



TOP TOWER

TOMORROW AND BEYOND



F A Y A T M I X I N G P L A N T S





TOP TOWER

Sustainable road building and energy saving requirements are major concerns for today's road builders. Production equipment must be adapted to suit all types of recycling and modern low-energy mixes, in addition to incorporating the most recent developments designed to optimise production costs. These concepts are behind the development of the FAYAT Mixing Plants' new generation asphalt plant - TOP TOWER.



Introduction	02
FOCUS	
What makes our plant unique	04
◆ Energy saving technology	06
◆ User-friendly	07
◆ Recycling solutions	08
◆ Easy and fast erection	10
◆ Evolution	12
TECHNICAL SPECIFICATIONS	
◆ General operation of the plant	14
◆ Aggregate cold feeders	15
◆ Drying-filtering unit	16
◆ Mixing tower	18
◆ Mixer	21
◆ Binder storage equipment	22
◆ Hot-mix asphalt storage	23
◆ Recovered fines and imported filler circuit	24
◆ Asphalt plant management	25
THE RANGE	
CUSTOMER SERVICE	
Retrofitting	30
Service	31
Spare parts	31
Training	31



What makes our plant unique

ENERGY SAVING TECHNOLOGY

Our technology, your profitability

Whatever your mix is, it will be at the lowest total cost of ownership.

High efficiency motors, insulations, reduction of thermal losses, energy recovering, software with CYB-\$AVE Energy Control Module are some of the innovative solutions to reduce energy and fuel consumption.

EASY AND FAST ERECTION

A plant installed quicker starts producing profit sooner

Pre-cabled and fully tested modules, electrical cabling above ground and possibility of mobile steel bases save unnecessary costs during assembly and minimize civil engineering. The filter on top of the dryer allows a saving of 30% ground space on site compared to the solution with filter on ground

RECYCLING SOLUTION

The widest variety of solutions available in the market

The right balance between ecology and profitability.

Four different solutions perfectly match the required level of recycling rate and your level of investment.



EVOLUTION

Ready for present and future challenges

Easy and cost-effective extension to RAP technology.

Easy and cost-effective upgrades, at any possible time.

The plant is designed to use Warm Mix technology, immediately or at a later stage.

USER-FRIENDLY

Making hard work easier

Critical components with a long life time, easy access to maintenance points and effortless trouble-shooting maximize the plant up-time and reduce operational costs.



Energy saving technology

Energy savings and the reduction of greenhouse gas emissions are at the heart of the TOP TOWER design. All types of recycling and special or warm asphalt production technologies are also offered.



Environment

- the plant innovative design helps to reduce electricity and fuel consumption, resulting in significantly reduced CO₂ emissions
- atmospheric particle emissions comply with the latest environmental regulations
- the mixing tower is designed to incorporate total or partial cladding, for even lower particle and dust emissions and reduced noise
- the plant also has a smaller footprint

Energy savings

- by positioning the filter above the dryer drum and redesigning the drying-filtering unit, we have

- optimised the gas and recovered fines circuits
- thanks to the shorter dryer-filter duct, the gases at the dryer mixer outlet lose less heat and the burner consumption is significantly reduced
- the treated fines are collected by gravity into the hopper positioned under the filter and are stored next to the fines weighing hopper, which reduces the number of screws required and the overall electrical consumption. These recovered fines are kept in a hot environment and are reintroduced into the final mixture at the highest possible temperature
- the screen and hot bins are insulated and cladded in order to reduce energy losses

User-friendly

With their professional design, accurate choice of materials and precise erection, the entire range of the TOP TOWER asphalt plant series guarantees long component's life and easy maintenance operations.

The plant conforms to all the most stringent international laws and technical regulation in the sector. It is fitted with highly efficient safety devices to guarantee the wellbeing of the plant operators at all stages of work and maintenance.

All plants have good size maintenance ports (up to 600 mm in width) and most of them have centralized grease points which optimize and reduce all maintenance operations.

Easy maintenance

- arms and paddles with bolted anti-wear components symmetrical paddle shape
- bolted anti-wear plates on mixer bottom, made from
- special, highly resistant cast iron
- special anti-wear plates (optional) to increase life of
- components subject to abrasion (up to 6 times)
- easy replacement of screen meshes thanks to
- a patented system to reduce dismantling and
- assembly time
- two ample access points (with integrated by-pass) drum regulation (setting) is faster as the rollers are very easy to adjust

Improved ergonomics

- the layout of the plant has been optimised, thus
- simplifying the movement of site equipment
- a spacious cabin, offering a perfect view of the plant,
- houses all of the electrical control cabinets
- the stairs and walkways allow easy access to all parts of the plant and its peripheral components
- wide access points allow for ease of movement in complete safety





Recycling solutions

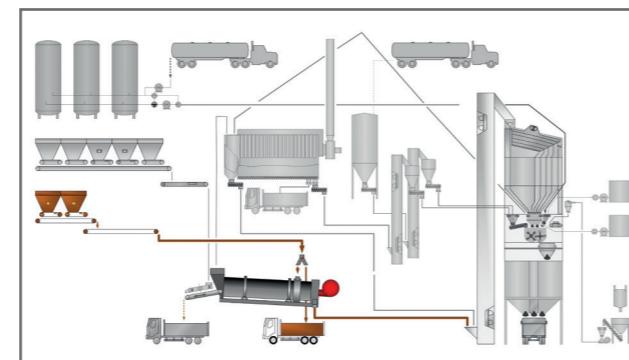
Over the years increasing interest has been paid to the question of recycling asphalt pavements, and nowadays it can no longer be considered an optional.

All over the world, authorities are working in this direction for a variety of reasons:

- reduction of refuse: the degradation of the road network
- results in a considerable amount of recyclable material, with consequent problems of storage and disposal, which is taxed as refuse for disposal
- reuse of raw materials: there is a lack of aggregates due to the diminishing number of active quarries at national and international level

- energy savings: the energy consumption is reduced on aggregate extraction, vehicle transportation and traffic stoppages
- bitumen recycling: not only aggregates are reused but also the bitumen binder can be partially reutilized

TOP TOWER: four main recycling solutions



Recycling in special dryer drum ring

The recycling in dryer drum is always the spearhead of MARINI solutions, proven by hundreds of applications.

A specially designed ring means RAP can be fed into the most ideal part of the drum, without any cold air infiltration.

The recycled material does not come into direct contact with the hot gases of the flame, but is heated in the drum by 'heat recovery' flights and mixed with the virgin aggregates, which have been partially heated to an ideal temperature.

In this way, the RAP is heated gradually, reducing the risk of bitumen degeneration, and the remixing with the virgin aggregates avoids agglomeration formation, which could cause problems later on.

The line consists of:

- cold feeder and feed belt
- recycling ring on dryer drum

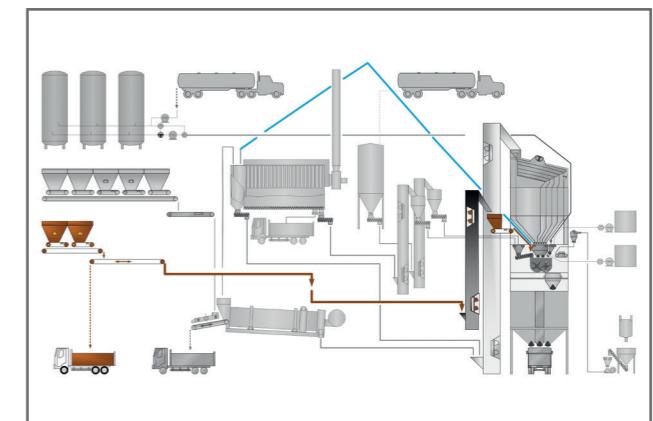
Advantages:

- recycling up to 35% (higher percentages are possible if material has been properly treated and dried)
- minimal initial investment compared with any other RAP technology

Cold RAP metering into mixer

Introduction of RAP directly into the mixer with a special feed line consisting of:

- cold feeder and feed belt
- cold RAP feed and metering unit including: bucket elevator, surge hopper and weighing scale, chute into mixer vapour exhaust system



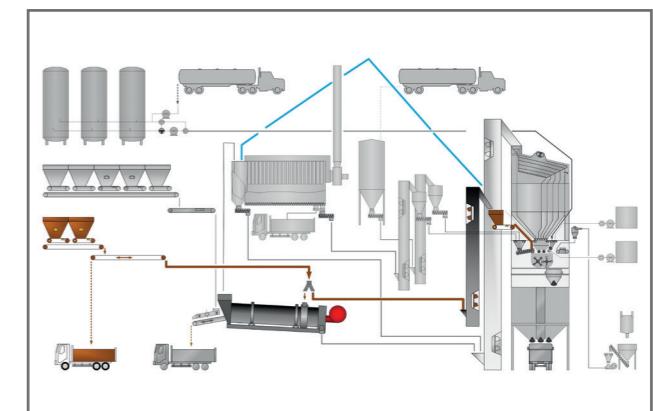
Advantages:

- recycling up to 40%
- highly recommendable when virgin aggregate screening is required

Two in one for the maximum flexibility

A combination of the two previously described technologies forms the best technical solution in terms of flexibility with RAP use and performance

- recycling up to 50% or 60% (the material have been properly treated and stockpiled in the correct way)



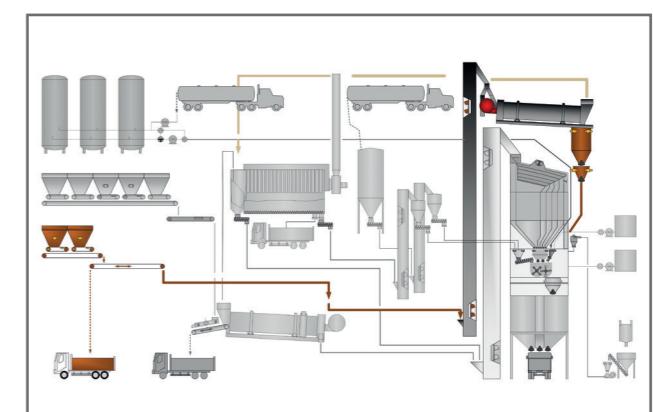
Parallel drum

The recycled materials are dried and heated in a dedicated parallel-flow dryer drum, especially designed for this purpose.

Because of the high economical investment this solution is recommended when high quantities of reselected RAP material are available and it is possible to use such high quantity in production.

The line consists of:

- cold feeders and feed belt
- elevator and dryer drum specially dedicated to RAP



Advantages:

- high recycling percentages (up to 80%)
- useful when virgin aggregate screening is required

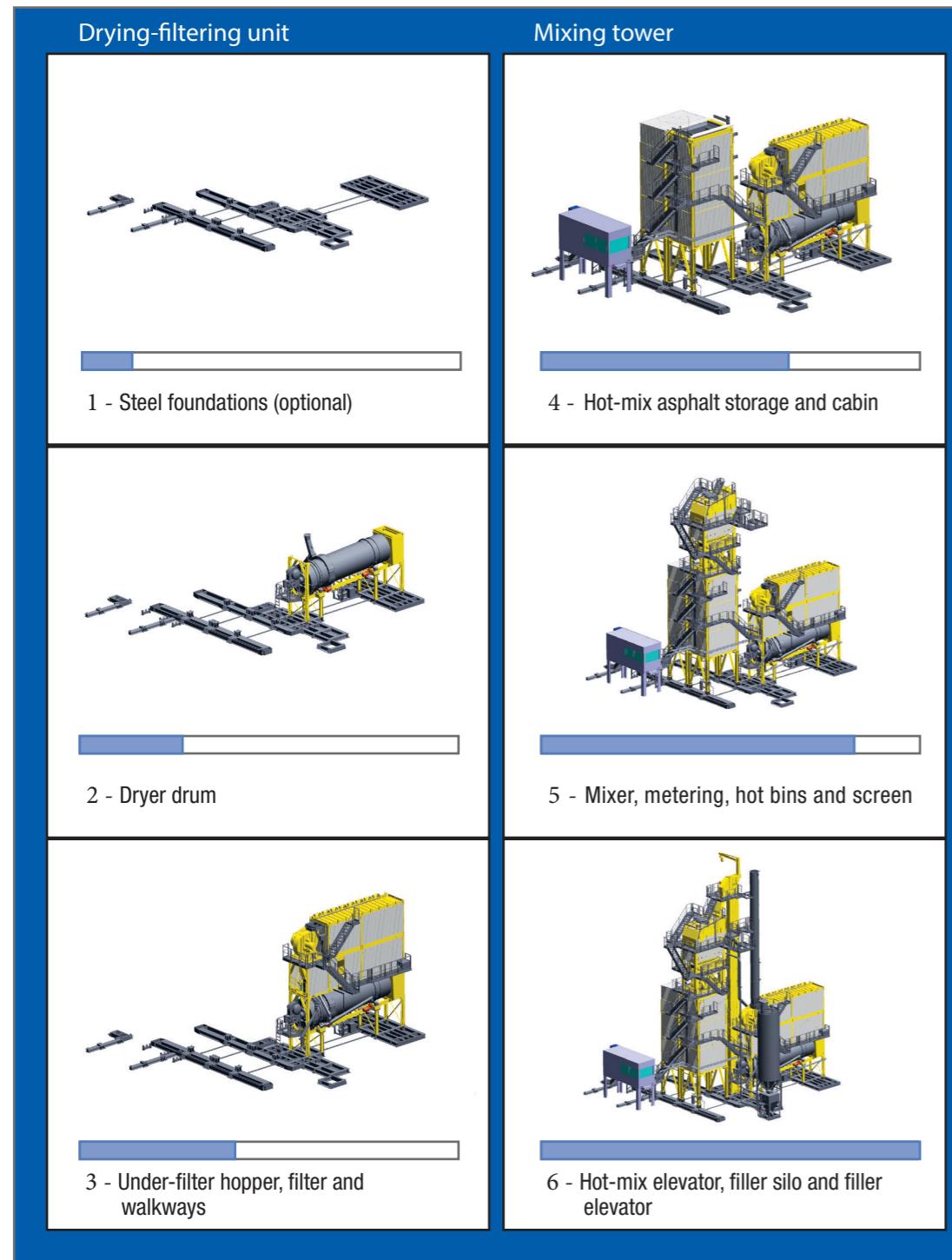


Easy and fast erection

The plant modular design and factory pre-wiring facilitate transportation and speed up the assembly of its components.

The ergonomics of the plant have also been redesigned in order to improve user's comfort and new safety standards.

Assembly sequence



Quick assembly and transfers

- the plant modular design facilitates the transportation and assembly of its components

- the self-supporting steel foundations allow the plant to be assembled on a stabilised ground (2.5kg/cm^2), for easier transfers
- all of the tower cable tray is built into the structure and walkways





Evolution

The plant innovative design allows the use of every kind of different type of additives in order to produce all products. Our special optional kit can be added at order or at any later stage.



- This MARINI top class asphalt plant can manage:
- rubber crumb (high quality recycled car and truck tyres for maintaining binder elasticity and reducing deformation, noise pollution and moisture damage)
- cellulose fiber (highly fibrillated cellulose fiber pellets, designed to stabilise the asphalt mix and help to prevent binder drainage)
- pigments (iron oxyde red, yellow, red, blue, white)
- bitumen and polymer modifiers (Waxes, EVA, SBS, Latex)
- clear binder (synthetic asphalt binder, giving colouring flexibility and a righter coloured asphalt surfacing)

- rubber crumb (high quality recycled car and truck tyres for maintaining binder elasticity and reducing deformation, noise pollution and moisture damage)
- adhesion modifier (wetting and adhesion agent in liquid and pellet form, giving improved bitumen-aggregate bonding, greater viscosity and better temperature performance)

Warm Mix Asphalt (WMA) is already the asphalt mix of tomorrow. Most commonly produced 30°C below Hot Mix Asphalt (HMA) temperature, it ensures high mechanical performances similar to those of HMA, while providing a multitude of benefits:

- reduction of bitumen VOC emissions
- reduction of CO₂ (carbon dioxide) and other gasses emissions due to energy saving consumption for drying and heating virgin aggregates.
- reduction of fumes, emissions and odours
- faster opening to traffic
- higher workability
- better compaction performances and extension of paving season
- delivery of mix asphalt at longer distances
- reduction of energy consumption = low production cost
- higher plant recycling performances

The water based technology for WMA is actually representing the best performing solution and in particular applications with microbubbled foam bitumen give the widest range of all possible technical and economical advantages.

Solufoam: an easily fitted kit

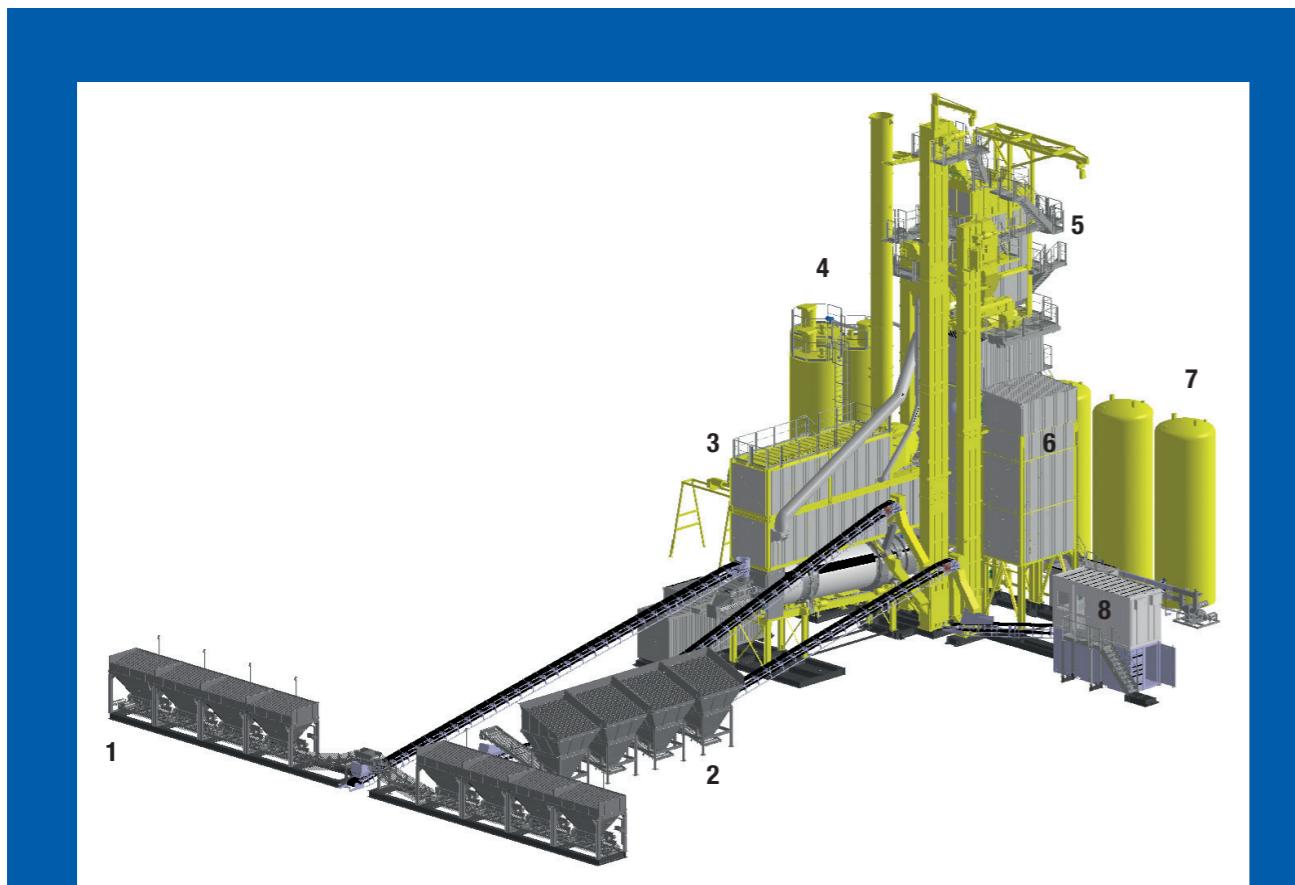
At any moment in time, TOP TOWER can be updated to meet a variety of challenges in the work place and upgraded with modern technical solution:

- installation of a KIT called «SOLUFOAM» made by Marini, to allow the production of warm asphalt, a very high quality mix at temperatures 20-30° C lower than traditional warm mixes.

The new equipment has been developed from the experience of the FAYAT Group in this specific technology working with the most important companies in the sector.



General operation of the plant



- 1 storage and metering of virgin aggregates
- 2 storage and metering of recycled materials
- 3 drying-filtering unit
 - dryer drum and recycling ring
 - under-filter storage silo
 - filter
- 4 imported filler silo

- 5 mixing tower
 - hot elevator
 - fines elevator
 - screen
 - hot aggregate bins
 - metering of components
 - mixer
- 6 hot-mix asphalt storage
- 7 binder storage tank
- 8 control cabin and automation



Aggregate cold feeders

Storage of materials and recomposition of the gradation curve

Hopper

- basic capacity/width:
 - 11 m³ / 3.5 m
 - 18 m³ / 3.5 m
 - 24 m³ / 3.5 m
 - 42 m³ / 4.5 m
- from 1 to 15 hoppers
- higher capacities are available on demand
- protective grids

Cold feeder

- volumetric metering
- output from 6 to 150 t/h

Options

- metering controlled by weight
- antiadhesive coating
- steel foundations

Features

- synchronisation of extractor outputs
- LED indicators showing extractor operation and the need to reload the hopper
- reduced loading height



Drying-filtering unit

The filter is positioned directly over the dryer drum. The flows of gases and materials have been optimised and the plant smaller footprint facilitates the movement of site equipment and supply vehicles.



Dryer feeding belt

- reversible belt for easy calibration of the aggregate metering devices (optional)
- a vibrating scalping screen can be fitted at the start of the feeding belt (optional)

High-output counter-flow dryer drum

- robotically arc-welded special steel tube
- shape and layout of the flights are designed to optimise heat exchanges between combustion gases and aggregates

- temperature probe for continuous monitoring of the aggregates at drum outlet
- aggregate outlet chute protected by a wearing plate
- air space insulation (rockwool insulation available as an option)

Quick and easy drum position adjustment

- powered by 4 friction drives
- drum can be adjusted simply by turning the external adjusting screws, without stopping the drum

Burner

The burner/dryer unit has been designed with maximum thermal efficiency in mind: for optimised fuel consumption and lower CO₂ emissions.

- reliable closed total air burner, with a simple design
- automatic start-up and adjustment of the burner and regulation of heating power according to output temperature of aggregates
- suitable for all types of fuels on the market: diesel, heavy fuel oil, natural gas, LPG and brown coal powder, wood powder
- mechanical or electronic adjustment of the air/fuel ratio
- mechanical or pneumatic atomization of fuel

Filter and storage hopper

Filter

- the elliptical shape of the aramid fibre bags reduces the size of the housing while maintaining the same filtering efficiency

Recovered fines storage hopper

- as the storage hopper is situated directly underneath the filter, the fines can be collected via gravity and reintroduced hot in the mixing process
- the screw operates at constant efficiency, regardless of the quantity of fines stored



Mixing tower

With larger and more comfortable access points and a new patented quick screen mesh replacement system, servicing the tower has never been so easy. Gravity metering of bitumen is another of the TOP TOWER new features.



18



19

Hot aggregate bins

Insulated to minimise heat losses, the hot aggregate bins are designed to accommodate one or two bypasses, depending on the model.

Bitumen metering

Design

The bitumen gravity metering system allows changing of binder types "on the fly" without wasting materials and time.

The weighing hopper is mounted on weighing scales for maximum accuracy.

It is emptied via an electrically-heated butterfly valve and activated by an electro-pneumatic cylinder.

Safety

The weighing hopper is equipped with a safety level indicator linked to the cutoff for the metering pump.

Metering of aggregates and fines

Aggregates and fines/fillers are both weighed in a dedicated weighing scale.

Recovered fines/ imported filler elevator

Double, sealed elevator with rubber belt and steel buckets.



Mixer

This essential part of the TOP TOWER has been completely redesigned. With its new shafts, honeycomb paddles and ingenious sealing system, this new-generation mixer is now even more reliable and efficient.



Mixer

The drive system for the twin-shaft mixer consists of two motor-reducers which are directly connected to the shafts and synchronised by splined couplings. The shafts and paddles have a remarkable anti-wear honeycomb design for optimal mixing.

Versatility

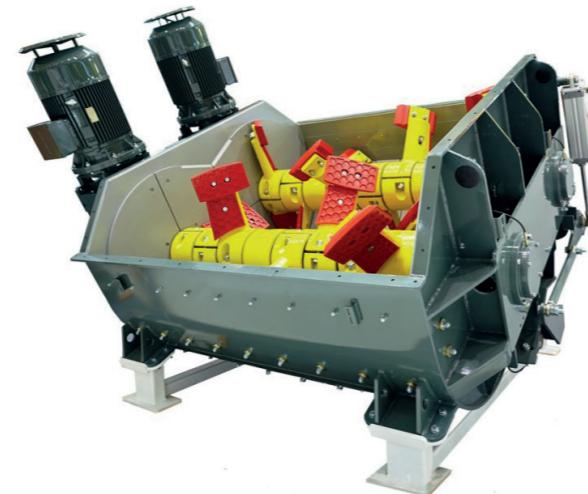
The mixer is ready to accept all types of additives in bags or big-bags, in addition to recycled materials.

It also features a water vapour disposal system.

All types of modern asphalt mixtures can be produced (modified bitumen, warm-mix asphalt, etc.).

Safety

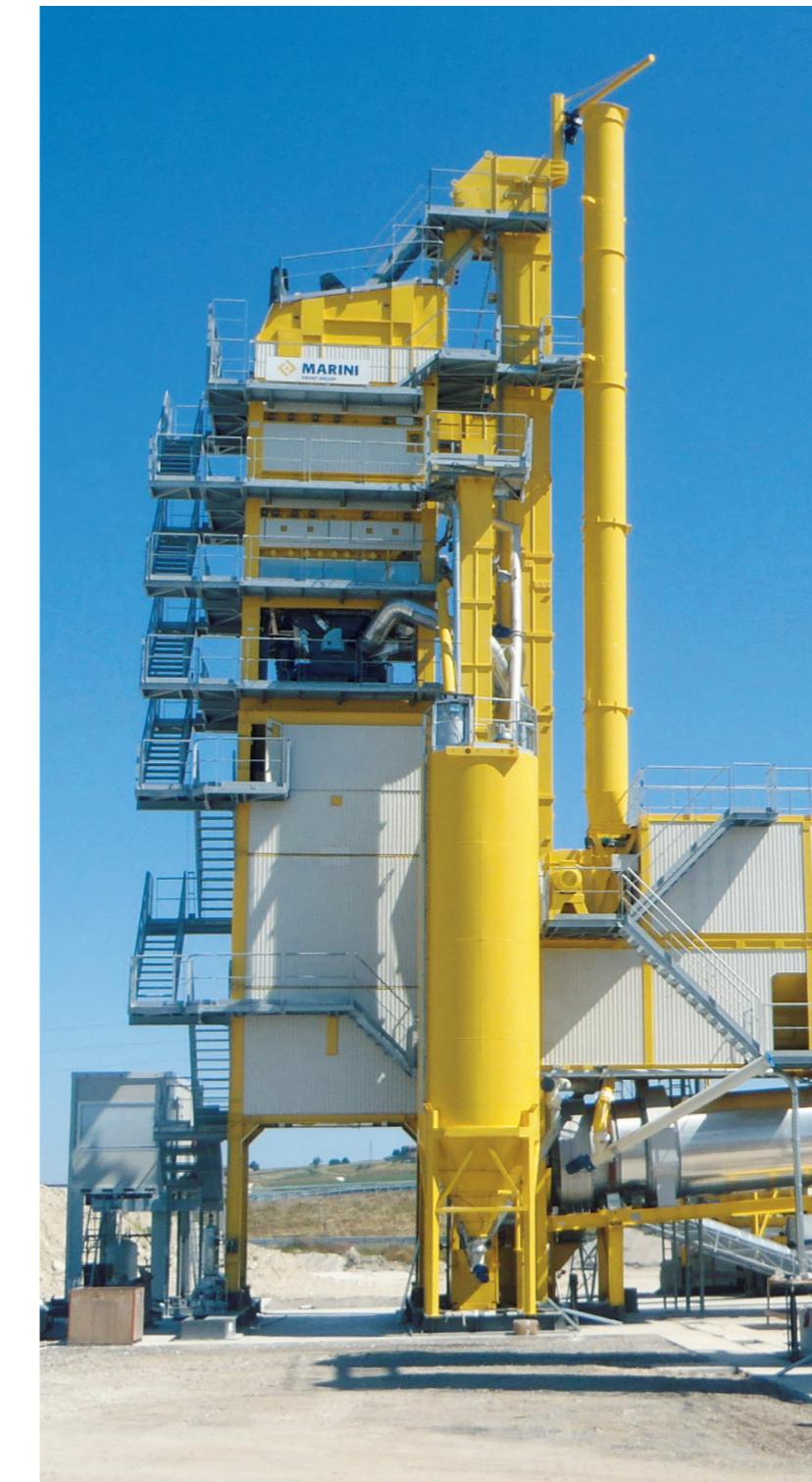
Operators are protected by a lockout key system which prevents access to the interior of the mixer when the plant is operating.



Reliability

The mixer seals and shaft support bearings are situated outside the mixer, allowing for easy access and easy maintenance while offering unrivalled durability, as they are not in direct contact with the hot mix.

The mixer is equipped with automatic lubricators but on demand can benefit from a centralized lubrication system which can be also automated.



Recovered fines and imported filler circuits

The design of the new drying-filtering unit optimises the recovered fines circuit.

Recovered fines circuit

As the filter is situated immediately above the dryer drum, the fines descend into the storage hopper via gravity for collection. As the distance travelled by the recovered fines has been minimised, they can be added back into the mixture without losing heat.

Pre-separator

The filter integrated pre-separator collects the largest fines, which are reintroduced directly at the dryer drum outlet.

Recovered fines circuit

- By elevator
The fines are transported to the weighing scale by a screw that is directly connected to the under-filter storage hopper

- By screw
The recovered fines are transported to the buffer hopper by a double fines/filler elevator, and then transferred to the weighing scale by a screw

Imported fillers

- By elevator
The weighing scale is supplied by a feed screw that is directly connected to the raised storage silo

- By screw
The fillers are transported to the weighing scale by a double fines/filler elevator

- Alternative fines/filler circuits may be designed upon demand in response to specific configurations



Binder storage equipment

The binder storage equipment is designed for loading tanks and supplying the asphalt plant in complete safety. Featuring vertical or horizontal tanks, heated electrically or by oil, the equipment on offer is capable of storing all types of hydrocarbon or synthetic binders.



Vertical, electrically-heated tanks

Specifications

- rockwool-insulated tanks up to 300 mm
- heated by a thermostatically-controlled electrical heating element
- continuous level indicator
- high-level safety indicator to prevent overflow
- purging vent

Capacity
50 m ³
60 m ³
80 m ³



Boilers

Different models of boilers are available, depending upon the desired heating power. All are equipped with automatic burners and can use different fuels: light fuel oil, natural gas and LPG.

Model	Heating power
500.000 kCal/h	581 kW
800.000 kCal/h	930 kW
1.000.000 kCal/h	1163 kW



Thermal Oil Heated Tanks

Thermo-fluid heated storage equipment can be supplied with horizontal or vertical tanks. Horizontal tanks are also available in mobile versions.

Vertical	Horizontal
50 m ³	38 m ³
60 m ³	50 m ³
80 m ³	100 m ³

Hot-mix asphalt storage

Several different capacities and configurations are available to satisfy all requirements.

Thanks to the modular design of the storage silos, up to 3 modules can be combined, in an in-line or perpendicular configuration.

Design

- truck clearance for under mixer storage: 4 m (4.36 m on steel foundations)
- rockwool-insulated storage hoppers
- electrically-heated and insulated discharge doors
- high-level indicator in hoppers (continuous level available as an option)



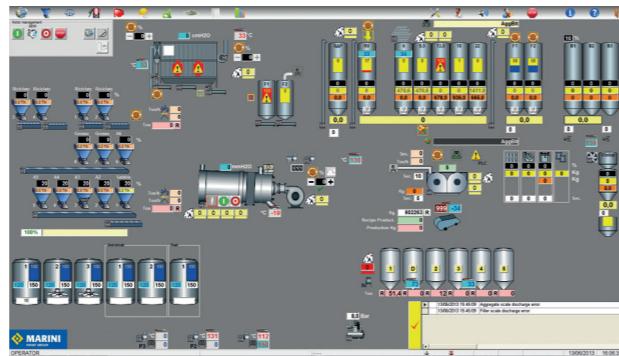
TECHNICAL SPECIFICATIONS

Asphalt plant management

The new CYBERTRONIC control system manages all calibration, production and maintenance operations. User-friendly and reliable, it guarantees the total traceability of production parameters.

Ergonomics and safety

- new visual design
- starts up the entire plant in complete safety - each motor can be controlled with just one click
- easily identifiable alarms
- safety system for temperature monitoring
- monitors the absorption of the main motors
- maintenance module



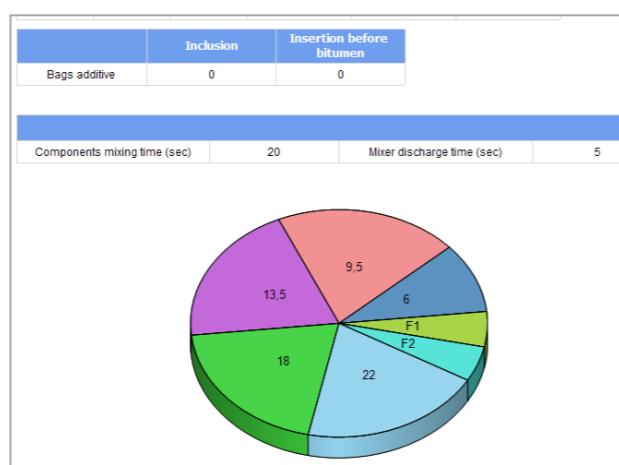
Production management

- easy management of mix formulas and production in progress
- integrated extractor calibration system
- complete control of aggregates heating
- complete management of binder storage tanks (loading, storage, transfer, etc.)
- management of hot-mix asphalt storage silos
- possible to incorporate a description of materials used
- warm mix asphalt production management
- interface with external weighing bridge
- truck's geotracking - **NEW**



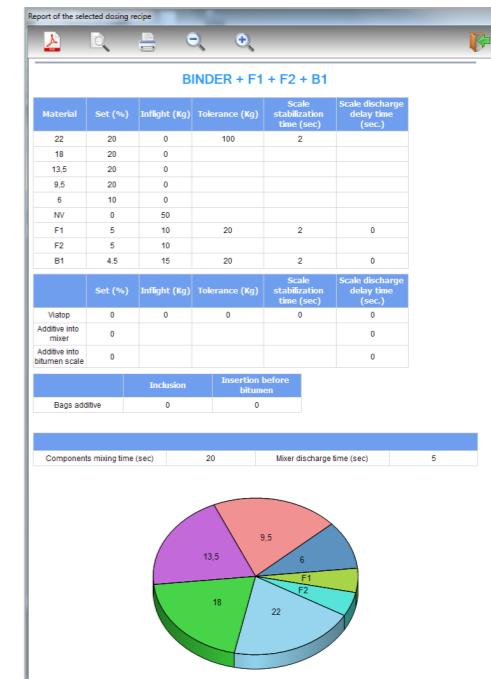
Data management and traceability

- history of quantities of materials used or produced according to formulas and production dates
- production data can be exported in Microsoft® or EXCEL® file formats
- new detailed report available
- new diagnostic interface
- new CYB-\$AVE - Energy Control Module - **NEW**
- technical documentation available on tablet, smartphone and web access



Data management and traceability

- Recording the amount of raw materials used and the final product produced according to the recipe used and production
- date Transferring data to EXCEL® format Easily
- New and more detailed reports
- New diagnostic interface
- New CYB - \$AVE - Energy Control Module - **NEW**
- Fault detection and troubleshooting via remote service access via tablet, smartphone, web - **NEW**





MODEL	TOP TOWER 3000	TOP TOWER 4500
Capacity at %3 moisture	240 ton/h	340 ton/h
Dryer	E220 (L=9m - D=2,2m)	E250 (L=10m - D=2,5m)
Capacity	13,9 MW	22,5 MW
Filter Bags Total Surface	750 m ²	970 m ²
Hopper Under Filter Capacity	28 ton	45 ton
Vibrating Screen qty	5-6 selection	5-6 selection
Total Screen Surface	27,3 m ² - 32 m ²	40,2 m ² - 48,7 m ²
Hot Aggregate Bin Capacity	30 ton - 60 ton	87 ton - 140 ton
Compartman qty	bypass + 5-6 selection	bypass + 5-6 selection
Mixer Capacity	3.000 kg	4.500 kg
Mixer motor power	2x 37 kW	2x 55 kW
Product silo capacity	Std. 30ton - 1 comp 55ton - 2 comp 112ton - 2 comp	80ton - 2 comp 170ton - 2 comp
Recycling Systems	up to 30% RAP into dryer up to 40% RAP into mixer up to 60% RAP into dryer & mixer up to 80% RAP parallel dryer	up to 30% RAP into dryer up to 40% RAP into mixer up to 60% RAP into dryer & mixer up to 80% RAP parallel dryer





Customer service

MARINI offers its customers the experience and professionalism of a team of experts, capable of offering consultancy and finding solutions regarding retrofitting, service, spare parts, training.

We can work together to:

- renovate old plants with the integration of new components
- improve plant efficiency
- increase plant capacity

- bring the plant up to current emission and eco-standards
- add kits and other packages to benefit from recycling
- implement modern technologies for warm mix asphalt



Retrofitting

New technical solutions to existing plants, replacement of obsolete or dated technologies, new life to parts needing replacement, upgrade to improve and complete the asphalt plant to give it a new lease of industrial life: this is the target of retrofitting.

Together with our team of experts and consultants, customers can identify the best solutions to achieve reliability and quick return on investment.

Service

Expertise and professionalism of the MARINI team is the core of service, perfectly integrated in our CUSTOMER SUPPORT programme, with the aim of creating an ongoing relationship of excellence. Prompt efficiency, competence and knowledge support the day by day work and activities of our customers and plants all over the world.



Spare parts

Thanks to the experience accumulated over many decades and the expertise of its staff, MARINI is in a position to meet the requirements of the most demanding customers. The company can trace and supply spare parts also for plants which are out-of-production and when this is not possible our experts can always provide the best alternative technical solutions.

Customers can access our **online parts catalogues** from MARINI official website and inquire about parts availability and price at any time. Remember only genuine original MARINI spare parts and accessories guarantee reliability and high performance to your asphalt plant.



Training

Well prepared and competent staff guarantee the productivity and reliability of the plant. This is why we have designed a package of four different training programmes, implemented in the new Training Academy or directly on site.

MARINI training programmes:

- a basic course for asphalt plant operators
- how to manage and run the dryer burner



- how to maintain the Asphalt Plant
- CYBERTRONIC: the MARINI control system



**MARINI MAKİNA A.Ş.**

1. OSB Kırımlı Hanlığı Cad.
No:1 06935
Sincan / Ankara
TURKEY
Ph.: +90 (312) 386 33 22
Fax: +90 (312) 386 33 23
info@marini.com.tr
www.marini.com.tr

MARINI INDIA PVT LTD

AV/39-40-41 GIDC,
Sanand - Industrial Estate II,
BOL, Sanand Ahmedabad
382110 - Gujarat
INDIA
Ph.: +91 (0)75 7485 2816
support@marini.co.in
www.marini.co.in

MARINI SpA

Via Roma, 50
48011 Alfonsine (RA)
ITALY
Ph.: +39 0544 88 111
Fax: +39 0544 81 341
info@marini.fayat.com
www.marini.fayat.com

FAYAT MIDDLE EAST FZE

Jafza South
FZS1AH03 Dubai
U.A.E.
Ph.: +971 (0)4 8863233
Fax: +971 (0)4 8863234
marinime@emirates.net.ae
www.marini.fayat.com

MARINI CHINA

20, Huaxiang Road
Langfang
Economic and Technical
Development Zone
Hebei 065001
CHINA
Ph.: +86 (0)316 608 7001
Fax: +86 (0)316 608 7002
info@marini.com.cn
www.marini.com.cn

FAYAT BOMAG POLSKA sp. z.o.o.

Ul. Szyzkowa 52
02-285 Warszawa
POLAND
Ph.: +48 224820400
Fax: +48 224820401
www.bomag.com/pl/pl/home.htm
m.klosowski@fayat.pl

FAYAT BOMAG Rus OOO

Khimki, Klyazma block, h. 1-g
141400, RF,
Moscow
RUSSIA
Ph.: +7 (0)495 2879290
Fax: +7 (0)495 2879291

This is not a contractual document and reference should be made to individual offers. The manufacturer reserves the right to make modifications at any time (02/2019)