the SmartService service booklet and the paver is ready for the next job site.

CORONAVIRUS PANDEMIC

Help for the Poorest of Us

The coronavirus pandemic has transformed our society. The global lockdowns led to previously unimagined shifts in social and economic life in most countries around the world.



hile the countries of the Global North have often been able to mitigate the effects of the coronavirus through government assistance, the crisis has hit the Global South particularly hard.

Our more than 50 aid projects in our focal countries of India, Brazil, and the Philippines have also been severely affected. Many parents of our students used to keep their families afloat by working as day laborers, street vendors, or domestic workers. The shelter-in-place orders left them without income from one day to the next. Since they don't have any savings either, countless families have had to fight for bare survival since then. It's also impossible to maintain the hygiene standards to slow the spread of the virus in the slums due to limited space and lack of water supply. The already fragile healthcare systems in these areas quickly reached their limits.

Dedicated Local Project Partners

Our Children in Need charity group has the good fortune of being able to work with long-standing, reliable, and highly dedicated local project partners. In recent months, they have repeatedly found ways to use our donations to help the families most severely affected - whether through food packages or medical aid. In the meantime, many educational institutions that are funding have been able to resume their work - but not in the form of in-person classroom instruction. But distance learning is a major challenge for our aid projects. We need to find new ways to reach the children from poor families because they lack access to computers and the Internet.

The last few months have clearly demonstrated how dependent we all are on each other as a



The food packages provided on a regular basis by Children in Need protect the families in India from the worst hardships.

result of the globalized economy - making us all the more aware of our responsibility to help children and their families in countries particularly affected by COVID-19 overcome this crisis. We are doing our best and helping where we can. We kindly ask you to show your solidarity by making a donation.



Best wishes,

The "Children in Need" Charity Group Gisela Wirtgen

(Chair)

HE "CHILDREN IN NEED" CHARITY GROUP

YOU CAN ALSO HELP CHILDREN IN NEED!

Our projects are designed to help over the long term. Every cent brings us one step closer to our goal!

Accounts for Donations

Sparkasse Neuwied

Account number: 012 022 752 Routing number: 574 501 20 IBAN: DE87 5745 0120 0012 0227 52

SWIFT-BIC: MALADE51NWD

Raiffeisenbank Neustadt e.G.

IBAN: DE16 5706 9238 0100 0527 24

BIC: GENODED1ASN

The Charity Group

was founded in 1983 on the initiative of Gisela Wirtgen, operates on a voluntary and charitable basis for children in need based on the idea of "helping people help themselves," is not affiliated with any political party or religious denomination, and carries out aid projects in the Philippines, India, and Brazil.

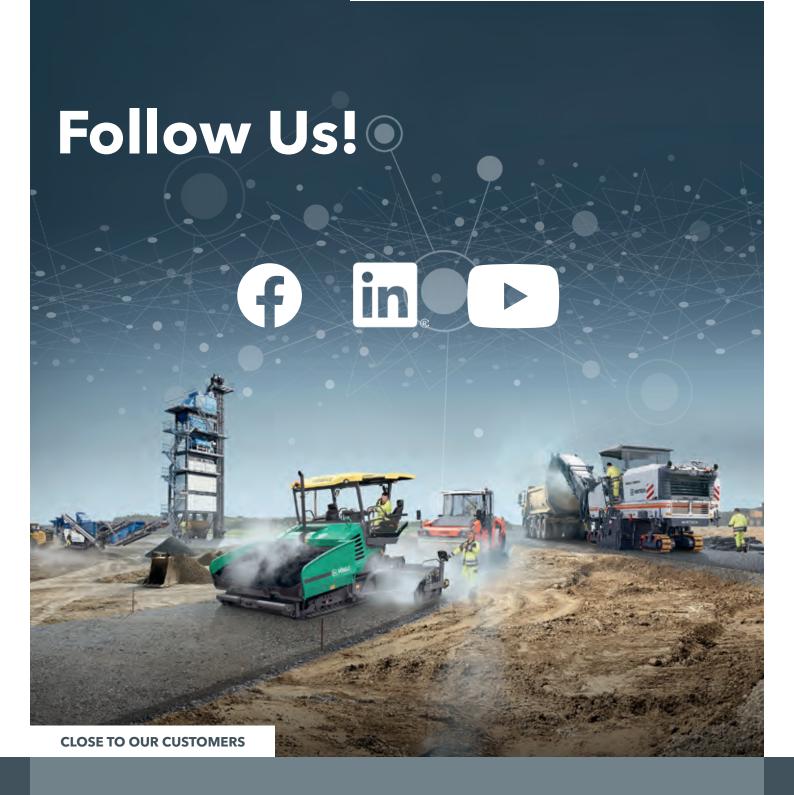
Further Information



www.kinder-in-not.de







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