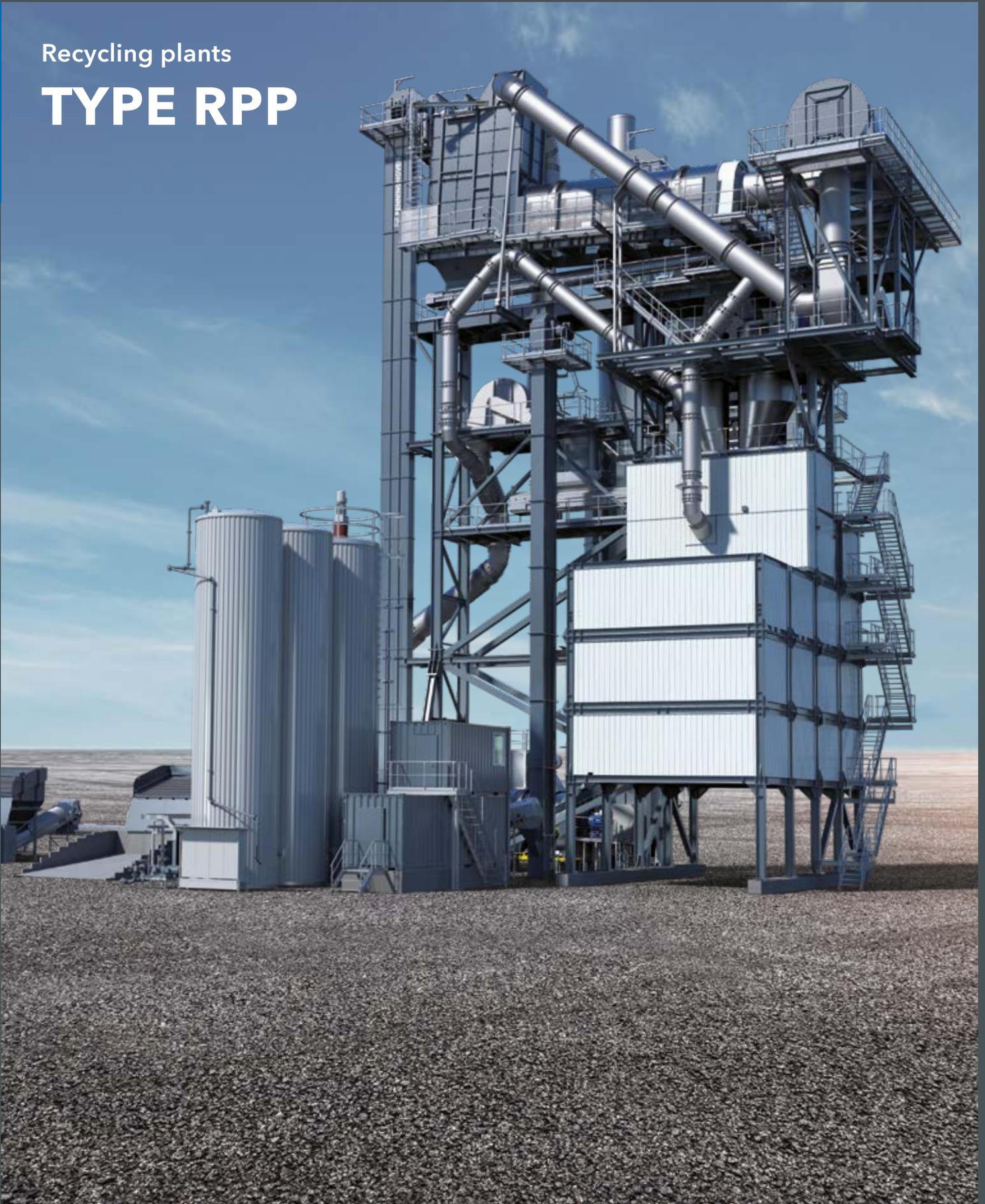




Recycling plants

TYPE RPP



IT'S ALL IN THE MIX.

Leading asphalt mixing plant technology.

State of the art! BENNINGHOVEN has been following this approach for over a century. Through consistent further development, growing from a trade workshop to a globally active company, BENNINGHOVEN is a pacesetter in the field of asphalt mixing plants today. The opening of the world's most modern factory for asphalt mixing plants in summer 2018 was another milestone in our successful history. This allows us to offer our customers the best possible solutions when it comes to producing the highest quality asphalt in an economical process.

BENNINGHOVEN is part of the expanding, worldwide active WIRTGEN GROUP which has been part of John Deere since late 2017.

BENNINGHOVEN PRODUCT RANGE

ECO
Asphalt mixing plant
"The multi-talent"

TBA
Asphalt mixing plant
"The specialist"

RPP
Recycling plant
"The sustainable one"

**RETROFIT
SOLUTIONS**

THE SUSTAINABLE ONE

Asphalt mixing plant for maximum recycling



RPP plants are the specialist for recycling in the BENNINGHOVEN product range.

An asphalt mixing plant has to be designed such that all substances are available in the correct quantities, with the correct temperature, at the right time and at the defined location. In addition to this, the processes have to be safe, economical and environmentally friendly.

The powerful RPP plants feature unlimited equipment options and a vast production capacity with optimum asphaltic mixture quality. They are always planned as a location concept and individually tailored to the customer's economic requirements.

RPP enables customers to secure the market and dominate it over many years.

RPP plants are equipped with "RECYCLING+" and impress with the maximum recycling addition rate of up to 100 %. With low emissions, the plant makes an effective contribution to energy efficiency, economic efficiency and active environmental protection.



THE HIGHLIGHTS

Perfectly positioned.

> Recycling*

- > Up to 100 % recycling addition rate achievable
- > Output of the RAP plant 180 t/h, 220 t/h
- > Parallel drum or recycling drum with hot gas generator

> Environmentally friendly

- > Low environmental impact (emissions)
- > Low energy consumption of the plant

> High-tech plant power

- > Wide range of mixing capacities 320 - 400 t/h
- > Hot bin section capacity 80 - 320 t in up to 14 bins
- > Mixed material storage silo capacity 325 - 1,100 t in 11 bins
- > RAP silo capacity 40 - 80 t

> Plug & work

- > Location concept with flexible modular system
- > Modular expansion possible
- > Short project implementation periods
- > Short installation periods

> Operator benefit

- > Ergonomics concept
- > Health and safety
- > Maintenance concept

> Sustainable solutions

Eco-friendly asphalt production - carbon-neutral, energy-efficient and economical

- > Reusing asphalt (recycling material)
- > Storing virgin mineral and recycling material correctly
- > Using low-temperature asphalt
- > Electrifying bitumen tanks
- > Using renewable fuels



BENNINGHOVEN SUSTAINABILITY describes innovative technologies and solutions which are consistent with the sustainability objectives of the WIRTGEN GROUP.

RPP RECYCLING TECHNOLOGIES

Economical and environmentally friendly.



BENNINGHOVEN
SUSTAINABILITY

The processing of recycled asphalt is a high priority when it comes to conserving natural resources. This fundamental drive for re-using materials is only one of many.

Country-specific requirements, the reduction of emissions and increased economic efficiency are important points in favour of recycling and environmentally friendly asphalt production, because green asphalt is possible only with the use of recycling materials.

BENNINGHOVEN offers a wide range of products and services in the field of recycling feed systems. The main advantage of these technologies is how they work to combine sustainability and efficiency in a profitable way.

Advantages of using recycling materials

- > Conserving natural resources (mineral/bitumen)
- > Highest possible re-use based on the recycling concept
- > Reducing CO₂ emissions in the entire process chain: Use of RAP material from the environment of the plant, short travel distances, production of mineral (quarrying/breaking) and bitumen (refinery) are no longer required.
- > Proactive reaction to bitumen availability
- > Increased economic efficiency

POSSIBLE ADDITION RATES OF RECYCLING SYSTEMS

Cold recycling

Variable dosing system (cold RAP only)	40 %
Multi-variable dosing system (cold RAP and bulk materials)	40 %

Hot recycling

Parallel drum	70 %
Recycling drum with hot gas generator	100 %



Environmentally friendly production
Saving resources

Improved economic efficiency
thanks to easy retrofitting

Broad range of products
Cold and hot recycling feed systems

INTELLIGENT PLANT DESIGN RPP - RECYCLING PRIORITY PLANT

Clean performance.

The basic principle of RPP plants is that recycling is the top priority. By optimising the material flow, the recycling material takes the straight path through the plant to avoid deflections, which could cause adhesions.

The designation "RPP" asphalt mixing plant stands for Recycling Priority Plant, i.e. a plant that mostly produces asphalt with a high addition rate of recycling material. Recycling is the top priority.

The RPP can be configured with a parallel drum using the parallel flow principle or with a recycling drum using the counterflow principle with a hot gas generator.



BENNINGHOVEN
SUSTAINABILITY

- 01 Recycling drum
- 02 RAP silo
- 03 RAP weigher
- 04 Mixer



BENNINGHOVEN > PROCESS KNOWLEDGE

Comparison of the RPP hot recycling systems

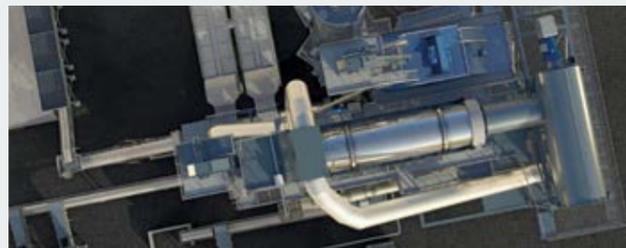
Parallel drum (PD)

- > Parallel-flow principle
- > Direct heating
- > Optimised for the material
- > RAP addition rate of up to 70 %
- > RAP system drying capacity 180 t/h, 220 t/h



Recycling drum with hot gas generator (HG)

- > Counter-flow principle
- > Indirect heating
- > Optimised for material & emissions
- > RAP addition rate of up to 100 %
- > RAP system drying capacity 180 t/h, 220 t/h



High efficiency

Increase of the RAP feed rate up to 100 %

Optimised material flow

Intelligent plant design

Energy-efficient production

Low total energy demand

HOT GAS GENERATOR

Future-oriented.

With the BENNINGHOVEN hot gas generator, sustainable asphalt production can easily be implemented with maximum recycling input while ensuring minimal emissions.

The leading recycling technology from BENNINGHOVEN allows plant owners to produce asphaltic mixtures from 100 % reclaimed asphalt. At the same time, the asphalt mixing plant meets the stringent official limits for air quality control, including the German TA-Luft regulation. This legislation requires a significant reduction in emissions. The resulting total carbon (VOC) emissions must not exceed the limit value of < 50 mg/Nm³.

With the hot gas generator, BENNINGHOVEN guarantees that the demands for a high recycling content can be met while low emission are achieved in continuous operation, with the appropriate measurements. In this way, asphalt recycling with the BENNINGHOVEN hot gas generator makes a significant contribution to reducing the carbon footprint. Even the use of 60 % reclaimed asphalt when producing new asphalt mixtures can cut CO₂ by 17 % across the complete road construction process chain.

High recycling addition rates with low emissions can only be achieved by means of the counterflow action in the hot gas generator. This process generates only low levels of VOC because the recycling material is heated to only 160 °C. The situation is different in particular for natural asphalt or aggregates. In this case, harmful substances already evaporate at temperatures below 160 °C. The hot gas generator, however, can reduce this.

With the counterflow action, the burner fires into the hot gas generator and intensively heats the surrounding air in the recycling drum. This hot air then acts as a gentle and indirect heat source for the recycling material in the downstream recycling drum, efficiently heating the recycling material to its final temperature.



WORLDWIDE COMPLIANCE WITH STRINGENT LEGAL EMISSIONS LIMITS

Compliance with TA-Luft guaranteed - in continuous operation with appropriate measurements
new version for Germany since 01/12/2021



Exhaust gas temperature level adjustable, just above the dew point

160 °C

160 °C

160 °C

160 °C

160 °C



Low emissions
VOC < 50 mg/Nm³

High efficiency

Increase of the RAP input rate up to 100 %

Temperature of the virgin mineral / recycling material / final product

- 01** The burner fires into the hot gas generator and intensively heats the circulating air using counterflow action
- 02** Indirect heating of the recycling material in the recycling drum using hot air - no flame contact
- 03** In the recycling drum, the recycling material is gently heated to the processing temperature in the counterflow, while the gases are cooled down
- 04** Up to 100 % recycling addition rates possible
- 05** Low exhaust gas temperatures of only 100 °C
- 06** The recycling material heated to processing temperature can be stored and processed directly
- 07** Optimum processing temperature of 160 °C

- Hot gas
- Circulating air
- Exhaust air
- Recycling material



HIGH-TECH PLANT POWER

Pure passion.

The designation "RPP" asphalt mixing plant stands for Recycling Priority Plant, i.e. a plant that mostly produces asphalt with a high content of recycling material. Recycling is the top priority. The RAP asphalt mixing plant consists of two towers - the mixing / recycling tower and the screen tower.

Mixing / recycling tower

The mixing and recycling tower, consisting of the hot RAP feed system, RAP silo(s), RAP weigher, weighing and mixing section and the loading silo underneath. The optimised material flow

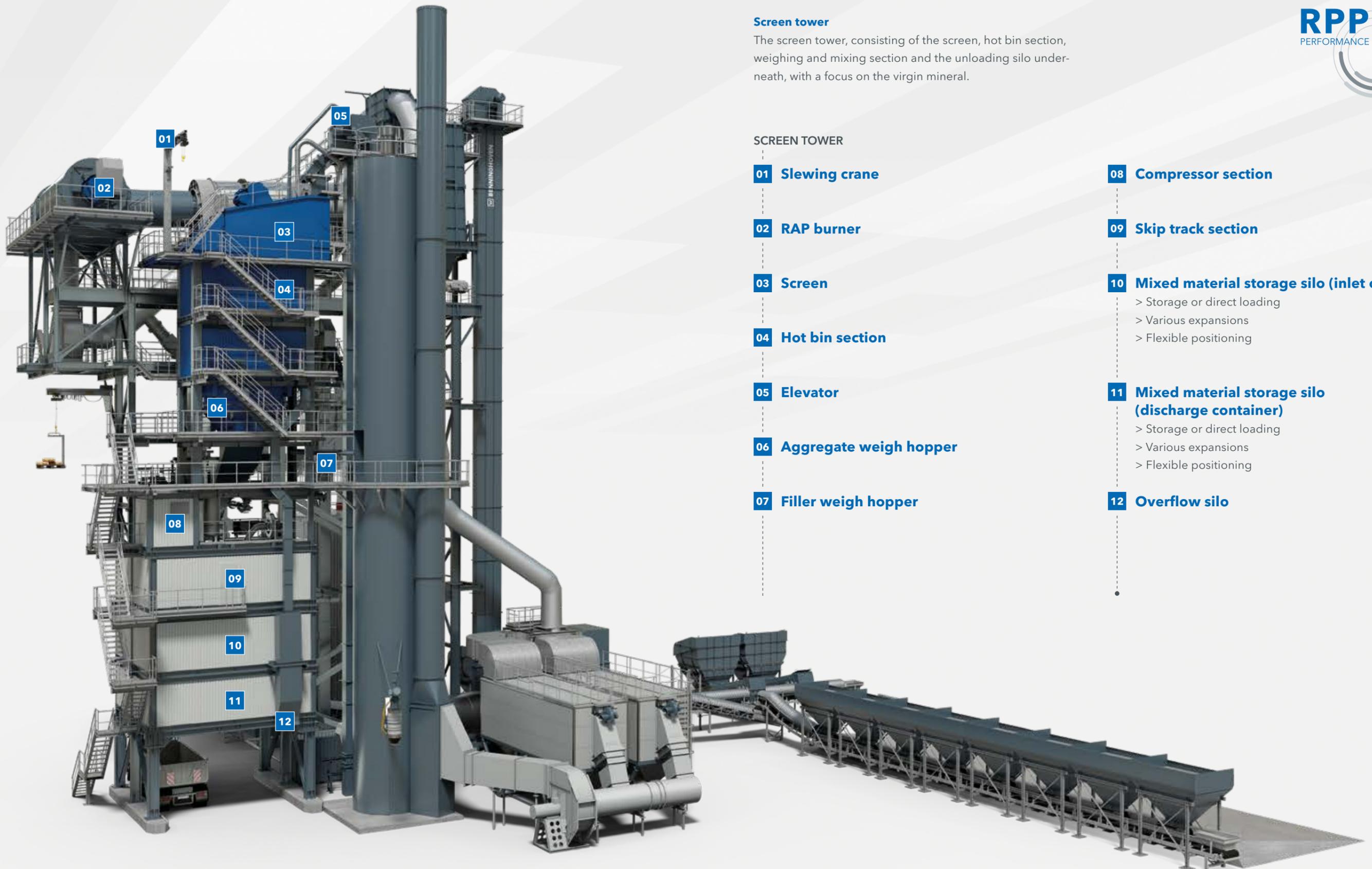
ensures that the recycling material takes a direct path through the plant, resulting in neither redirections nor adhering material.



MIXING / RECYCLING TOWER

- | | |
|---|---|
| <p>01 Hot RAP elevator</p> <p>02 Extraction hood</p> <p>03 Circulating air line</p> <p>04 Recycling drum</p> <p>05 Hot gas generator</p> <p>06 Exhaust fan</p> <p>07 Circulation fan</p> | <p>08 RAP silo(s)</p> <p>09 Multivariable / variable dosing system (RAP)</p> <p>10 Cold RAP elevator</p> <p>11 Material feed / mixer section</p> <p>12 Control cabin + control cabinet container</p> |
|---|---|





Screen tower

The screen tower, consisting of the screen, hot bin section, weighing and mixing section and the unloading silo underneath, with a focus on the virgin mineral.

SCREEN TOWER

01 Slewing crane

02 RAP burner

03 Screen

04 Hot bin section

05 Elevator

06 Aggregate weigh hopper

07 Filler weigh hopper

08 Compressor section

09 Skip track section

10 Mixed material storage silo (inlet container)

- > Storage or direct loading
- > Various expansions
- > Flexible positioning

11 Mixed material storage silo (discharge container)

- > Storage or direct loading
- > Various expansions
- > Flexible positioning

12 Overflow silo

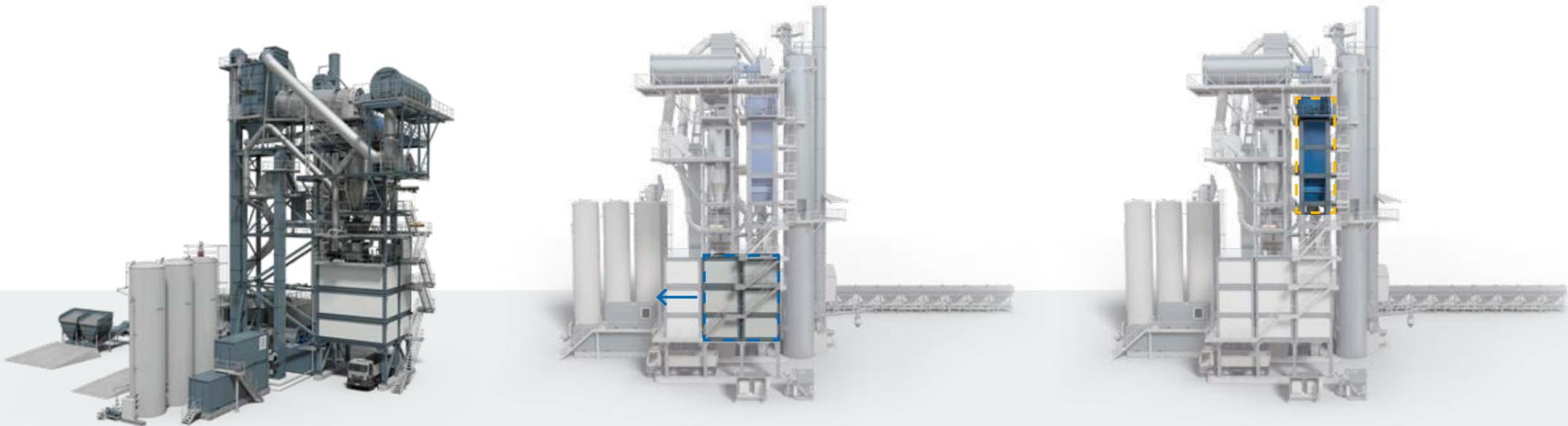
THE RPP VARIETY OF OPTIONS

Thought further.

A clever modular system - composed of modules and adaptable at any time.

The modular BENNINGHOVEN design also enables the integration of a large number of high-tech components which can be quickly and easily adapted to the specific needs of the plant owner, even at a later stage. BENNINGHOVEN ensures this with its pre-configured interfaces (plug & work) which can be activated at any time. Individual configuration of the hot bin section or the expansion options for the loading silo are other

examples for this. Space constraints that require a highly compact plant, a large variety of recipes that necessitate a large number of storage chambers or the requirement for only one weighing bridge - customer requirements are always individual. With the BENNINGHOVEN modular system, these can be achieved at any time, for future-proof plants that are a reliable investment.



RAP silo variants

- > 1 x 40 t
- > 1 x 45 t
- > 2 x 25 t
- > 2 x 30 t
- > 2 x 40 t

Mixed material storage silo expansions

- | | |
|----------------------|-------------------------|
| > 325 t (4 chambers) | > 660 t (6 chambers) |
| > 355 t (4 chambers) | > 715 t (8 chambers) |
| > 440 t (4 chambers) | > 880 t (8 chambers) |
| > 485 t (6 chambers) | > 895 t (10 chambers) |
| > 535 t (6 chambers) | > 1,100 t (10 chambers) |
| > 645 t (8 chambers) | |

Hot bin section variants

- > 80 t - 6/7 bins
- > 130 t - 6/7 bins
- > 150 t - 13/14 bins
- > 170 t - 7 bins
- > 195 t - 13/14 bins
- > 270 t - 7/8 bins
- > 320 t - 13/14 bins

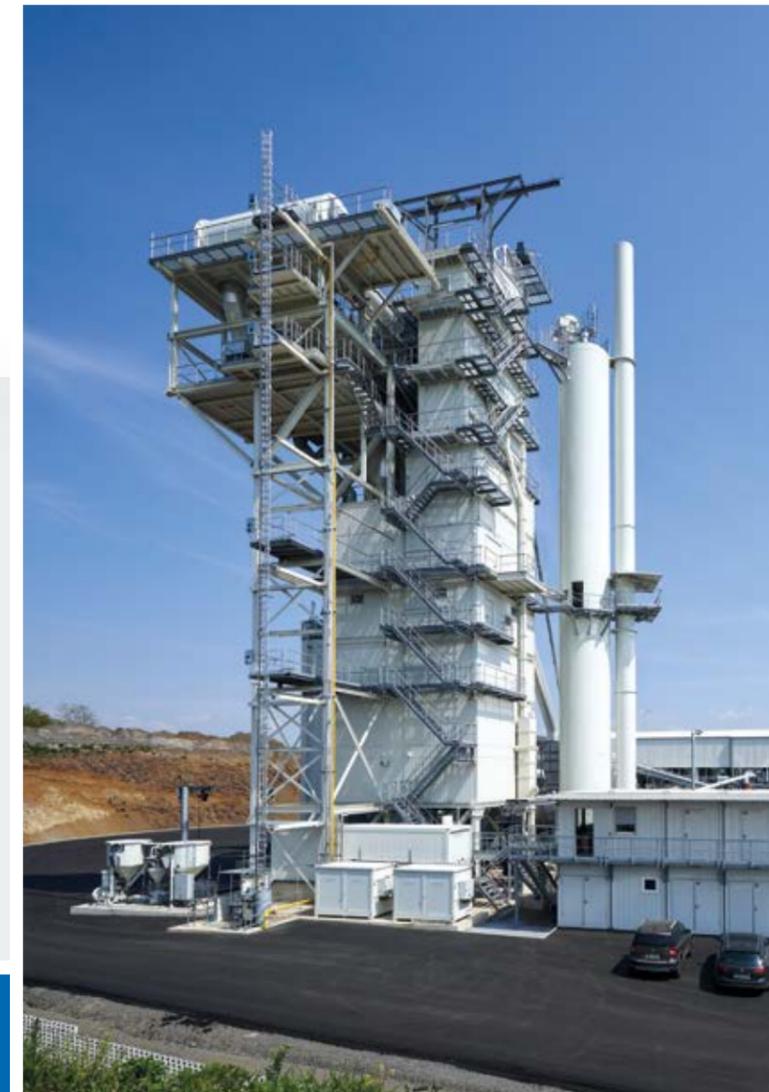
BENNINGHOVEN > GOOD TO KNOW

Asphalt optimisation with feed systems - plug & work

Additives can be introduced into the mixture to optimise the properties of the asphalt. BENNINGHOVEN offers various feed systems for this.

Feed options:

- > Granulate dosing system
- > Powder/granulate dosing system
- > Bag dosing unit
- > Liquide additive system
- > Additional customer requests



Flexible expansion

Mixed material storage silo + hot bin section

Individual adaptation

depending on requirements

Time-optimised loading

of a variety of recipes

SUSTAINABLE BURNER TECHNOLOGY

Still burning in the future.



BENNINGHOVEN
SUSTAINABILITY

When it comes to the highest possible level of eco-friendly and sustainable operation of asphalt mixing plants, the innovative BENNINGHOVEN burners are the first choice for safe and reliable use of renewable and future-proof energy sources.

Many markets are now preparing to exit from coal, while systems running on oil or gas are also increasingly subject to tighter regulations and restrictions. With burner technology from BENNINGHOVEN, plant owners can modernize their plants and safeguard the continued operation of their business.

EVO JET multi-fuel burners, which can use renewable fuels such as biomass to liquid (BtL) and wood dust, contribute to this. Both fuels are carbon-neutral and are also attractive when it comes to their availability, as fossil fuels are not only limited, but are becoming increasingly more difficult to obtain.

Fuel change at the press of a button

This turns the burner into a combination burner, which means that different variants of oil, natural gas, liquid gas and all gaseous substances (DME, etc.) available on the market, coal dust, BtL and wood dust can be combined as fuels. This eliminates plant downtime due to lack of raw material or delivery problems. In the event of price fluctuations for any particular fuel, the cheapest fuel can always be selected.

Best service for smooth operation

The world's largest and most modern factory for asphalt mixing plants offers optimum conditions for production at the highest level. As the manufacturer of the plants, BENNINGHOVEN can offer best possible customer service that is perfectly tailored to the respective asphalt mixing plants. Our specialists have extensive process know-how and are familiar with every little detail of the plants.

Before delivery from the factory, all burners are tested thoroughly and all basic settings are made. The optimum settings for energy-efficient and effective operation are made on site - to save CO₂ and comply with emission limits.



Innovative multi-fuel burner
up to four fuels

Modular structure
Easy retrofitting and expansions

Strong performance
Highly efficient consumption



Retrofitting solid fuel burner (wood)

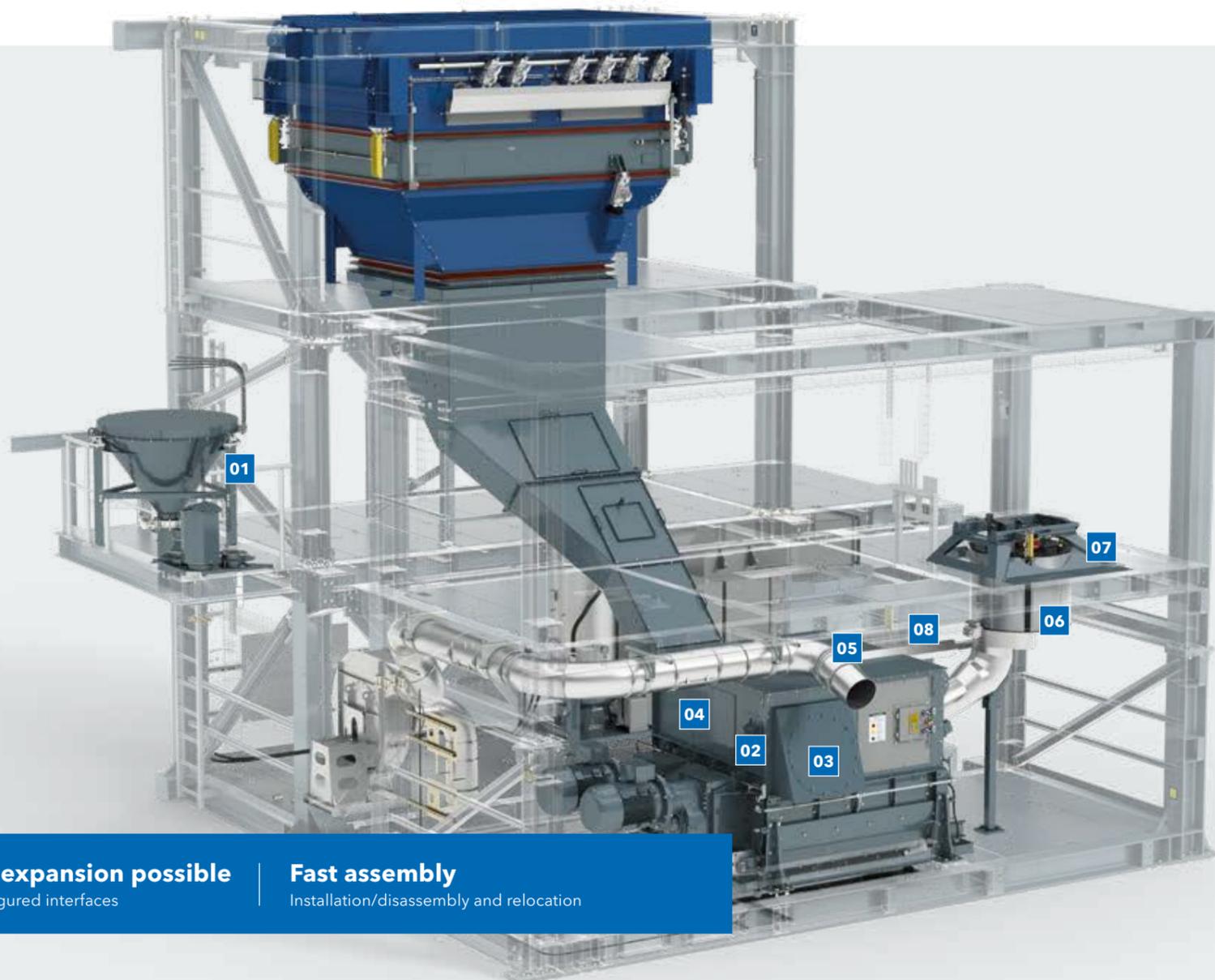
PRE-CONFIGURED INTERFACES

Added value right from the start.

With their intelligent design, BENNINGHOVEN plants can be adapted in a modular structure at any time to offer added value right from the start.

An interface is provided on the plant for each additional technical component. This allows all subsequent retrofitting requests to easily be flanged onto the weighing and mixing section.

Only the blind cover needs to be removed and the connection attached - no further welding or structural changes required.



BENNINGHOVEN > GOOD TO KNOW

The BENNINGHOVEN mixer for the best mixture quality

- > Wide dimensioned mixer design
- > Pre-configured interfaces for adding recycling material, bags, foam bitumen, granulate, powder, fibres and liquide additive
- > Optimum fill level (< 60 %) - no overfilling
- > Highest quality materials for extreme conditions
- > Optimum wear protection, long service life
- > Stable and reliable process
- > Key transfer system for high level of safety



PLUG & WORK

- 01** Granulate dosing system
- 02** Powder dosing system
- 03** Recycling extraction
- 04** Cold recycling dosing system
- 05** Hot recycling dosing system
- 06** Foam bitumen
- 07** Liquide additive system
- 08** Bag dosing unit



Modular expansion possible
with pre-configured interfaces

Fast assembly

Installation/disassembly and relocation

FLEXIBLE MODULAR SYSTEM

Ready for great deeds.



01



02



03



04



05



06

Thanks to the flexible modular design, the RPP asphalt mixing plant features short project implementation times and is ready for operation within a very short time.

The stationary asphalt mixing plant is produced in sturdy container units, fully assembled and with full wiring and piping to make installation very simple. Continuous internal walking

platforms and wide access stairs offer comfortable access and safe, uncomplicated maintenance options. All components are fully tested at the factory and are absolutely reliable.



Scan the code now and watch a video of the installation of an RPP plant.

PLUG & WORK

BENNINGHOVEN > GOOD TO KNOW

RPP asphalt mixing plant expansion stages

Stage 1

> Without hot recycling, but prepared accordingly



Stage 2

> Fully equipped



Fast and easy installation
Low design engineering effort

High level of functional reliability
All components tested at the factory

ERGONOMICS, MAINTENANCE, AND HEALTH & SAFETY CONCEPT

Always right in the middle.

The development and design of the BENNINGHOVEN asphalt mixing plants are based on a high level of functionality while prioritising reliable operation and functioning as well as optimum accessibility.



Very good accessibility to all areas with 800 mm wide surrounding access/working platform

Ergonomics and maintenance concept

- > At BENNINGHOVEN, maintenance access openings always have a size of at least 600 x 600 mm

- > Large-dimension expansion space above the mixer allows upright working for service work.

- > Clever layout of components - easy maintenance, ensured escape routes, health & safety, large installation space

- > Option of forced ventilation (entry into tight spaces) - mixer box, dryer drum

- > Anchor points for PPE

- > Wear parts are mostly bolted on - for good accessibility

- > Most lubrication points are in a central, ergonomic position, with colour coding

- > Power and compressed air connection for tools and maintenance work

- > Central compressed air maintenance unit for oiler and separator, plus filters

- > Platform loads are designed so that even accordingly large spare parts (drive motors above 500 kg) can be stored temporarily

- > Central location of control cabinets in the control cabinet container - air conditioned, high system stability, weather protection, no negative influence from hot components



Very good accessibility
ensured in all sections





01 Access to screen with stairs including handrail, anti-slip surface **02** Escape routes ensured - headroom and sufficient width
03 Cable guiding - strain relief with clamps

Health and safety concept

- > Design and implementation of the health and safety measures in compliance with the standards (Machinery Directive 2006/42/EC, DIN EN 536 Road construction machines - Mixing plants for road construction materials)
- > Emergency stop button
- > Contact protection on the complete drivetrain of the mixer and on all pneumatic cylinders
- > Encapsulated material transfer areas
- > Optimum illumination of the work and maintenance areas with LED technology
- > Safe access to all service and maintenance points (guard rails, ventilation openings, etc.)
- > Key transfer system for increased safety
- > Cable guiding in compliance with standards (clamps provide strain relief for cables)
- > Fall protection
- > Anti-slip surfaces (R12)
- > Escape routes ensured - headroom and sufficient width
- > Automatic venting of the pneumatic units for maintenance
- > Elevators with creep drive according to CE regulations
- > Extraction of bituminous vapours during loading (option)

BENNINGHOVEN > GOOD TO KNOW

Key transfer system for increased safety

- > Key-operated mechanical system
- > Based on the premise that a key cannot be in two places at the same time
- > The key can only be removed in the safe state if there are no hazards present
- > Safety concept with highly intuitive operation
- > Purely mechanical interlocking device - robust and not prone to malfunctions
- > No manipulations possible



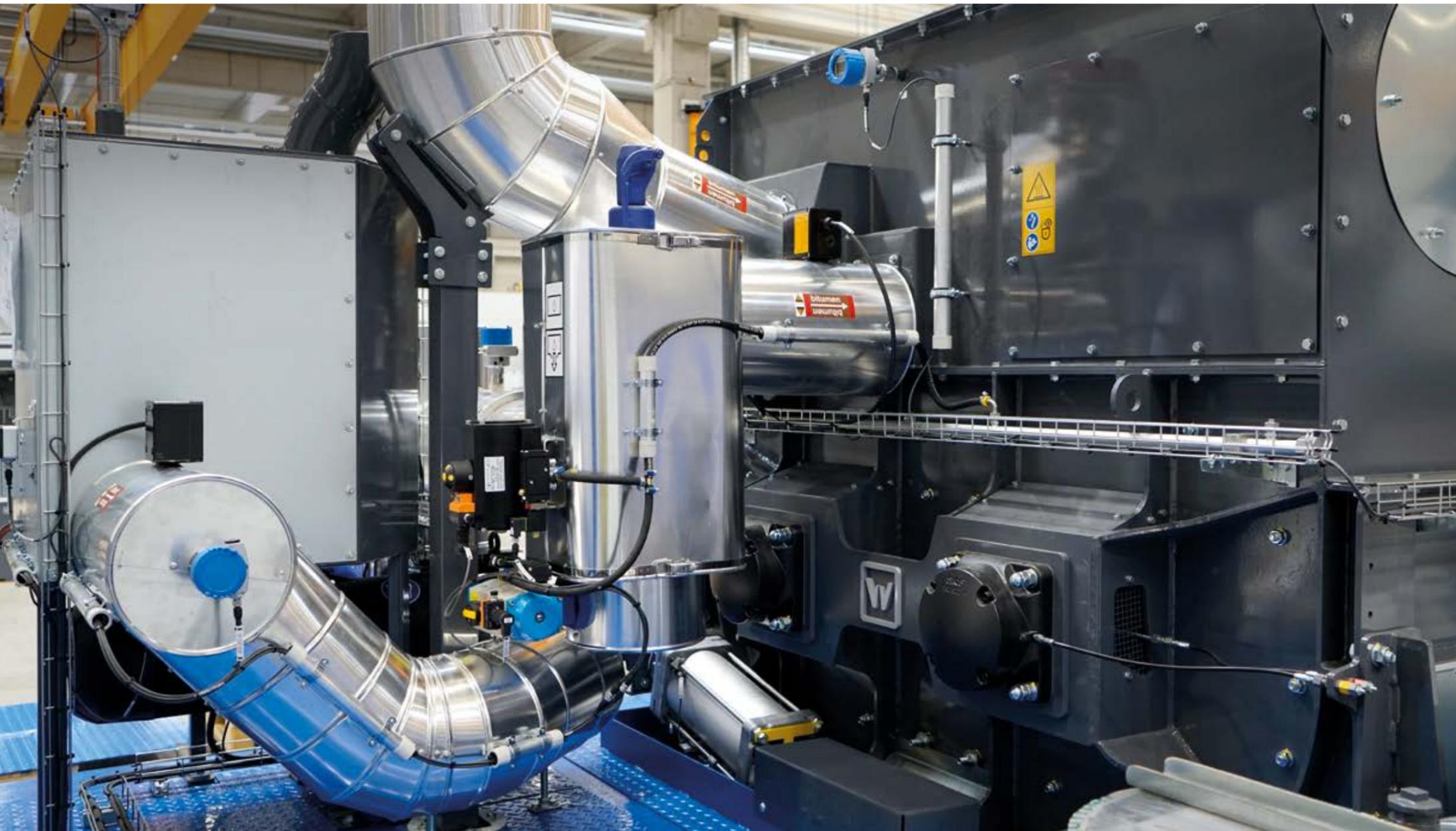
HIGHEST PRODUCT QUALITY

Sustainability ex works.

BENNINGHOVEN has the objective of continuously making improvements across divisions and plants - from design engineering and final assembly to commissioning at the customer site.



Mechanical and electric test run at the factory



Test run at the factory

All core components undergo a test run at the factory. This means that all components are started up "dry" and the mechanical and electrical systems are tested thoroughly. Even for the screen, the factory has a dedicated, decoupled area.

The high level of competence of the specialists at the factory is a crucial factor in preventing faults - before assembly and commissioning in the field.

Surface quality

All components of a BENNINGHOVEN asphalt mixing plant are subject to a defined coating standard with at least corrosion protection class C3M or C4M for steel parts and containers.

Use of renowned suppliers

Design and manufacturing of BENNINGHOVEN asphalt mixing plants and components are carried out at the factory in Wittlich. Only high-quality components and parts (drive systems, sensor systems, electrics, etc.) from renowned, established and reliable suppliers are used to ensure continuous quality assurance.

MAXIMUM CUSTOMER FOCUS

The best recipe: more than 100 years of experience.

Our service does not start only when the order is signed or end with commissioning. The comprehensive customer support at BENNINGHOVEN already starts much earlier on during the preparation phase of a project.

Most importantly, this includes complete and competent support to help you find the best possible plant solution. We believe it is important to take into account technical as well as location-related requirements and to develop an appropriate logistics concept.



Technical support

- > Fault diagnosis / troubleshooting
- > Application consulting
- > Training
- > Operator days
- > Spare parts
- > Prevention and inspection
- > Retrofit
- > Energy optimisation



Logistics concept

- > Logistics paths / infrastructure on the plant and mixing station
- > Ship and HGV loading
- > Transport planning
- > Links between transport and installation
- > Approval process



Plant engineering

- > Technical plant and operating descriptions
- > Installation and layout plans
- > Emissions measurement
- > Safety devices
- > Structural calculations
- > Advice on current standards



Environmental requirements

- > Topography
- > Industrial area / nature reserve
- > Municipal restrictions
- > Colours / housing

SUSTAINABLE SOLUTIONS

Green technology for a golden future.

BENNINGHOVEN is also state-of-the-art in all areas where "being green" matters - from the economical use of resources to an overall environmentally friendly production process at our state-of-the-art main factory.

Working more efficiently with sustainable and economical technologies is the challenge of today and tomorrow. BENNINGHOVEN offers a variety of innovative solutions for reducing emissions and securing the future of asphalt mixing plant sites. State-of-the-art technologies ensure that stringent legal requirements are met or even overfulfilled.

Considering the entire road construction process from material acquisition and asphalt production to building the roads, companies can save up to 60 % CO₂ with these technologies (60 % recycling input rate, carbon-neutral fuel).



BENNINGHOVEN
SUSTAINABILITY



> Reusing asphalt

> Storing correctly

> Low-temperature asphalt

> Electrifying bitumen tanks

> Using renewable fuels

YOUR WIRTGEN GROUP CUSTOMER SUPPORT

Service you can always rely on.

Place your trust in our reliable and fast support during the complete life cycle of your machine. Our wide service offer includes suitable solutions to meet all of your challenges.



Service

We keep our service promises - with fast and uncomplicated assistance both on the building site and in our professional workshops. Our Service team has received expert training. Thanks to special tools, repair, care and maintenance work is completed quickly. Upon request, we can support you with tailored service agreements.

> www.wirtgen-group.com/service



Spare parts

Original parts and accessories from WIRTGEN GROUP can ensure the high reliability and availability of your machines in the long term. Our experts will be glad to advise you on application-optimised wear part solutions. Our parts are available worldwide, at any time and are easy to order.

> parts.wirtgen-group.com



Training

Staff responsible for the WIRTGEN GROUP's product brands are specialists in their areas and have decades of application experience. Our customers also greatly benefit from these experts. In our WIRTGEN GROUP training courses, we gladly pass on our knowledge to operators and service personnel.

> www.wirtgen-group.com/training



Telematics solutions

Construction machines with leading technology and perfected telematics solutions work hand-in-hand in the WIRTGEN GROUP. Intelligent monitoring systems such as WITOS or JD Link* not only facilitate the maintenance planning of your machines but also increase productivity and economy.

> www.wirtgen-group.com/telematics

* WITOS and JD Link are not currently available in all countries. Please consult your responsible branch or dealer if you have any questions in this area.



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