

Systems

## Amix Twin-Shaft Compulsory Mixers

Innovative technology

# There is a name for demanding mixing tasks – Amix

Mixing of building materials is one of our core competencies. Model trials, practice applied many times over, and decades of experience are the basis of our fundamental know-how. A high level of homogeneity, short mixing cycles, and precise reproducibility are the central requirements necessary for producing economical quality coated materials. The raw materials are different materials with different physical characteristics and aggregate states. A homogeneous, reproducible mixture is the end product. We know what we are talking about. Mixers that have proven themselves thousands of times and that are used daily in the most rugged applications speak a clear language.

## The principle

The principle behind the twin-shaft compulsory mixer has completely established itself in the area of mixing applications for concrete and asphalt. The reasons are efficient, thorough mixing and the massive reduction in costs associated with wear, relative to other technologies. Twin shafts ensure a high degree of homogeneity within a short time thanks to the combination of material transport and turbulent mixing and shear zone. Mixing efficiency and the systematic lifting of coated materials off the mixer floor are the two characteristic features of twin-shaft mixing technology, which together constitute the striking advantage over other mixer technologies.

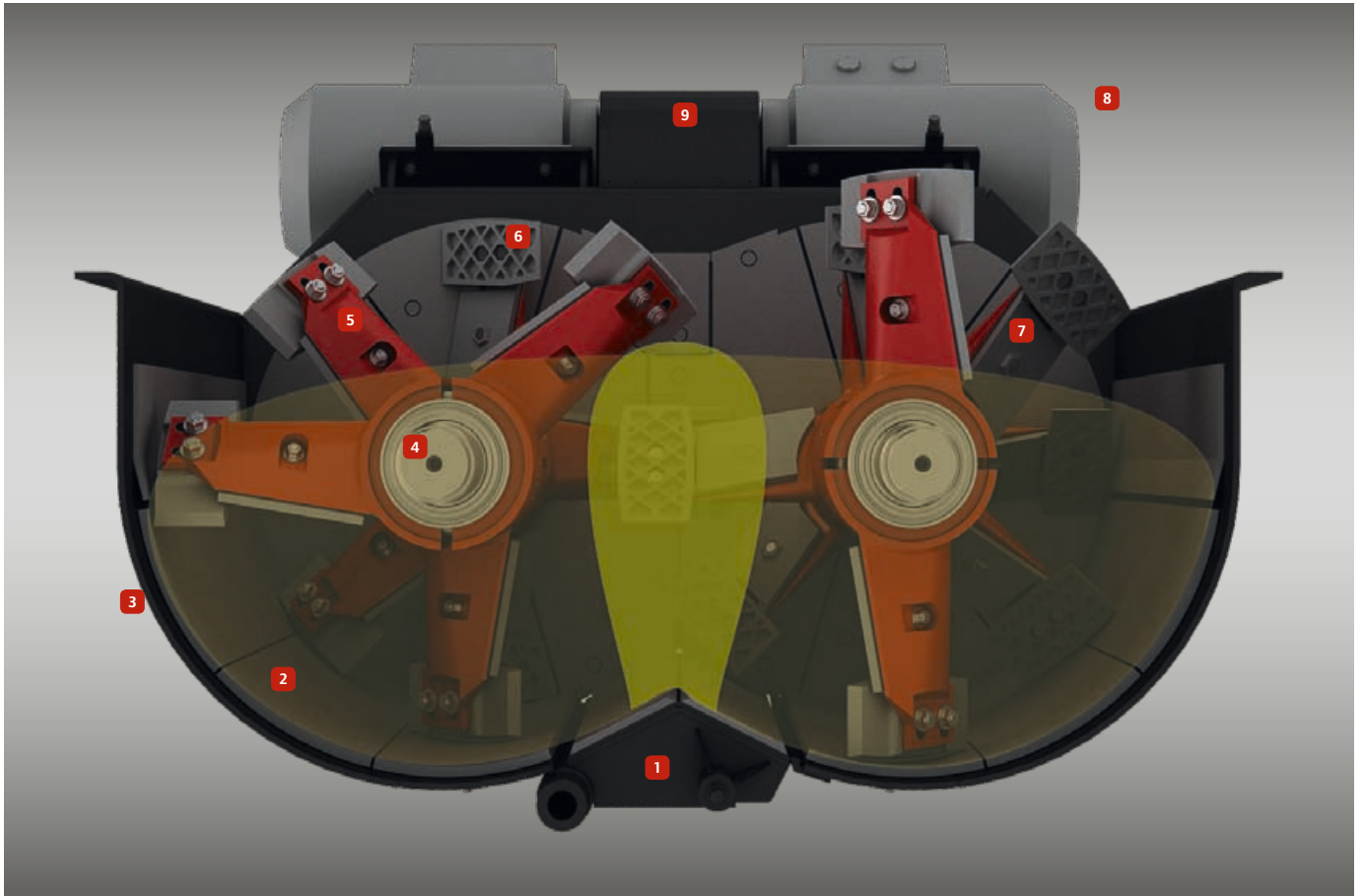
## Advantages at a glance

- Outstanding coated materials capacity, with high coated materials quality
- Low wear
- Fast reaction to different market requirements thanks to suitability for different mixing tasks

**“Quality is no coincidence!  
The Amix mixer reaches the  
required homogeneity in no time.”**

## The mixer

The ideal mixer must maximize as much relative movement as possible to the coated materials. The mixing arms and paddles must constantly and systematically apply forces that accelerate the particles of coated materials around the mixer body to produce a complete homogeneous blended mix. The twin-shaft compulsory mixer easily satisfies these requirements. In practical applications it has proven to be the ideal mixing tool for building materials, such as asphalt and concrete. The intersecting mixing arms/paddles ensure a high degree of homogeneity in the shortest time possible through the combination of material transport, mix and shear movement.



The Amix mixer ensures uniform, thorough mixture of the material

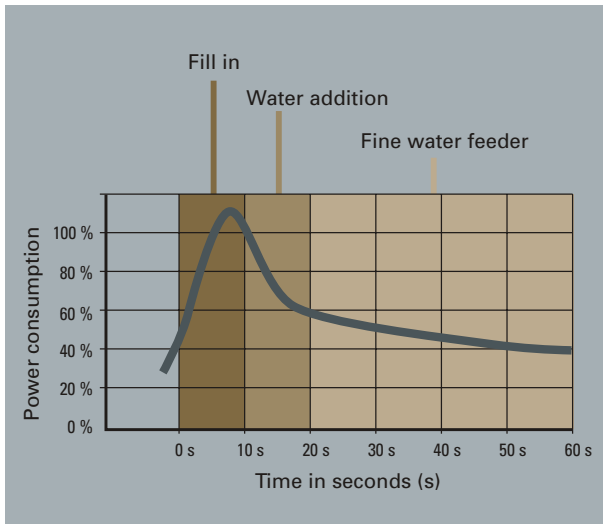
## The mixing process

The combination of circular material movement and transverse transport between the two shafts, ensures thorough mixing at an extremely high level. Thanks to the special arrangement and positioning of the mixing arms on the shafts, a systematic progressive movement and redistribution of the coated materials is achieved. The positioning of the mixer arms are all based on the same logic, which ensures a uniform, thorough mix over the entire length of the mixer body.

### Key

- 1 Mixer discharge gate
- 2 Liner plates
- 3 Mixer body
- 4 Mixer shafts
- 5 Agitator paddles
- 6 Mixer arms
- 7 Agitator arm guard
- 8 Drive cover
- 9 Drive motor
- Turbulent mixing and shear zone
- Material filling

Note: Increase the service life of your wear plates! Your Ammann contact would be pleased to provide you with information and advice on periodic service.



Power consumption in seconds

## The efficiency

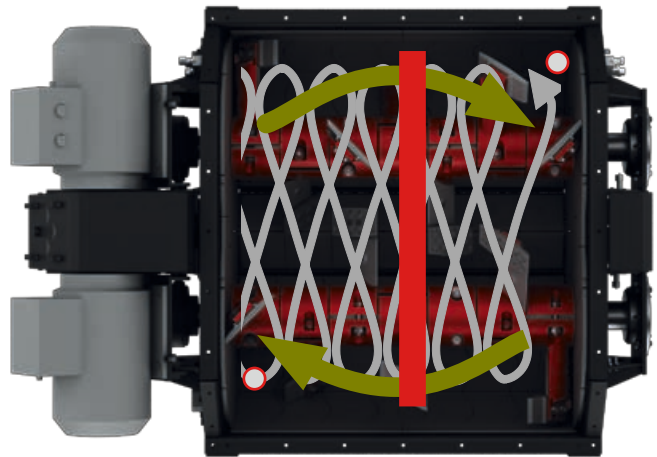
A level of mixing efficiency is reached that is significantly higher than that reached with products that are designed based on different mixing principles. Recording power consumption makes it possible to assess the level of homogeneity reached, and thus fulfilment of the mixing task can be precisely specified. Using concrete production as the example, the adjacent graphic shows that after 15 seconds an extremely high level of homogeneity is reached, based on the change in power consumption. The same measuring principle governs the mixer fill level, residence time, and thus coated material capacity for continuous mixers.

## Reproducibility

The principle behind the twin-shaft compulsory mixer with its permanently connected agitator planes and the intersecting mixing circles always forces material transport in the same progression. This necessarily results in a high level of reproducibility of the mixing results obtained.

## Optimal filling of the mixer

Due to the material movement in the mixer an optimal position occurs for filling. We recommend filling in the middle of the mixer (based on the longitudinal axis). This causes the material (stone, bitumen, filler, etc.) to be distributed uniformly in both directions. The great advantage: Fast and thorough mixing of the material and thus fast homogeneity.



### Key to material movement in the mixer

- Basic movement due to displacement of the individual shaft
- Shear movement due to the interaction of the 2 shafts
- Optimal filling of the mixer
- When filling avoid: because of slower distribution of the material, i.e. delayed homogeneity

## Ammann mixes:

### Asphalt products, like

- Sub base (HMT)
- Aggregate base (AB)
- Stone mastic asphalt (SMA)
- Reclaimed asphalt pavement
- Poured asphalt
- Foamed asphalt
- Asphalt emulsion
- Mineral sealing's

### Concrete products, such as:

- Ready-mixed concrete
- Different types of mortar
- Flow-able concrete, to self-compacting concrete (SCC)
- Ultra high-performance concrete (UHPC)
- Lightweight concrete
- Coloured concrete
- Fibre concrete
- Hydraulically bound sub bases



**Top Fig:** Universal NG 300 with the Amix3\_5.00A asphalt mixer Maximum mixer capacity: 5 t/h  
**Bottom Fig:** The JustWhite concrete mixing system with the Amix2\_3.00SB with a capacity of 1.5 m<sup>3</sup> / batch



## Practical examples and our solutions



OP 11

### Open-pore asphalts OPA

The open pore asphalts types, also referred to as 'self drain' asphalts or 'low noise' asphalt are characterized by their open grading, resulting in relatively high proportions of coarse stone which causes contiguous cavities within the asphalt. The advantage of this type of product is that rain water simply flows off and the cavities have an acoustic-insulation effect.

**Consequence:** Here the challenge is to achieve a high level of homogeneity in the shortest time possible. With the overlapping movement zones, combined with the coated materials that lift off in the mixing process, in this application the twin-shaft compulsory mixer offers a clear advantage.



SMA 11

### Stone mastic asphalt SMA

Stone mastic asphalt is a special asphalt with 'gap grading' similar to 'open pore' asphalts. In addition it has increased binder and filler content, so that a cavity occurs in the same manner as in normal asphalt. Frequently the binders are enhanced with polymers. It is particularly well suited for durability under high stress or for high traffic volumes. To increase stress resistance and to avoid segregation prior to installation, stabilizing additives, such as cellulose are added to the mix design of the SMA.

**Consequence:** A difficult mixing task for which the twin-shaft compulsory mixer is a most effective solution. The pronounced shear forces in this mixing process must be overcome, and the materials differing consistency must be quickly transformed into a homogeneous mixture. The mixing time extension of 10 % to 50 % due to these factors can be significantly reduced by using a double-arm agitator pattern.

## Self-compacting concrete - SCC

“Self-compacting concrete” does not need to be vibrated. It flows around the reinforcement on its own and is self-levelling. To obtain this type of flowable consistency high-performance concrete liquefiers are added to the coated materials. The specific characteristics of SCC, such as high viscosity and strength, as well as autonomous venting are extremely sensitive to fluctuations in the quality and quantity of the mixing components. For production of this type of concrete, the most important factors are precisely dosing the amount of water and consideration of the moisture of the aggregates.

**Consequence:** The excellent flow characteristics of this concrete impose rigorous requirements on the seal of the mixer discharge gate, as well as on the shaft seals, and on the capability to homogeneously mixing liquid materials. The superposed movement zones combined with systematic redistribution of the coated materials are the prerequisites for this difficult mixing task. The adjustable wear plates of the mixer discharge gate ensure a good seal over time.

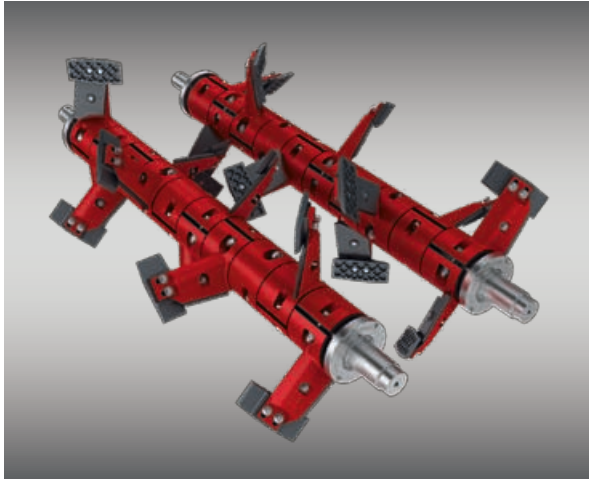
## Ultra-high performance concrete UHPC

“Ultra-high performance concrete” has a high level of strength that is far superior to that of normal concrete. These characteristics are achieved thanks to the addition of strengthening liquid additives, steel or plastic fibres, which bolster and strengthen the concrete. Bearing structures made of UHPC have a dead load that is 30% to 50% lower than that of normal concrete. Thus bridges can be built with simple pre-stressing systems and without steel-reinforced concrete. In addition UHPC has an extremely high structural density and hardly has any pores. UHPC is virtually impermeable to liquids, and this feature is the basis of the long service life of this type of concrete.

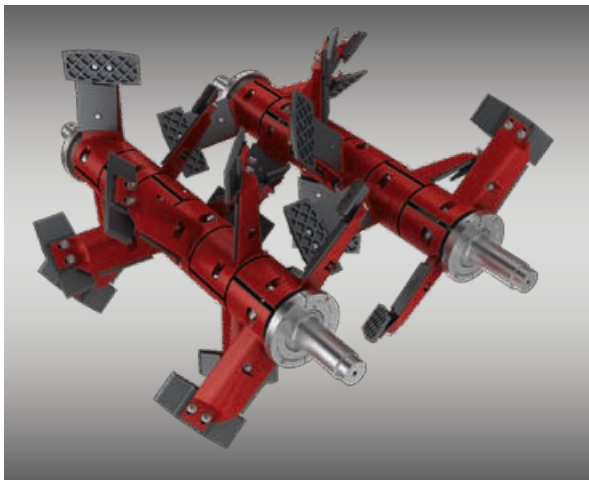
**Consequence:** A difficult mixing task for which the twin-shaft mixer is a most effective solution: The predominant shear forces in this mixing process help the materials of different consistency transform quickly into an homogeneous mixture. If there are increased requirements imposed on homogeneity or mixing time the mixer can also be equipped with a double-arm agitator pattern. In combination with high-precision water dosing, and efficient consistency control the twin-shaft compulsory mixer provides optimal results for this application.



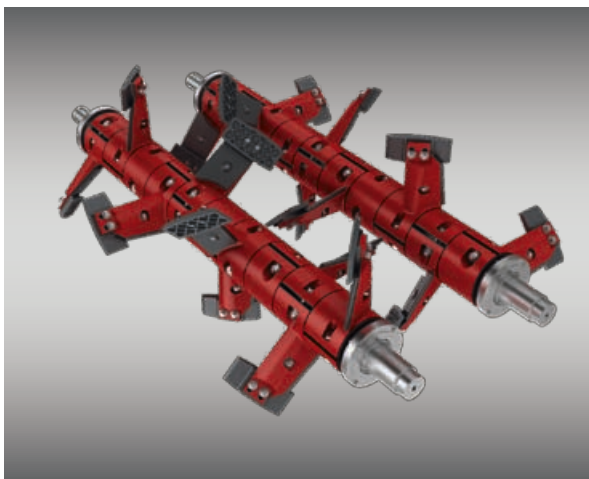
# The Amix offers the right agitator pattern for any mixer task



Single-arm agitator pattern



Double-arm agitator pattern



Special pattern

The Amix can handle all your mixing requirements. Largely the excellent quality and efficiency of the thorough mixing process is mainly determined by the positioning of the agitator arms, i.e. the pattern and arrangement of the arms on the shafts, and the synchronization of these arms.

## Single-arm agitator pattern

The single arm agitator arrangement is used in most mixing tasks. The positioning of the arms on the shaft, as well as the angle of the agitator paddles which turn in the turbulent mixing zone result in a uniformed application of energy and behaviour to the coated materials over the entire length of the mixer body. This ensures that the shortest possible mixing times are achieved. This agitator arm pattern suffices most mixing tasks and it represents a compromise between mixing capacity, energy utilization and operating costs.

## Double-arm agitator pattern

The double-arm agitator pattern is recommended for extremely demanding mixing tasks. Powerful and intensive, thorough mixing results in a mixing process that is twice as fast. Naturally the higher speed is also associated with higher levels of wear and higher energy costs. This agitator arm pattern is ideally suited for particularly demanding mixing tasks, for which the shortest possible mixing times and excellent homogeneity are required.

## Special patterns

The agitator arm patterns used for 'continuous flow', 'flow-type', 'pug mill' and hybrid type mixers are customised for the respective application. Thanks to different weighting of displacement, shear effect and transverse movement, the mixer can be configured for any desired quality characteristic. The possibilities of exploiting this technology by having the flexibility are only achievable with the twin shaft compulsory mixer. The twin shafts make it possible to custom build the mixer to any desired mixing task.





Weighing and mixing level with a 4-ton asphalt mixer

## Low wear for the trough lining and agitator arms saves money

Twin shaft technology offers fundamental and significant advantages where wear is concerned. Thanks to the twin shaft compulsory mixers design, shorter mixing times are achieved, minimising the time the coated materials are in contact with the trough lining. This results in longer service life of the parts subjected to wear.

Geometry and material planning of the wear parts used are always designed for a long service life. Particular care was devoted to ensure service life of the trough lining, which is difficult to replace, that is approximately 5 times that of the agitator arm paddle. The agitator arm paddles can be adjusted and they can be turned, thanks to the symmetric shape. This feature noticeably extends the service life of the paddles. The manner in which the individual plates are fastened ensures easy replacement.

The wear behaviour of each mixer can vary and significantly depends on the physical condition of the mineral substances used, and on the dry mix / wet mix time ratio. Individual material pairings and especially hardened wear plates can be implemented for special applications.

### Lower operating costs

The service life of the wear parts in the mixer will influence the overall operating costs of the plant, which can be significant. Original Ammann wear parts are characterised by high resistance to abrasion and wear. Thanks to a symmetrical design of the agitator paddles that can be adjusted and rotated, longer service life is achieved.

# Asphalt mixer

## Discharge gate geometry

The mixer discharge gate is generously dimensioned and runs the full length of the mixer trough ensuring extremely short emptying times of under 10 seconds. The gate design and geometry ensures a tight seal. Its configuration and wipe off effect also prevents material residues from building up and jamming the gate mechanism.

## Central lubrication

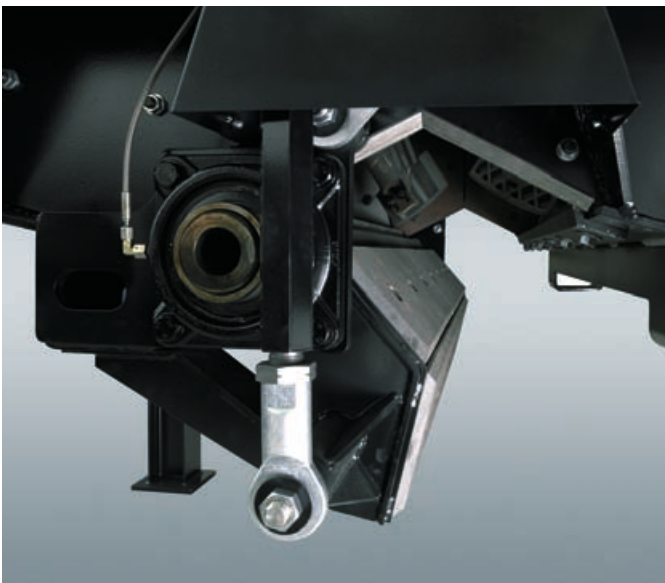
For systems with extremely high production capacity, or a high level of automation, an automatic central lubrication can be used for the lubricating points of the mixer. The specific lubricating points are supplied with grease as needed via a grease tank with fill level monitoring.

## Agitator arm guard

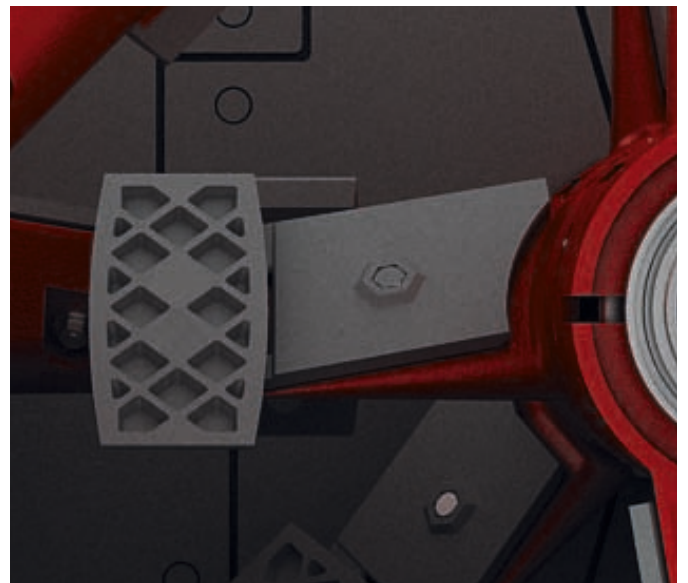
In the case of particularly abrasive material the agitator arms can be protected against increased wear by an extremely wear-resistant guard.

## Heater

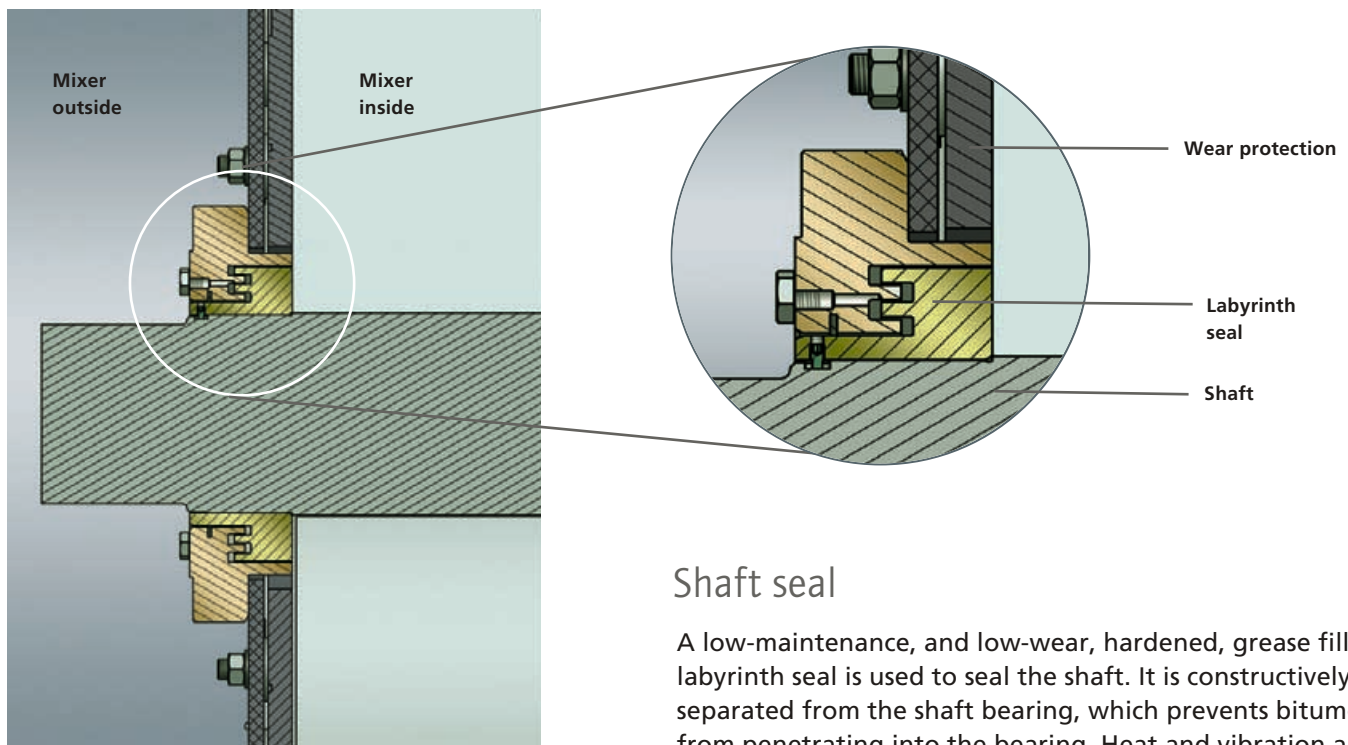
The Amix mixer can be equipped with an additional trough heater. The heater enables the mixer body to be heated prior to production or after a production interruption akin to the coated material temperature.



A large mixer discharge gate enables fast emptying



All wear parts of the Amix are made of highly-resistant chilled cast iron



### Shaft seal

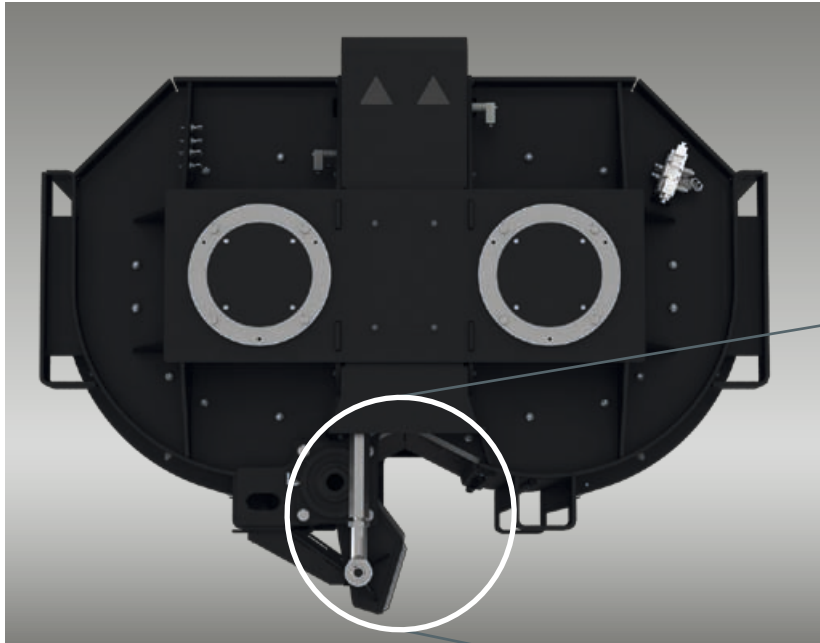
A low-maintenance, and low-wear, hardened, grease filled labyrinth seal is used to seal the shaft. It is constructively separated from the shaft bearing, which prevents bitumen from penetrating into the bearing. Heat and vibration are kept away from the bearing.

## Technical specifications - asphalt mixers

	AMIX1			AMIX2			AMIX3		
Batch mixing plant	AMIX1_0.75A	AMIX1_1.25A	AMIX1_1.75A	AMIX2_2.00A	AMIX2_3.00A	AMIX2_4.00A	AMIX3_5.00A	AMIX3_6.00A	AMIX3_8.00A
Batch size	0.75 t / Bat.	1.25 t / Bat.	1.75 t / Bat.	2 t / Batch	3 t / Batch	4 t / Batch	5 t / Batch	6 t / Batch	8 t / Batch
Output <sup>1)</sup>	60 t/h	100 t/h	140 t/h	160 t/h	240 t/h	300 t/h	350 t/h	390 t/h	480 t/h
Continuous mixer			AMIX1_1.75CA			AMIX2_4.00CA			
Output			180 t/h			360 t/h			
<b>Basic data</b>									
Qty of motors	1	1	2	2	2	2	2	4	4
Drive power output	22 kW	30 kW	22 kW	30 kW	37 kW	45 kW	55 kW	37 kW	45 kW
Agitator level	5	8	11	5	7	10	6	7	9
Length inside	900 mm	1440 mm	1980 mm	1200 mm	1680 mm	2400 mm	1860 mm	2170 mm	2790 mm
Width inside	1390 mm			1910 mm			2500 mm		
Agitator circular diameter	790 mm			1080 mm			1420 mm		
Distance between axle	600 mm			830 mm			1090 mm		
Gross capacity (CECE)	0.82 m <sup>3</sup>	1.32 m <sup>3</sup>	1.81 m <sup>3</sup>	2.06 m <sup>3</sup>	2.88 m <sup>3</sup>	4.12 m <sup>3</sup>	5.52 m <sup>3</sup>	6.44 m <sup>3</sup>	8.28 m <sup>3</sup>
Net capacity (CECE)	0.74 m <sup>3</sup>	1.19 m <sup>3</sup>	1.63 m <sup>3</sup>	1.85 m <sup>3</sup>	2.60 m <sup>3</sup>	3.71 m <sup>3</sup>	4.97 m <sup>3</sup>	5.79 m <sup>3</sup>	7.45 m <sup>3</sup>
Filling degree	0.57	0.60	0.61	0.59	0.64	0.59	0.54	0.56	0.58

<sup>1)</sup> For residence time of the components that is not time-critical and non-special asphalts. 80 batches / hour correspond to a 45-second cycle time for the small and medium sized mixers

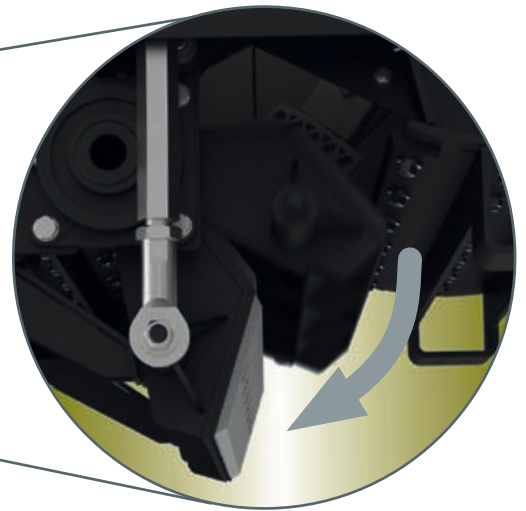
# Concrete mixers



Mixer discharge gate with different intermediate settings

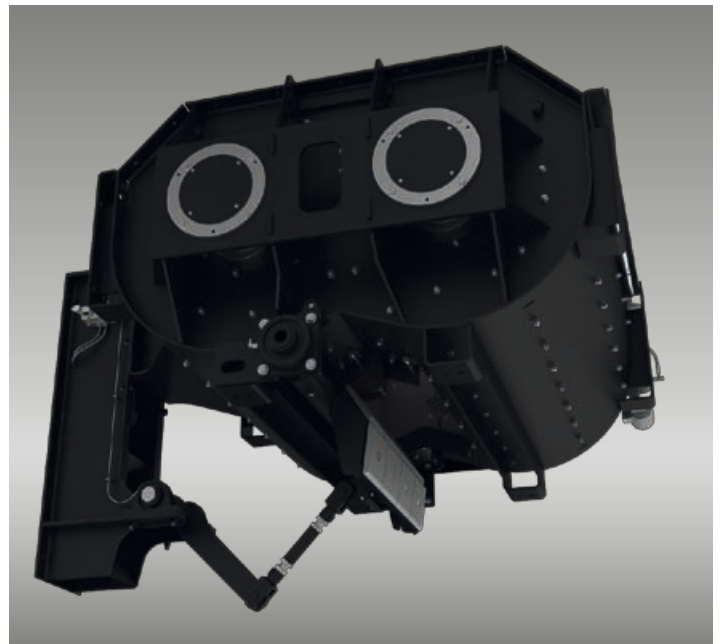
## Loading coated materials

The mixer discharge gate has adjustable and selectable intermediate settings and ensures continuous material discharge that is adapted to the transport vehicle.

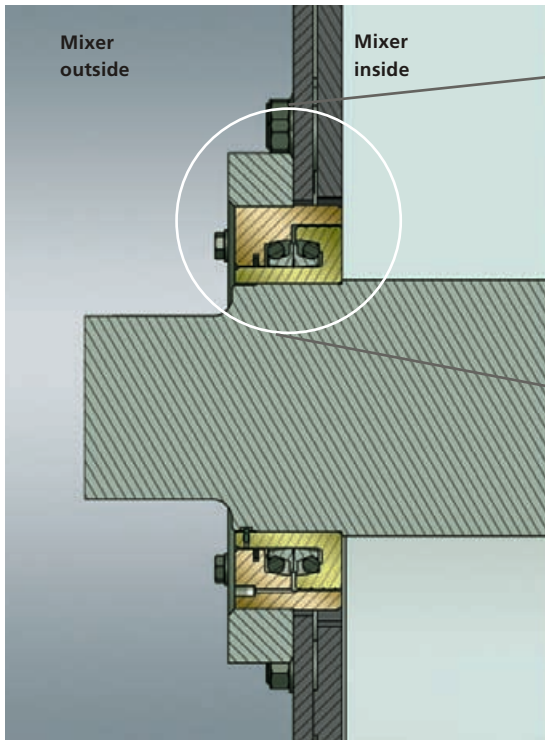


## Retracted mixer discharge gate

The retracted mixer discharge gate enables efficient loading on truck mixers. The compact design channels the material flow and optimally adapts to the limited withdrawal capacity of the truck mixer. One advantage of this construction is the lower height of the total system, which is approximately one meter lower. This can be a crucial factor if there is a height limit.

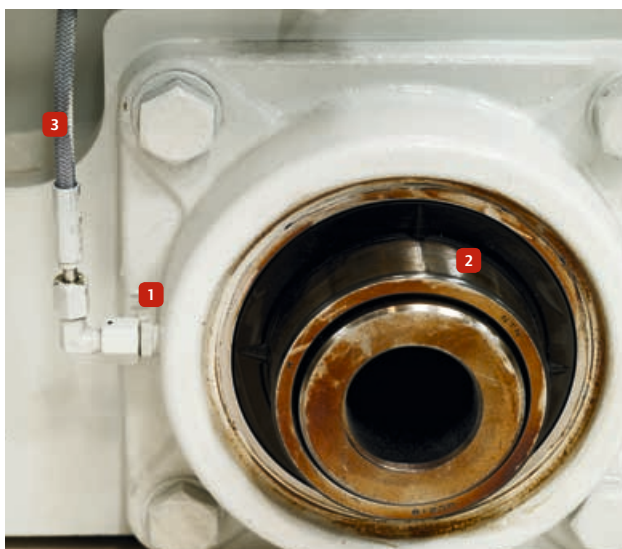


Concrete mixer with retracted mixer discharge gate



## Shaft seal

The tried and tested axial face seal with grease chamber is used to seal the mixer shafts. It is constructively separated from the shaft bearing so that cement residue cannot penetrate into the roller bearing.



## Central lubrication

The mixer is factory-equipped with an automatic central lubrication system. The specific lubricating points are supplied with grease, as needed, via a grease tank with fill-level monitoring. Supply of a continuous grease flow to the shaft seal is additionally ensured via a pulse-controlled grease flow monitor.

### Key

- 1** Line from the grease tank
- 2** Shaft
- 3** Central lubricating point

## Technical specifications - concrete mixers

	AMIX1	AMIX2		AMIX3		
Batch mixer		AMIX2_3.00B	AMIX2_4.00B	AMIX3_5.00B	AMIX3_6.00B	AMIX3_8.00B
Batch size		1.50 m <sup>3</sup> / Batch	2.00 m <sup>3</sup> / Batch	2.50 m <sup>3</sup> / Batch	3.00 m <sup>3</sup> / Batch	4.00 m <sup>3</sup> / Batch
Output <sup>1)</sup>		77 m <sup>3</sup> / h	96 m <sup>3</sup> / h	113 m <sup>3</sup> / h	127 m <sup>3</sup> / h	151 m <sup>3</sup> / h
Output <sup>2)</sup>		83 m <sup>3</sup> / h	105 m <sup>3</sup> / h	125 m <sup>3</sup> / h	144 m <sup>3</sup> / h	176 m <sup>3</sup> / h
Quantity of motors		2	2	2	4	4
Drive power output		37 kW	45 kW	55 kW	37 kW	45 kW
Continuous mixer	AMIX1_1.75CB		AMIX2_4.00CB			
Output	90 m <sup>3</sup> / h (HGT)		180 m <sup>3</sup> / h (HGT)			
<b>Basic data</b>						
Agitator level	11	7	10	6	7	9
Length inside	1980 mm	1680 mm	2400 mm	1860 mm	2170 mm	2790 mm
Width inside	1390 mm	1910 mm		2500 mm		
Agitator circular diameter	790 mm	1080 mm		1420 mm		
Distance between axle	600 mm	830 mm		1090 mm		
Gross capacity (CECE)	1.81 m <sup>3</sup>	2.88 m <sup>3</sup>	4.12 m <sup>3</sup>	5.52 m <sup>3</sup>	6.44 m <sup>3</sup>	8.28 m <sup>3</sup>
Net capacity (CECE)	1.63 m <sup>3</sup>	2.60 m <sup>3</sup>	3.71 m <sup>3</sup>	4.97 m <sup>3</sup>	5.79 m <sup>3</sup>	7.45 m <sup>3</sup>
Filling degree	0.68	0.69	0.64	0.59	0.60	0.63

<sup>1)</sup> At 30 sec. wet mix time and truck mixer charging capacity of 0.12 m<sup>3</sup> fresh concrete per second

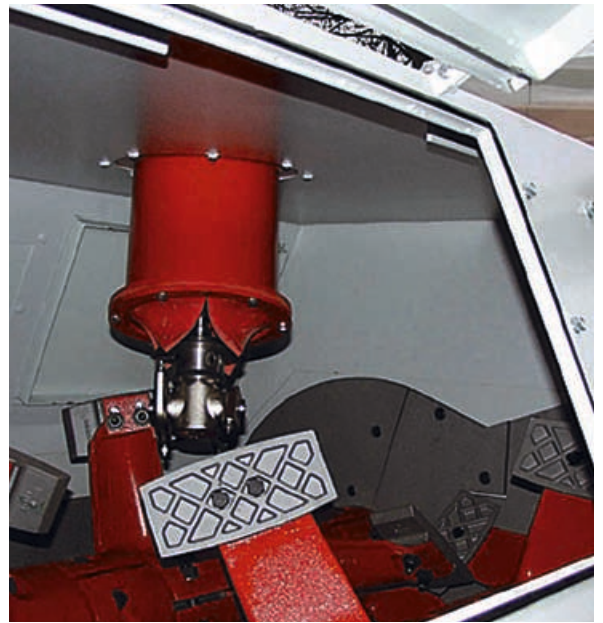
<sup>2)</sup> At 30 sec. wet mix time and a discharge capacity of 0.18 m<sup>3</sup> fresh concrete per second



## Supplemental equipment - concrete mixers

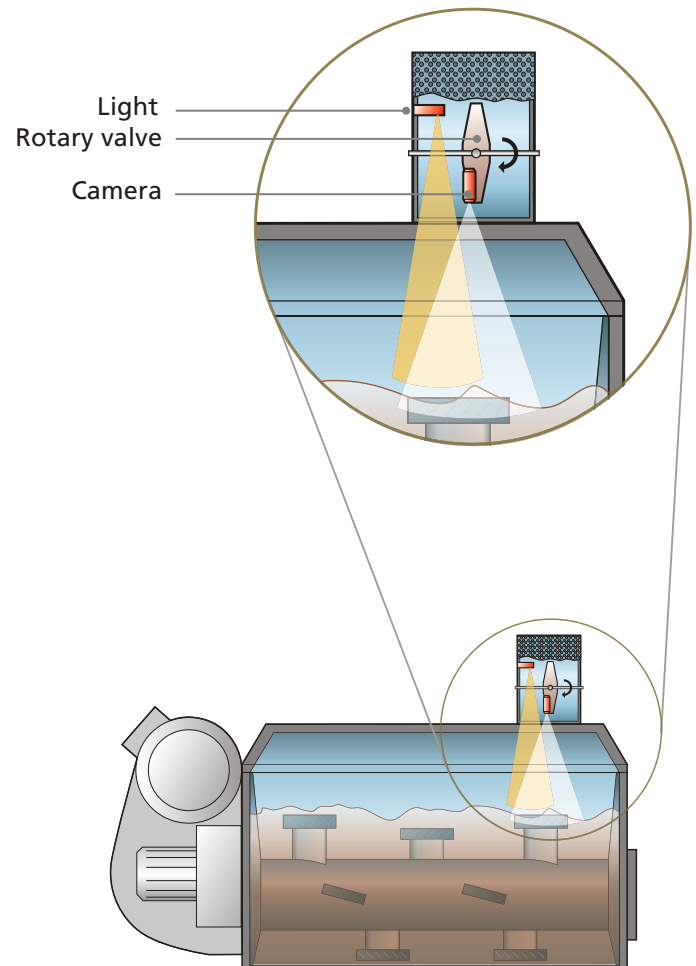
### Mixer washing system

An automatic high-pressure washing system (160 bar) with rotating wash head is available to clean the mixer. The cleaning efficiency is greater than 85%. An optional hand lance can be used to complete the cleaning process. The mixer washing system is extremely low-maintenance and has an extremely long service life.



### Mixer camera

The mixer camera enables visual evaluation of the coated material. With the mixer camera homogeneity of concrete, distribution of additives, as well as possible nest formation can be detected prior to emptying. The required supplement for the camera installation is the active mixer de-dusting system.



**Switzerland**

Ammann Schweiz AG  
Eisenbahnstrasse 25  
CH-4901 Langenthal  
Tél. +41 62 916 61 61  
Fax +41 62 916 66 77  
amp@ammann-group.ch

**Germany**

Ammann Asphalt GmbH  
Hannoversche Strasse 7-9  
D-31061 Alfeld (Leine)  
Tél. +49 5181 760  
Fax +49 5181 2 52 82  
ammann@ammann.de

**Italy**

SIM – Società Italiana Macchine S.p.A.  
Via dell'Industria, 1  
I-37012 Bussolengo (VR)  
Tél. +39 045 6764 911  
Fax +39 045 6701 192  
sim@simammann.it  
www.simammann.it

**France**

Ammann France SA  
Z.I. Les petites Haies  
31-33 rue de Valenton  
F-94046 Créteil/Cedex  
Tél. +33 1 45 17 08 88  
Fax +33 1 45 17 08 90  
contact@ammann.fr

**Austria**

Ammann Austria GmbH  
Neuhaus 9  
A-4114 Neuhaus  
Tél. +43 7232 29 9 44 0  
Fax +43 7232 29 9 44 24  
aea@ammann-group.com

**Benelux**

Ammann Benelux BV  
P.O. Box 64  
NL-6000 AB Weert  
Tél. +31 495 453 111  
Fax +31 495 453 222  
ammann.abx@hetnet.nl

**Great Britain**

Ammann Equipment Ltd.  
Bearley, Stratford-upon-Avon,  
Warwickshire CV37 0TY, England  
Tél. +44 17 89 203 235  
Fax +44 17 89 298 542  
sales@ammannuk.co.uk

**Poland**

Ammann Polska Sp.z.o.o.  
ul. Jutrzenki 84  
PL-02-230 Warszawa  
Tél. +48 22 33 77 900  
Fax +48 22 33 77 929  
ammann@ammann.com.pl

**China**

Ammann Construction  
Machinery Shanghai Co. Ltd.  
No.1609, Hui Bin Road,  
Qingpu Industrial Zone,  
Shanghai 201700, P.R. China  
Tél. +86 21 5986 8811  
Fax +86 21 5986 8800  
ammann@ammann.com.cn

**Russia**

Ammann Russland o.o.o.  
Ul. Urzhumskaja 4  
RU-129343 Moskau  
Tél. +7 495 933 35 61  
Fax +7 495 933 35 67  
info@ammann-russia.ru

**Romania**

Ammann Group Romania S.R.L.  
Aleea Tibles Nr. 26  
Parter, Sector 6  
RO-060233, Bucharest  
Tél. +40 21 315 36 24  
+40 21 301 90 47  
Fax +40 21 315 36 25  
info@ammann-group.ro

**Middle East**

Ammann Asphalt NME  
P.O. Box 293668, Dubai Airport Free Zone  
Building J1, Warehouse J05, Dubai  
United Arab Emirates  
Tél. +97 142 991 446 / 7  
Fax +97 142 991 449  
f.rjeili@ammann.ae

**Ukraine**

OOO "Ammann Ukraine"  
ul.Dimitrowa, 5  
03150 Kiew  
Tél. +38 044 499 0455  
Fax +38 044 499 0456  
anatoly.bytsenko@ammann-group.com

**Czech Republic**

Ammann Asphalt GmbH  
Príkop 6  
CZ-60200 Brno  
Tél. +42 0545 175 940  
Fax +42 0545 175 941  
kucera@ammanncz.cz

[www.ammann-group.com](http://www.ammann-group.com)