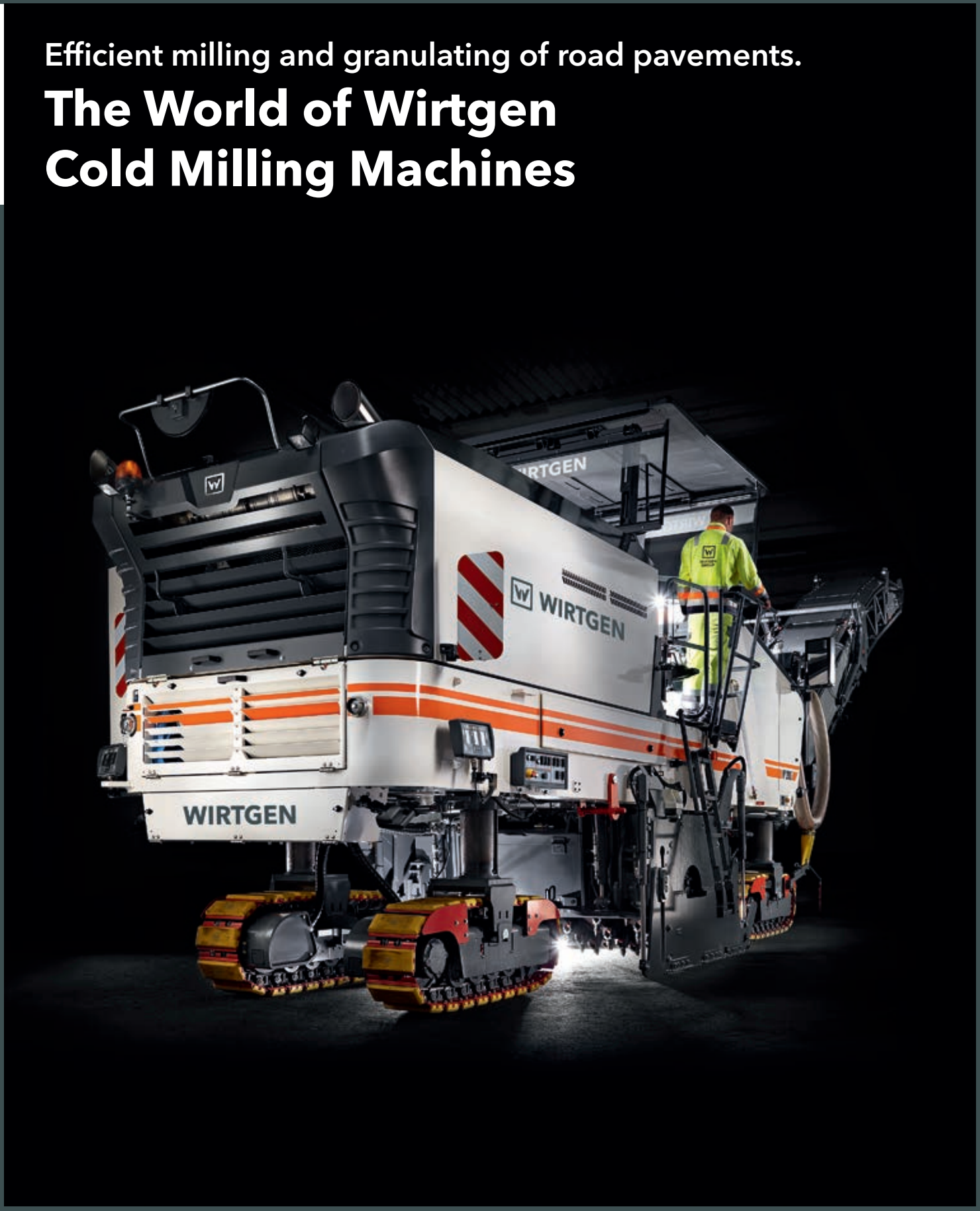
A WIRTGEN GROUP COMPANY

WIRTGEN

Efficient milling and granulating of road pavements.

The World of Wirtgen Cold Milling Machines



Cutting-edge technology for better roads.

THE STATE-OF-THE-ART MILLING TECHNOLOGY MEETS ALL REQUIREMENTS WHEN IT COMES TO THE ECONOMICALLY EFFICIENT AND ENVIRONMENTALLY FRIENDLY REHABILITATION OF ROAD PAVEMENTS. OUR VISION TO REHABILITATE PAVEMENTS QUICKLY AND EFFICIENTLY BY MEANS OF THE INNOVATIVE MILLING PROCESS HERALDED THE ERA OF THE COLD MILLING TECHNOLOGY. SINCE THAT TIME, WIRTGEN HAS BEEN CONSIDERED THE GLOBAL MARKET LEADER IN THIS MULTI-FACETED SEGMENT. FASCINATED BY THE INFINITE POSSIBILITIES IT OFFERS, WE ARE PRESSING AHEAD WITH THE CONTINUOUS DEVELOPMENT OF THIS METHOD SO THAT OUR INNOVATIVE SOLUTIONS WILL CONTINUE TO VITALIZE THE ROAD NETWORK IN THE YEARS TO COME.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CONTENTS

1 | *Reclaimed asphalt pavement is generally reused as a valuable recycling material.*

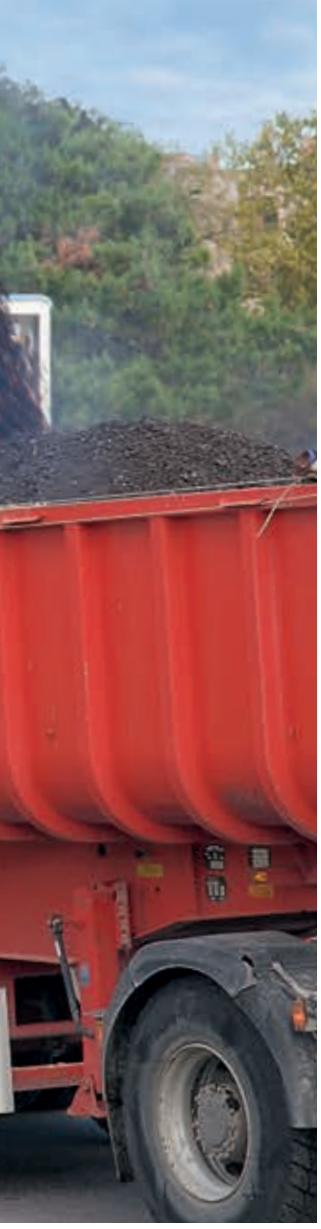
Keeping road traffic on the move by means of cold milling

AN EFFICIENT PROCESS

Cold milling machines are used for the quick, highly efficient removal of asphalt and concrete pavements. In doing so, they create an even, true-to-profile base for the construction of new surface courses of uniform layer thickness. For the quality of the surface produced by milling has an influence not only on the quality of the new surface courses and their performance but also on the economically efficient completion of the subsequent construction work. In addition, milling individual pavement layers enables the material to be reclaimed in a selective process and separated into the different mix types.

The cold milling process differentiates between pavement maintenance (minor interventions aiming at structural maintenance), pavement rehabilitation (major interventions aiming at both structural maintenance and the improvement of surface properties), as well as full pavement reconstruction.

As the market leader in cold milling, WIRTGEN has been the key driver of numerous innovations and pioneering technologies. Today, WIRTGEN offers by far the most comprehensive product portfolio in the industry.



2 |

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2 | *Cold milling machines remove pavements either at full depth or in individual, thin pavement layers.*

3 | *Cold milling is a multi-faceted technology applied worldwide and is unrivalled in terms of economic efficiency and environmental sustainability.*

From milling contractor to world market leader

1971

The first prototype of a hot milling machine succeeds in milling off damaged asphalt layers.

1979

The 3800 C is the first cold milling machine, a rear loader with hydraulic milling drum drive.

1984

The 2000 VC is the first front loader, making a deep and lasting impact on site logistics.

1988

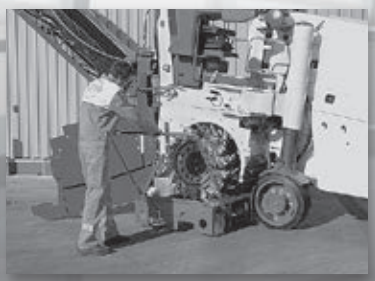
The range of applications is broadened considerably by the DC model range offering working depths of up to 300 mm.

1999

The W 2000 large milling machine sets new standards in state-of-the-art cold milling.

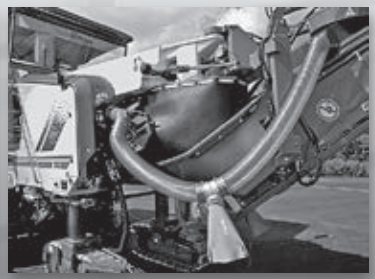
2001

Machine flexibility is enhanced significantly by the FCS quick-change system for milling drums.



2009

The VCS extraction system reduces dust emissions during operation.



2010

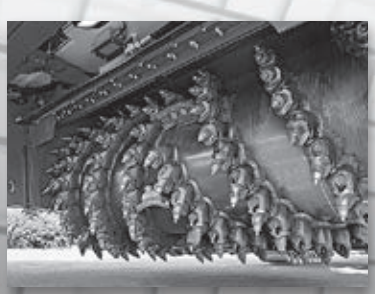
The new generation of large milling machines from W 200 to W 250 sets new standards in milling performance.

1980

The 500 C is the first half-metre cold milling machine, offering a milling depth of up to 100 mm.

1992

The first bolted toolholder system significantly increases the operational availability of the cold milling machines.



2005

The LEVEL PRO levelling technology developed by WIRTGEN adds ultra-precision to the cold milling process.

2015

W 50 Ri and W 100 CFi represent the new, highly effective operating concept implemented in the small milling machines.

INNOVATIVE MILESTONES

The perfectly engineered cold milling machines of today need mere minutes to load a 30-tonne truck with granulated asphalt material. It has been a long journey to get there, however, and WIRTGEN has been a key driver in enabling these advances to be made.

In 1971, WIRTGEN built the first of a total of 100 hot milling machines for the contracting fleet it owned at that time. The technological leap from hot milling to cold milling was sparked, in 1979, by the use of carbide-tipped point-attack cutting tools that were commonly used in the mining industry.

From the very first cornerstone – developing the cold milling technology for road construction – to date, WIRTGEN has paved the road to success of this technology with numerous innovative milestones. Today, the WIRTGEN name is synonymous worldwide with high-performance cold milling technology.

Operating principle of a cold milling machine in rear-loading design

1 | CONVEYOR SYSTEM

Slewing and height-adjustable conveyor for continuous loading of the milled material.

2 | OPERATOR'S PLATFORM WITH MULTIFUNCTIONAL ARMREST

Ergonomically designed operator's platform for non-tiring, productive working.

7 | PIVOTING MECHANISM

The right-hand rear wheel can be pivoted in for flush-to-kerb milling along obstacles.

LOADING THE MILLED MATERIAL TOWARDS THE REAR

Small milling machines are equipped with wheel units and a milling drum arranged at the rear of the machine. A slewing conveyor is also arranged at the rear of the machine, accepting the asphalt material granulated by the rotating milling drum and discharging it directly onto waiting trucks. This is why small milling machines are also called rear loaders. The compact rear loaders have been designed for one-man operation. In addition, they are usually extremely manoeuvrable machines, and their right-hand rear wheel can be pivoted in front of the milling drum. Engine performance in this machine class ranges from approx. 40 kW/55 PS to approx. 160 kW/220 PS.

3 | MECHANICAL MILLING DRUM DRIVE

Highly efficient mechanical milling drum drive.

4 | ENGINE STATION

Fuel-efficient, high-powered diesel engine for high milling performance.

6 | MILLING DRUM

Milling drums of different widths and variable tool spacings for a wide range of applications.

5 | WHEEL UNITS

Three or four wheels with large steering lock at the front to allow small turning radii.

Operating principle of a cold milling machine in front-loading design

2 | DUAL OPERATOR'S PLATFORM

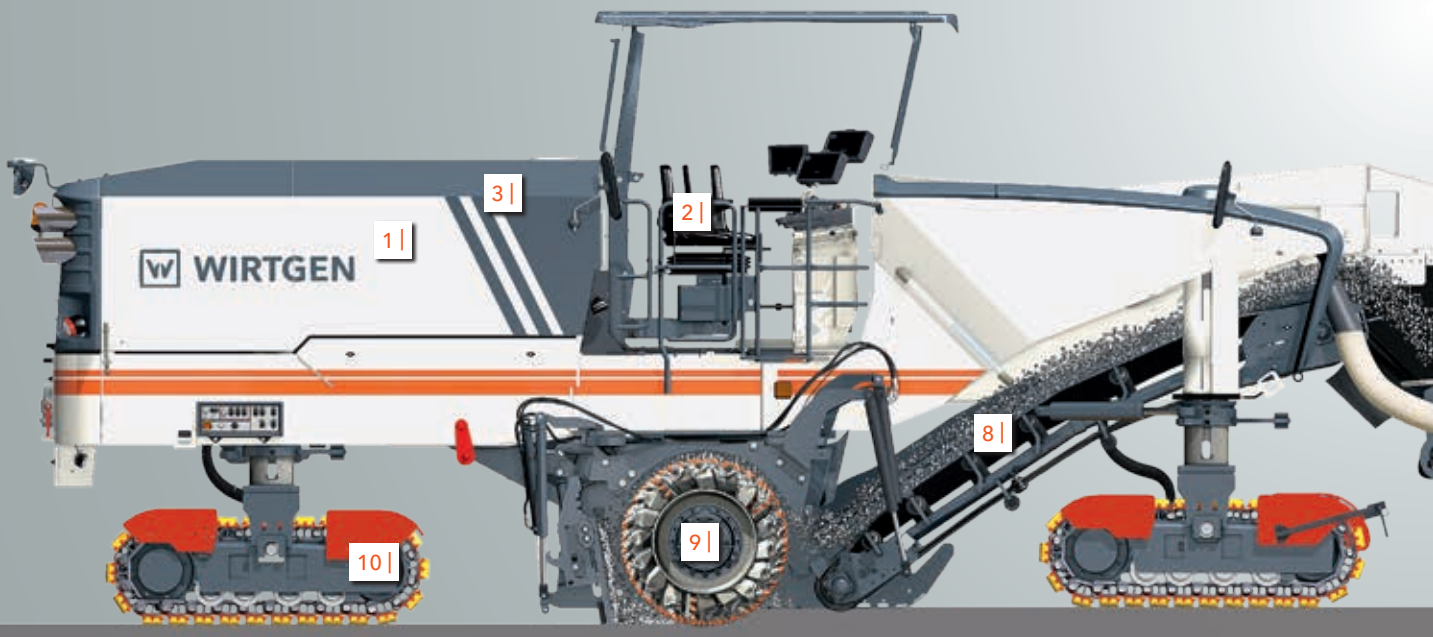
Spacious, ergonomically designed operator's platform with two identical workplaces for non-tiring, productive working.

3 | MECHANICAL MILLING DRUM DRIVE

Highly efficient mechanical milling drum drive.

1 | ENGINE / DUAL ENGINE

Fuel-efficient, high-powered diesel engine for high milling performance.



10 | TRACK UNITS

Hydraulically steerable and height-adjustable track units for precise adjustment of the milling depth and precise machine manoeuvring.

9 | MILLING DRUM

Milling drums offering working widths of up to 4.4 m and variable tool spacings for a wide range of applications.

LOADING THE MILLED MATERIAL TOWARDS THE FRONT

Large milling machines are designed with a milling drum arranged in the centre of the machine and a forward-loading two-stage conveyor system. They are therefore called front loaders. The powerful, slewing and height-adjustable discharge conveyor enables large trucks to be loaded quickly and with maximum flexibility. Front loaders are usually equipped with a walk-through operator's platform offering a high level of operator comfort. Alternatively, they are supplied with a hydraulically moving and swivelling operator's cabin. Numerous intelligent automated features support the operator in performing his job. Front loaders are equipped with four hydraulically steerable and height-adjustable track units. Engine performance in this machine class ranges from approx. 200 kW/270 PS to approx. 750 kW/1,000 PS.

4 | MATERIAL TRANSFER

Effectively sealed material transfer zone from primary to discharge conveyor.

5 | CONVEYOR BELT SPEED

Continuously adjustable conveying speed to alter the discharge pattern and ensure that trucks are loaded to full capacity.

6 | DISCHARGE CONVEYOR

Slewing and height-adjustable discharge conveyor for continuous loading of the milled material onto trucks.

8 | PRIMARY CONVEYOR

The primary conveyor accepts the milled material from the milling chamber.

7 | VACUUM CUTTING SYSTEM

The Vacuum Cutting System extracts fine material particles in the area of the milling drum housing.

WORKING DIRECTION

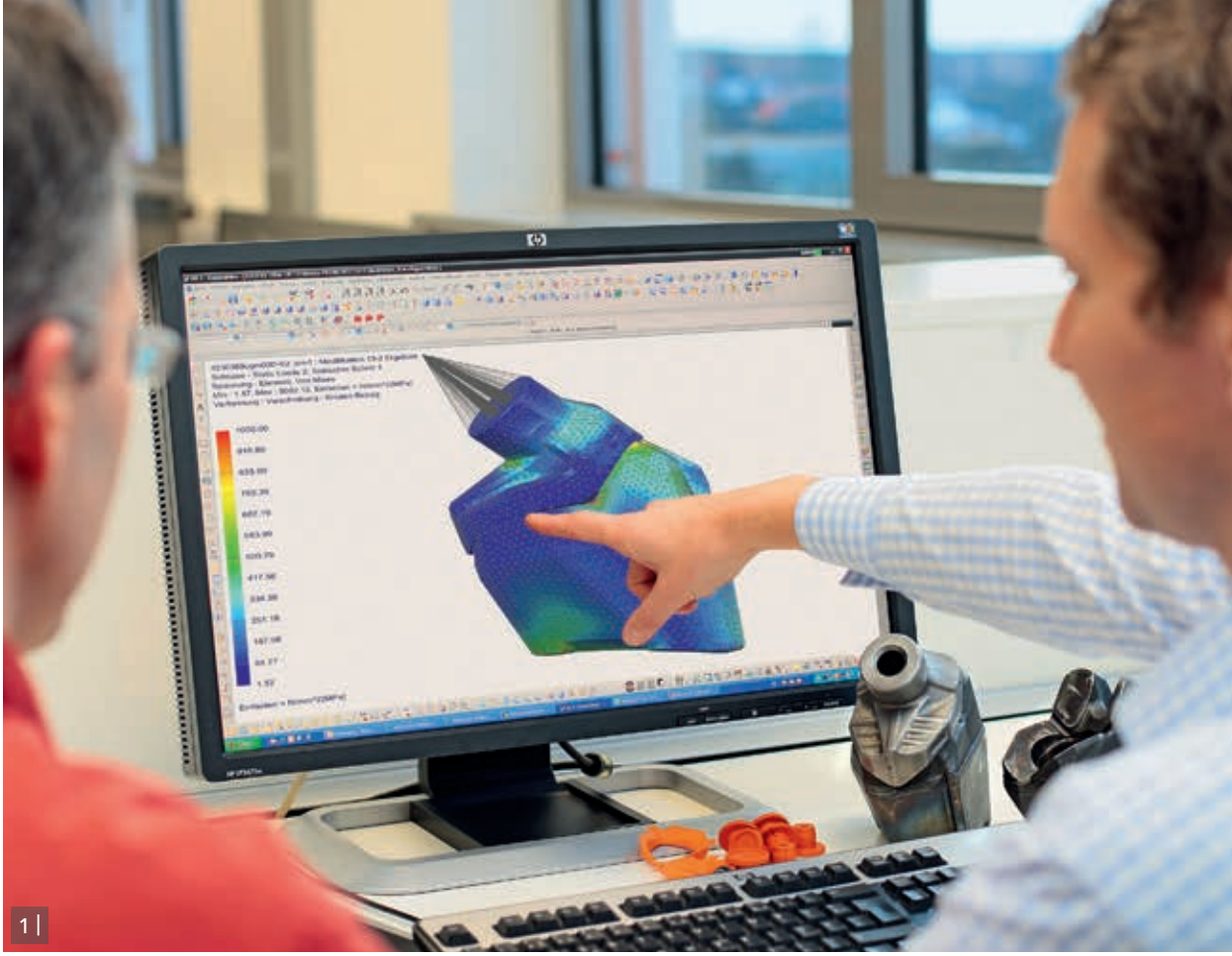
Wirtgen's core expertise: cutting technology

HIGH-TECH IN ASPHALT

Perfect interaction between the milling drum, toolholders and point-attack cutting tools is a prerequisite for the highly precise, efficient removal of road pavements. WIRTGEN is the market leader in cutting technology, offering customers perfectly matched, highly powerful cutting systems. In addition, WIRTGEN is continuously improving the components that are part of the cutting technology. Field experience and customer feedback are important factors feeding directly into the development process.

The cutting tools, which are subject to extremely high levels of stress and strain, offer highest resistance to wear and tear, thus providing increased milling performance and extended tool replacement intervals. The robust HT22 quick-change toolholder system minimizes breaks in operation and increases the lifespan of the entire milling drum. This is possible thanks to the use of high-quality materials, wear-optimized design and easy replacement of wearing parts. The highly effective milling drums and toolholders selected and arranged to precisely cater to the specific applications ensure outstanding milling performance and a perfect milling pattern.

WIRTGEN milling drum units combine the expertise gained in over fifty years with forward-thinking technologies.

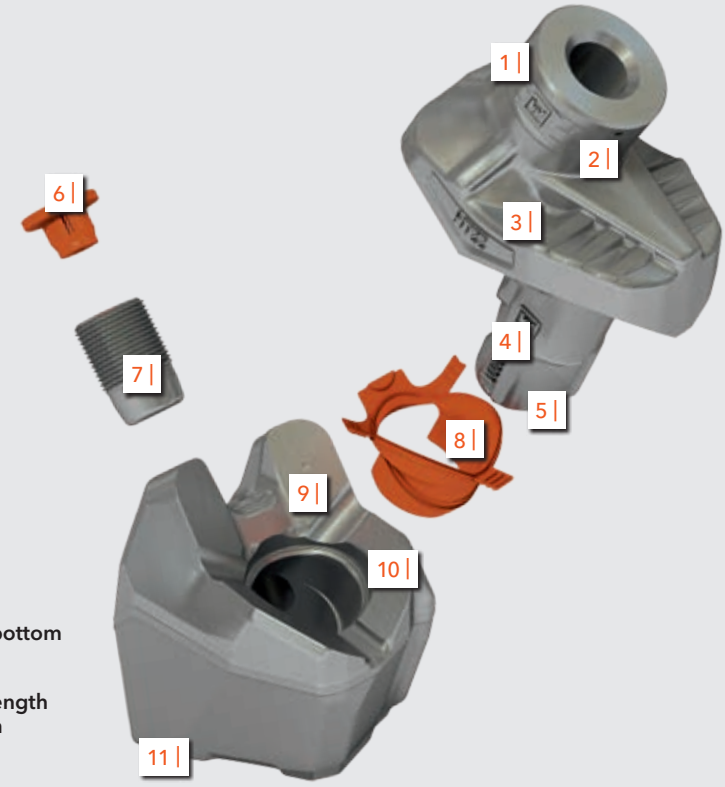


1 | *The design of the extremely hard-wearing cutting tools is optimized by means of intelligent methods such as the finite element model.*

2 | *HT22 quick-change toolholder system in detail.*

2 |

1 | Extremely large maximum wear distance
2 | Wear markers at 5 mm intervals
3 | High wear volume
4 | Optimized shank angle geometry for high component strength
5 | Large shank cross-section for significantly higher fracture strength
6 | Protective plug prevents soiling of bolt head
7 | Heavy-duty retaining bolt
8 | Seal between upper part and bottom part to allow simple insertion / removal of upper part
9 | Upper part covers bottom part completely for full protection of bottom part
10 | Extra large contact surface between upper part and bottom part for extended bottom part life
11 | Optimized welded connection offering increased strength and simultaneous flexibility for optimum tool rotation



LEVEL PRO / LEVEL PRO PLUS is synonymous with perfect levelling quality at high operating speeds.

Wirtgen's core expertise: levelling technology

SYSTEMS DEVELOPED ENTIRELY IN-HOUSE

In cold milling, it is crucial to remove pavements to the specified depth. The intuitive WIRTGEN LEVEL PRO / LEVEL PRO PLUS levelling technology can be relied on to precisely maintain the preset milling depth. The high-tech system includes software programmed specifically for cold milling machines and is fully integrated into the machine's overall management system. LEVEL PRO / LEVEL PRO PLUS continuously reconciles the actual milling depth with the preset target value. Any deviations detected by the system are levelled out dynamically by means of proportional control. The actual milling depth is determined by means of optical or mechanical sensors scanning a reference surface.

The levelling system developed by WIRTGEN can not only be operated with different types of sensors but also enables extra options to be added in accordance with requirements, such as the Multiplex system, laser levelling, or 3D levelling which uses the interface included in the system.

1 |

2 |

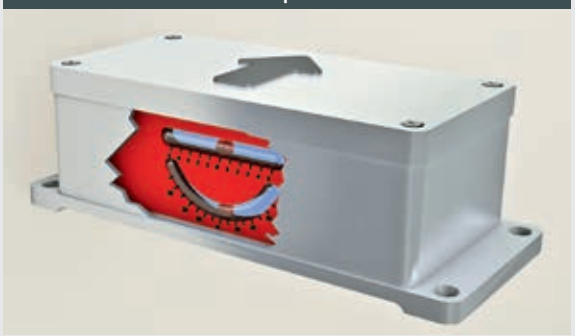
1 – 2 | *Operation of the LEVEL PRO / LEVEL PRO PLUS system is simple and self-explanatory.*

3 | *Overview of the scanning equipment included in LEVEL PRO / LEVEL PRO PLUS.*

3 |

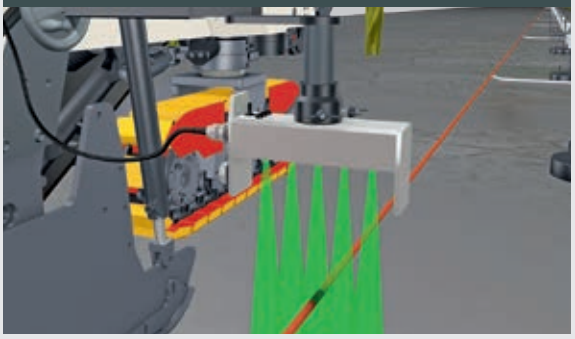
Hydraulic cylinder sensor

Cross slope sensor



Ultrasonic sensor

Sonic ski sensor



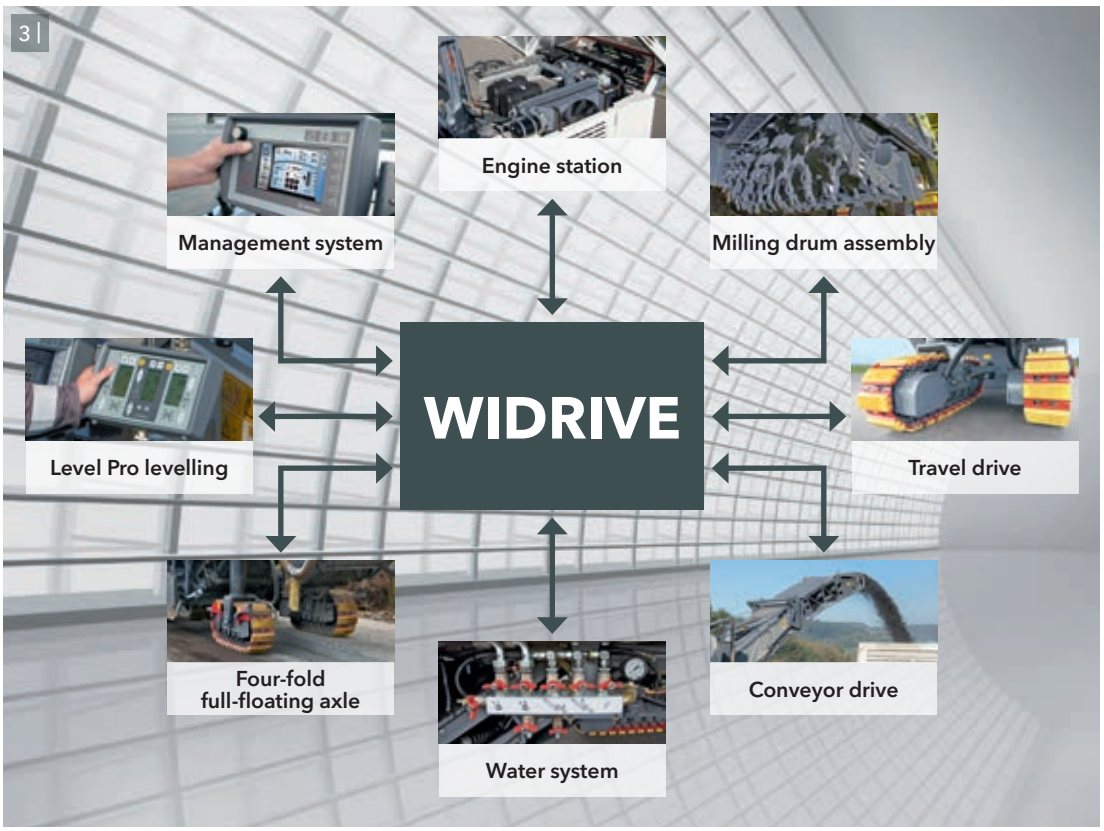
The machine operator is supported by intelligent computer-controlled features.

Wirtgen's core expertise: machine control

PRODUCTIVE INTELLIGENCE

State-of-the-art cold milling machines are highly effective pieces of construction equipment, and high milling performance is the major key to their success. To minimize the number of manual interventions in the milling process, the machine operator is supported by intelligent, computer-controlled automated features. When operating WIRTGEN high-performance cold milling machines, for example, the operator is assisted by the proprietary, fully integrated WIDRIVE machine management concept.

WIDRIVE acts as the machine's control centre. It integrates and controls all important machine functions, such as diesel engine, traction drive, milling drum drive, conveyor drive, water spray system, height adjustment, steering, levelling and milling drum unit. The machine's high performance potential is fully utilized at the same time, taking into account environmental aspects, high milling performance and low operating costs.



1 | *The multifunctional control screen developed for large milling machines provides a clear overview of job data, operating parameters and maintenance diagnostics.*

2 | *The small and compact milling machines feature a multifunctional armrest combining all controls required for the highly automated milling process.*

3 | *The perfectly engineered WIDRIVE machine management system increases productivity.*

JUST THE RIGHT SOLUTION FOR EACH TYPE OF JOB

WIRTGEN offers by far the most comprehensive portfolio of cold milling machines worldwide. The standard range covers milling widths from 14 mm to 4.4 m. The choice of machines ranges from the exceedingly compact W 35 Ri – which is also suitable for indoor use – all the way to the W 250i which completes large-scale projects on motorways or airports in record time.

Our product portfolio caters to all requirements. It offers the made-to-measure, technically superior solution for all types of customer-specific applications. Additional milling drums, the integrable VCS dust extraction system, the hydraulically moving and swivelling operator's cabin (OCS) – to name just a few options: customers can generally choose from a multitude of equipment features for their cold milling machine, enabling them to achieve maximum performance even when having to deal with complex site conditions.

Most comprehensive machine portfolio worldwide.


W 35 DC


W 35 Ri


W 50


W 50 H


W 50 R


W 50 Ri


W 60 R


W 60 Ri


W 100


W 100 R


W 100 Ri


W 120 R


W 120 Ri


W 100 H


W 130 H


W 100 CF


W 100 CFi


W 120 CF


W 120 CFi


W 130 CF


W 130 CFi


W 150 CF


W 150 CFi


W 1900


W 2000


W 200


W 200i


W 200 Hi


W 210


W 210i


W 220


W 250i

Unrivalled expertise in manufacturing

HIGH QUALITY GUARANTEED

At the main production plant in Windhagen, the machines are built to high quality standards for maximum machine performance. State-of-the-art production technology and experienced, highly motivated staff are the hallmarks of our high-quality manufacturing processes. Unrivalled know-how – especially in WIRTGEN's fields of core expertise – is the recipe of success ensuring the production of robust, highly durable machines.

Both small and large cold milling machines are assembled using cyclic production processes. Optimized assembly lines ensure consistently high quality and short lead times.

1 | *Our high degree of vertical integration is a vital key to the quick and flexible production of electrical modules.*

2 | *Series production of our machines ensures consistent quality.*

Full-scale customer service around the globe

HIGH-LEVEL AFTER-SALES SERVICE

In line with our entirely customer-driven philosophy, we have created a comprehensive global service infrastructure: an extensive network of professional local sales and service partners provides assistance to our customers in all parts of the world.

Our subsidiaries can be relied on to support customers around the globe with spare parts and customer services. Our highly qualified and fully equipped service engineers are on location quickly to provide active support, however remote the job site. In addition, excellently stocked parts inventories ensure that our tried-and-tested original spare parts are available in sufficient quantities whenever needed.

Our service engineers provide "just-in-time" support around the globe.

1 | *Milling on the steep slope of a water reservoir.*

2 | *Milling operation in a building with low ceiling height and a floor of limited bearing capacity.*

Versatile, efficient range of applications

FLEXIBILITY IN OPERATION

Based on our unparalleled experience and expertise in milling technology, we at WIRTGEN are continuously broadening the range of applications of our cold milling machines. As the leader in innovation, WIRTGEN can be relied on to always provide answers to challenging application requirements, frequently cooperating with customers to develop productive solutions in line with field requirements.

Different types of milling drums – such as the ECO cutter or fine milling drum – enable a wide variety of milling operations in asphalt rehabilitation. In addition, cold milling machines can be equipped with special features making them suitable for operations in concrete or rock. Examples of use in rock operations include levelling foundations, lowering track beds or lowering tunnel floors. Other special modifications enable the machines to be used for milling the steep slopes of artificial lakes, canals or balancing reservoirs at slope angles of up to 35 degrees. Cold milling machines are frequently also used to cut slots and grooves or produce trenches in pipeline construction. In short: our machines offer a tremendous range of applications.

3 | *Removing surface deformations by means of fine milling.*

4 | *Milling off a concrete surface on company premises.*

5 | *Removing road markings.*

6 | *Precise milling around road fixtures without the need for additional manual reworking.*

7 | *Milling off the surface of a cinder football pitch.*

1 | *The W 200 Hi with hydraulically movable milling drum is selling particularly well in Japan.*

2 | *The 3.8-m wide milling drum unit caters to the large road widths typical for the USA.*

Cold milling machines meeting specific market requirements

ENGINEERING EXPERTISE FOR MARKET-DRIVEN INNOVATIONS

Each market is unique in that it has its own, very specific needs. To cater to these needs with customized products and solutions, WIRTGEN offers a comprehensive range of products: the portfolio of cold milling machines includes a multitude of models which fully meet the various market-specific requirements. And WIRTGEN's high level of customer-driven engineering expertise guarantees innovations in line with market demands.

WIRTGEN realizes economically viable, cutting-edge solutions catering not only to road widths, maximum transport weights or maximum emission levels permissible under applicable law but also to regional climates and infrastructure.

In Japan, for example, road lanes frequently need to be milled off flush to kerb on both sides without the cold milling machine performing any turning manoeuvres. The W 200 Hi is the ideal choice for this job as it offers two zero-clearance sides. In addition, the W 200 Hi features state-of-the-art engine technology to comply with the stringent specifications of emission standard US Tier 4f applicable in Japan.

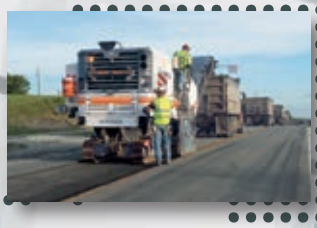
3 | *Using laser or 3D control in the milling process complies with the high standards that are applicable in Western Europe.*

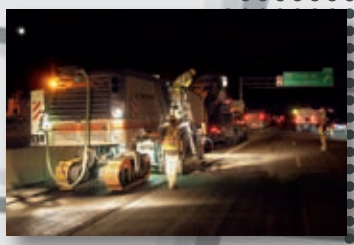
4 | *Very successful in China: the tried-and-tested W 35 DC and W 2000 models.*

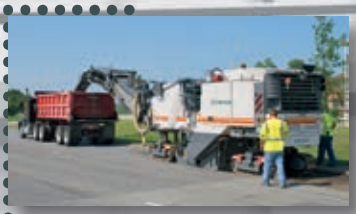
5 | *The W 50 H and W 100 H have been redesigned from the ground up to cater to the requirements of countries across Asia.*

6 | *The compact, wheel-mounted W 130 F has been tailored to the Indian market.*

On the road of success in over 100 countries

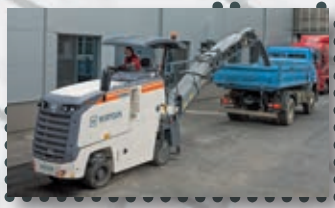


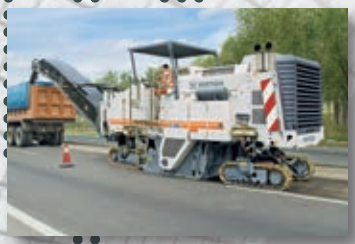




COLD MILLING IS A MULTI-FACETED TECHNOLOGY APPLIED AROUND THE GLOBE

Cold milling is a perfectly engineered construction method and is used on a global scale. In many countries, worn-out pavement layers of existing road networks are renewed at regular intervals. Cold milling machines are the prime choice for removing individual pavement layers to pinpoint precision. They are powerful, cost-efficient performers creating a true-to-profile base for the subsequent paving of new pavement layers. WIRTGEN is the world market leader in cold milling.





SIGNIFICANT REDUCTION OF EMISSIONS

WIRTGEN is very strongly committed to actively protecting both the environment and natural resources. Reclaimed asphalt pavement is a valuable recycling material that is fully reused in the production of asphalt mixes. Large milling machines featuring the Dual Engine Concept enable the second engine to be switched off in accordance with job requirements to save fuel and reduce exhaust emissions. Needless to say that our fuel-efficient diesel engines comply with current international exhaust emission standards. The WIDRIVE machine management system, which relieves the operator of a significant part of his workload, offers numerous automated features to ensure a fuel-efficient and low-emission milling process.

The highly effective VCS Vacuum Cutting System developed for large milling machines reduces dust emissions and improves the air quality in the surroundings of the milling drum housing. Effective soundproofing and the anti-vibration mounted engine ensure low noise and vibration levels.

Environmentally friendly machine technology.

WIRTGEN

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