DILLMAN COUNTERFLOW UNIDRUM®

ASPHALT DRYER/MIXER

ASTEC

ASTEC

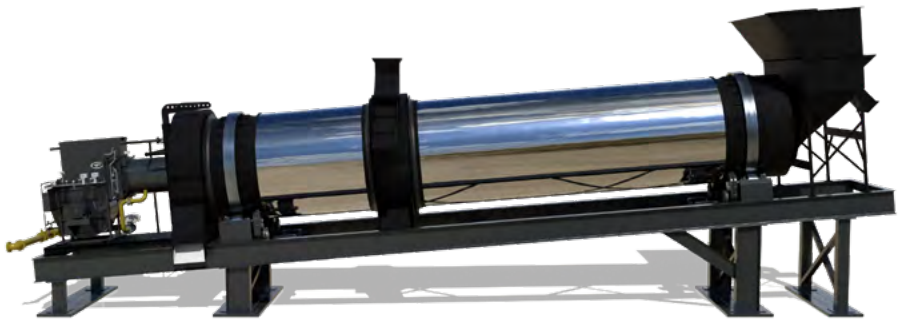
DILLMAN UNIDRUM DRYER/Mixer

The UniDrum mixer offers asphalt pavement producers a heavy-duty drum that generates high quality mix.

The UniDrum counterflow drum can process up to 50% RAP.* It is offered in both portable and relocatable arrangements, as part of complete new plants or for retrofit applications. Production capacities range from 300 to 600 tons per hour (182 to 544 tonnes per hour) at 5% moisture.

UniDrum
RELOCATABLE

Up to 50% RAP*



DRUM SIZE	MIXING CHAMBER	TPH (MTPH)
7.5′ x 50′ (2.3m x15.2m)	17′ (5.2m)	300 TPH (272 MTPH)
8.5′ x 50′ (2.6m x15.2m)	19′ (5.8m)	400 TPH (363 MTPH)
9.5′ x 54′ (2.9m x16.5m)	19′ (5.8m)	500 TPH (454 MTPH)
10.5′ x 60′ (3.2m x18.3m)	24′ (7.3m)	600 TPH (544 MTPH)

UniDrum
PORTABLE

Up to 50% RAP*

DRUM SIZE	MIXING CHAMBER	TPH (MTPH)
7.5′ x 50′ (2.3m x15.2m)	17′ (5.2m)	300 TPH (272 MTPH)
8.5′ x 50′ (2.6m x15.2m)	19′ (5.8m)	400 TPH (363 MTPH)
9.5′ x 52′ (2.9m x15.8m)	19′ (5.8m)	500 TPH (454 MTPH)

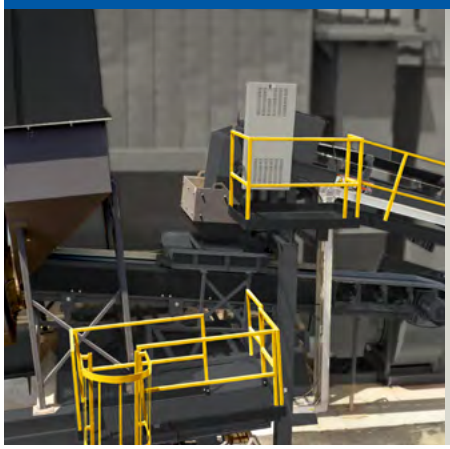
*50% is achieved with patented V-Pac

UniDrum

MATERIAL FLOW

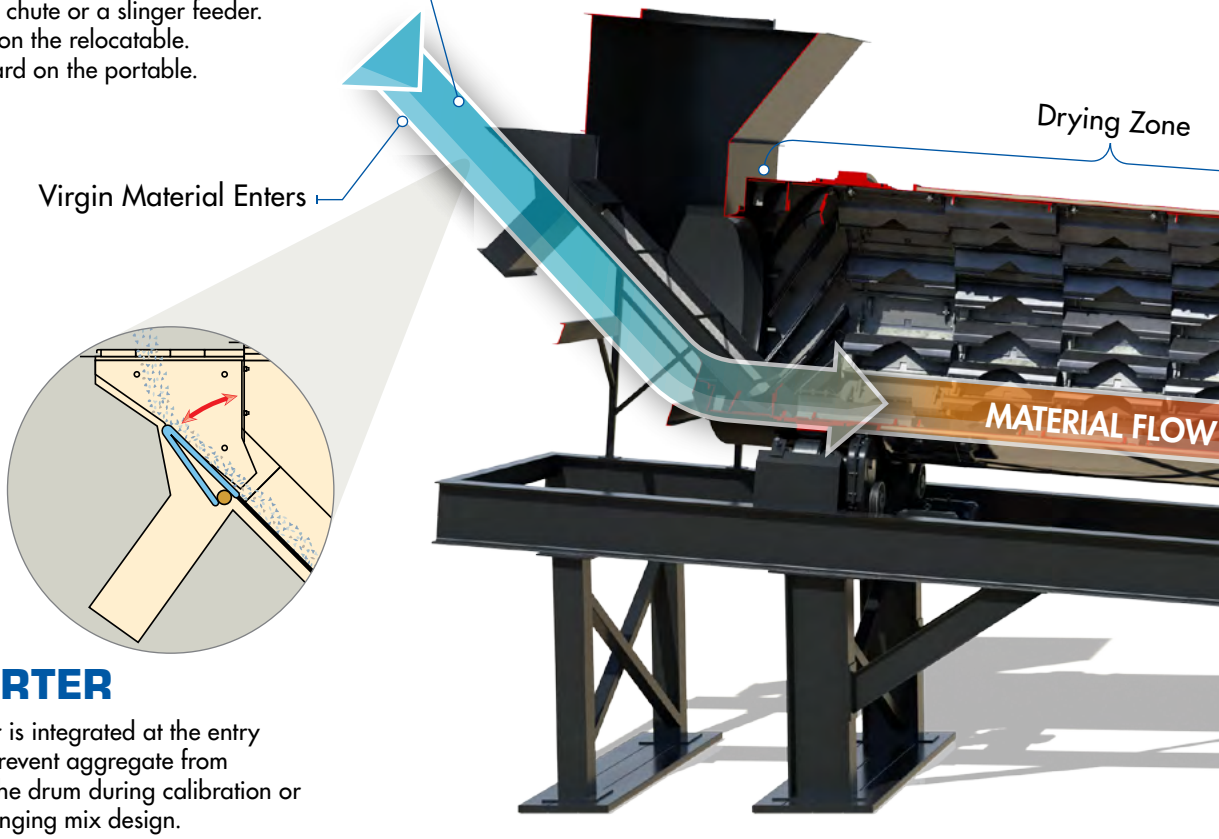
As aggregate enters the drum from the conveyor, it passes through the entry gate, which minimizes air leakage into the drum. From there, it passes through a series of flights that veil aggregate through the burner's gas stream, transfering heat from the burner to the aggregate. The aggregate continues along the drum behind the extended nose burner where dust, RAP, filler, additives, and liquid AC are added sequentially in a flame-free environment. In this zone, the constituents are mixed for the remainder of the drum length before exiting to the drag conveyor.

Optional Slinger Feeder



SEALED AGGREGATE ENTRY

A sealed aggregate entry chute minimizes air in the baghouse. Minimizing the amount of air that enters the baghouse helps maintain production by reducing the chance of baghouse mudding. You have the choice to configure the drum with either a gravity feed chute or a slinger feeder. Gravity feed is standard on the relocatable. A slinger feeder is standard on the portable.

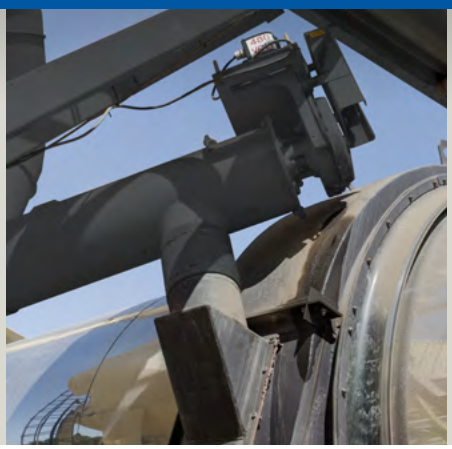


DIVERTER

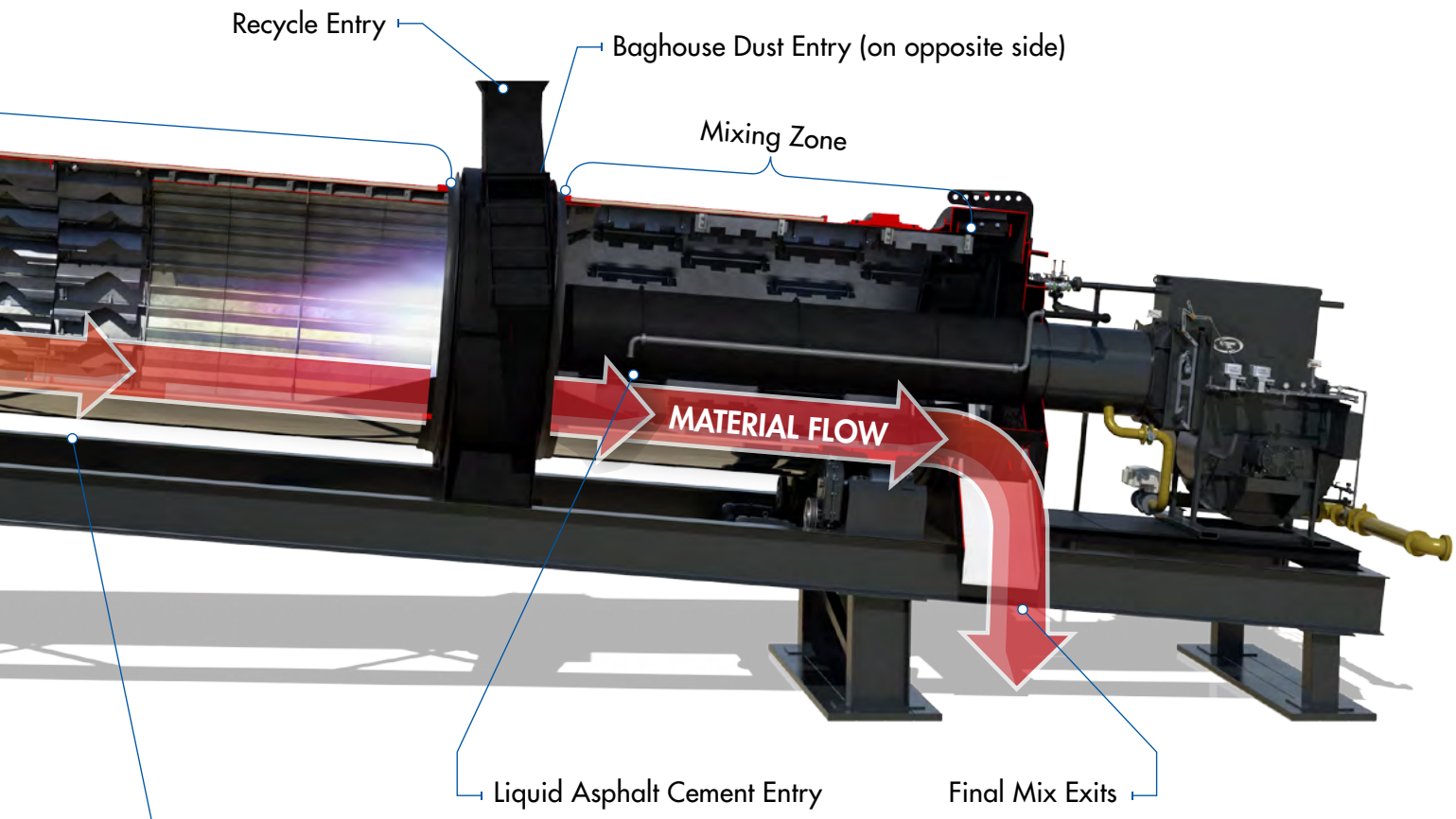
A diverter is integrated at the entry point to prevent aggregate from entering the drum during calibration or when changing mix design.

Recycle Entry

Baghouse Dust Entry



Final Mix Exit



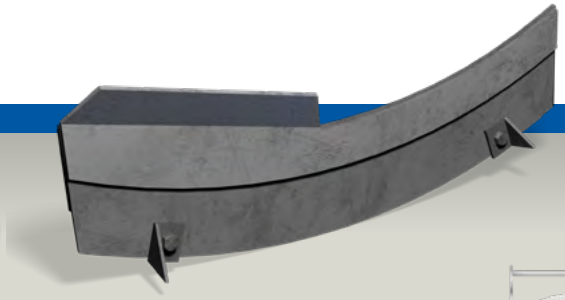
EXTRA-LONG DRUM

With an extra-long drum, the Dillman UniDrum mixer is uniquely capable of producing quality mix at a high production rate with a high percentage of recycle. The extra-long drum length maximizes mixing and drying times to reduce fuel consumption and provide superior mixing.

UniDrum

DRYING

Drying of the virgin aggregate is the first step in the mix process and takes place in the first portion of the drum. The drying process begins when the virgin aggregate enters the inner drum through a sealed aggregate entry chute. The sealed chute restricts air entry into the drum while allowing the aggregate to pass through. The angle of the ceramic-lined inlet chute keeps material flowing freely into the drum. State-of-the-art flights move the material through the drying zones. Once dried and heated, the aggregate leaves the drying zone of the drum and moves past the burner nozzle into the mixing zone of the drum.

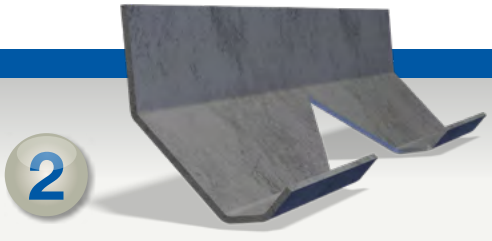


1

FEEDER FLIGHTS

Move material into the drying portion of the drum

Feeder flights guide aggregate as it enters the drum, helping it move efficiently toward the v-flights.



2

V-FLIGHTS

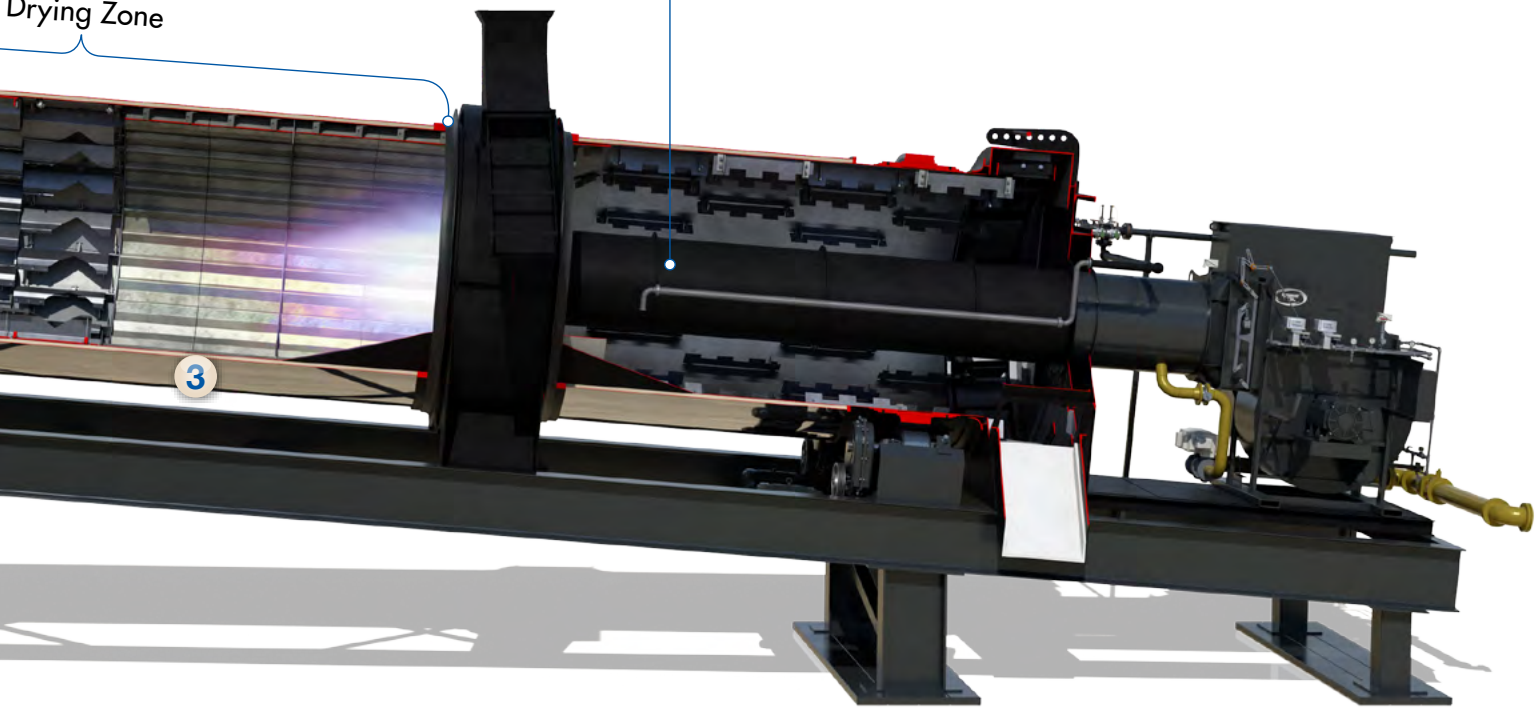
Provide greater uniformity of aggregate veiling through the gas stream during the drying process, across a wide variety of mix designs and tonnage rates

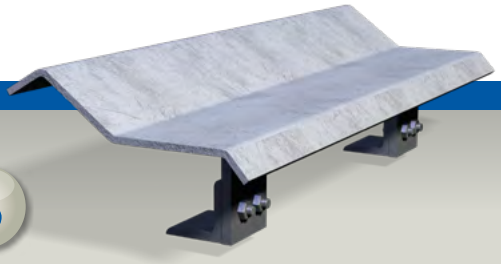
The v-shaped notch allows material to start pouring out of the bucket at the beginning of each revolution. The material in the bucket continues to pour out until the rotation is complete. This is what provides an even veil of material. The v-flight is also larger than a traditional flight, allowing it to carry the same amount of aggregate even with the notch.

U.S. Patent No. 9,835,374

EXTENDED NOSE BURNERS

The extended nose puts the flame up close to the aggregate to maximize drying, while keeping the flame away from the RAP and liquid AC to minimize oxidation and drum fires.

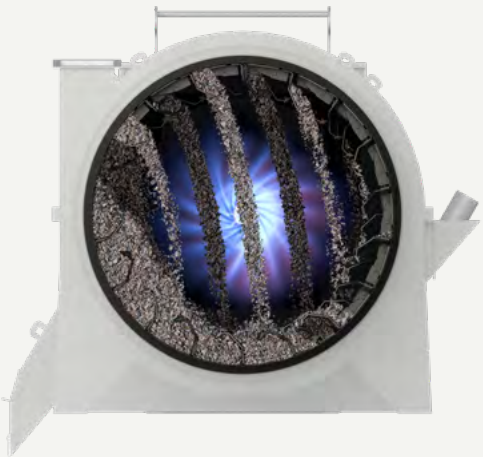




3

COMBUSTION FLIGHTS

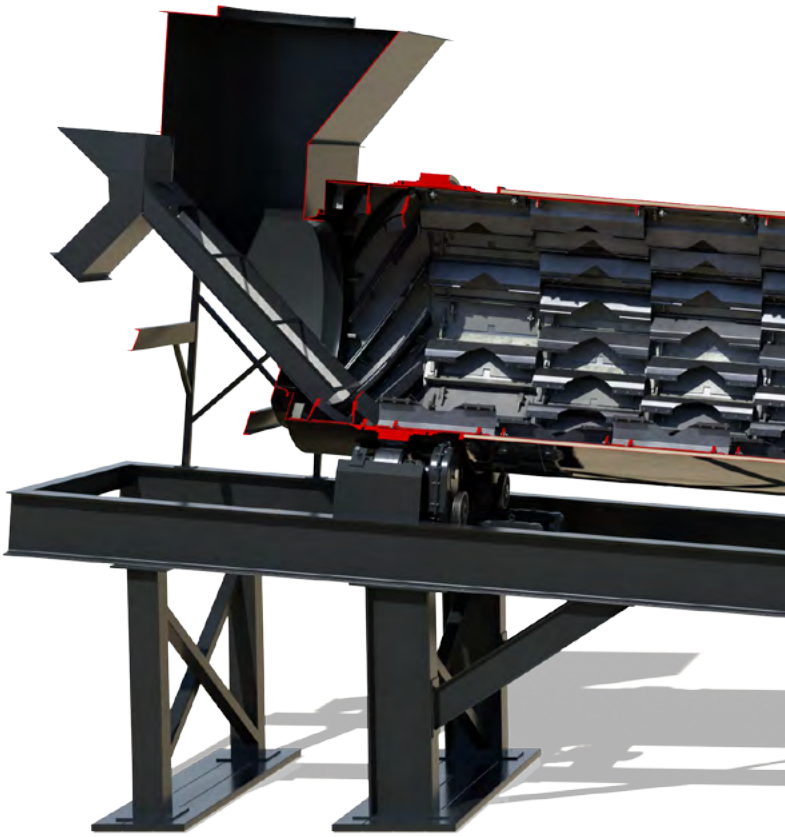
Prevent aggregate from impinging on the flame, while spreading the material to maximize radiant heat transfer



The combustion flights are made of stainless steel, which lasts longer than traditional carbon steel. The flights overlap one another, creating a shield that minimizes radiant heat from hitting the drum shell, to keep it from overheating. The overlapping also reduces the opportunity for aggregate to get behind the flights and cause additional drum wear.

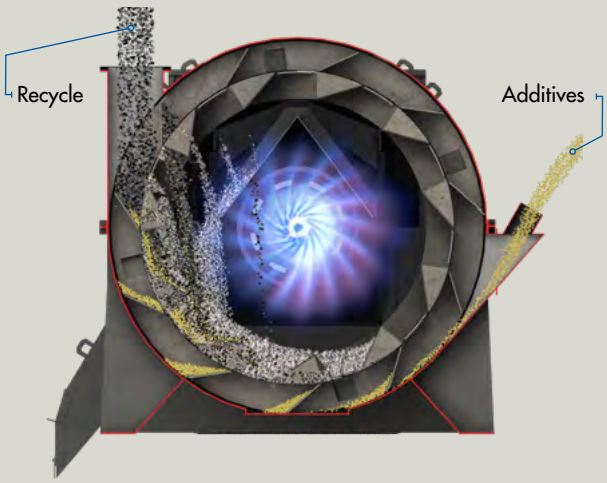
UniDrum
MIXING

Achieving a quality asphalt pavement requires mixing materials correctly, with consideration given to providing sufficient time for blending. The superheated virgin materials must have adequate mixing time with the recycled asphalt to bring it to temperature. The virgin aggregate, recycled asphalt and shingles, additives, baghouse fines, and virgin liquid AC must all be blended thoroughly to ensure everything is well coated and the gradation is uniform. The mixing chamber in the UniDrum mixer is an excellent mechanism to ensure adequate blending to achieve a quality mix.

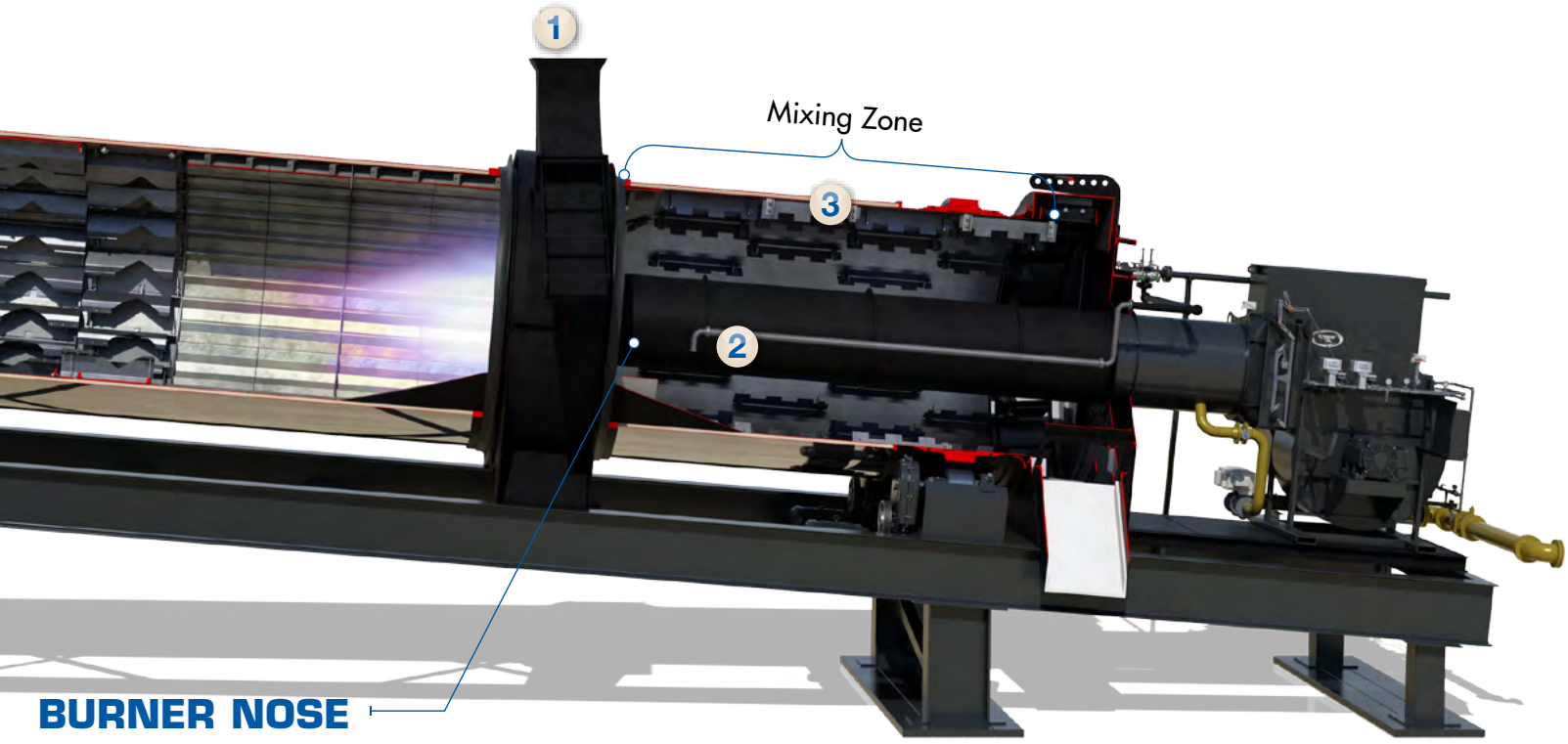


1 RECYCLE INLET

A collar around the drum allows entry of recycled asphalt (RAP), additives/filler, and baghouse dust into the mixing chamber, where they are blended with the virgin material.



RAP, recycled asphat shingles (RAS), baghouse dust, and any additive/fillers enter the mixing chamber directly behind the burner tip, minimizing oxidation of the liquid asphalt from the burner flame allowing preliminary blending before the virgin liquid asphalt is added.

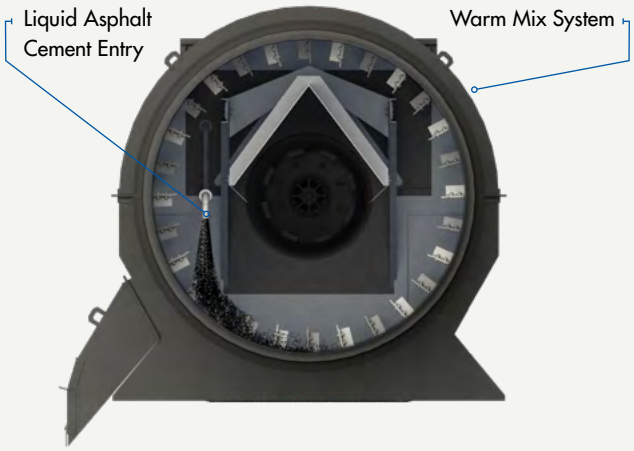


BURNER NOSE

The burner nose restricts the cross sectional area of the mixing chamber. This smaller area means more particles come in contact with one another, providing better heat exchange, and better blending of materials. A deflector hood prevents mix from contacting the long burner nozzle.

2 LIQUID ASPHALT INLET

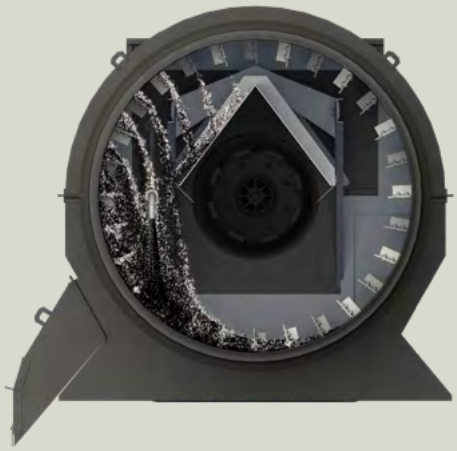
Liquid asphalt is injected after the virgin aggregate, the recycled material, and baghouse dust are mixed. Pre-mixing these materials allows a more even distribution of the liquid asphalt cement.



Liquid asphalt is accurately pumped from the storage tanks directly to the liquid asphalt inlet inside the mixing zone, or it can be redirected to the Astec Warm Mix System to produce foamed asphalt before being injected in the mixing zone.

3 MIXING FLIGHTS

After virgin and recycled materials are combined and brought up to the proper temperature, liquid asphalt is injected. Mixing flights provide increased agitation for improved mix quality.

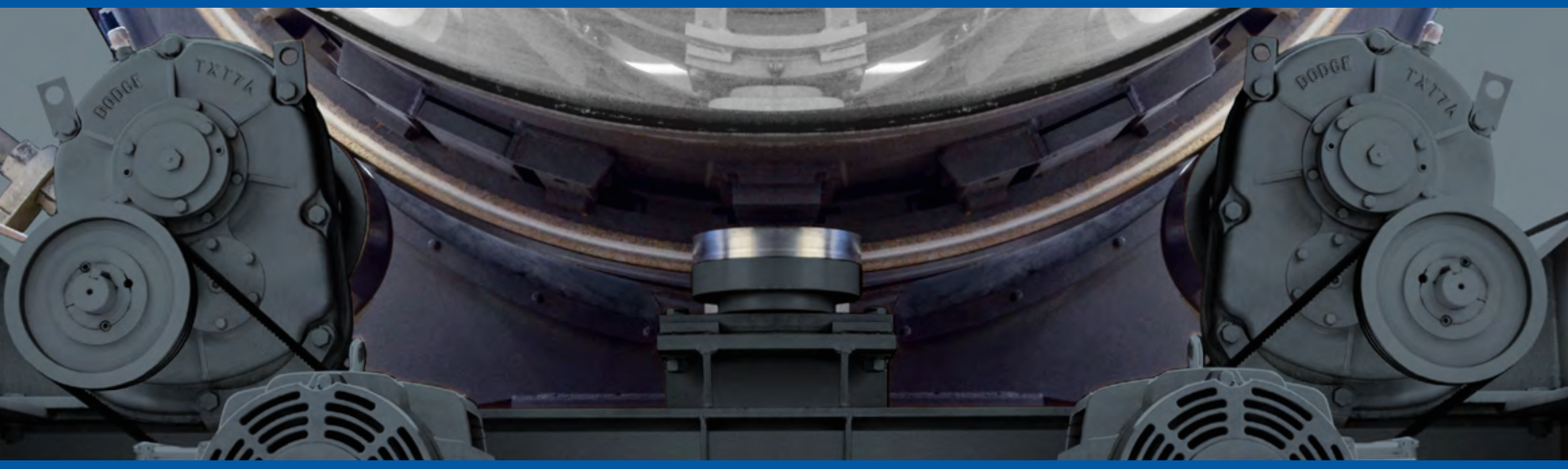


UniDrum mixing flights are engineered to comb through virgin and recycled materials to give thorough blending before the mix exits the drum.


ASTEC
SCALE 3

UniDrum
DRIVE SYSTEM

The key to a long-lasting and reliable drum is the drive system. From massive trunnions to heavy-duty drum tires, the UniDrum dryer/mixer uses drive components that are made to last. The unique tire spoke design keeps heat from warping the tire. A single point trunnion adjustment system keeps the drum spinning smoothly and minimizes wear.



THRUST ROLLERS

Industrial duty thrust rollers support the drum and keep it from riding up or down while spinning. With single point trunnion alignment, finding the sweet spot between the thrust rollers is simple.

TRUNNION DRIVES

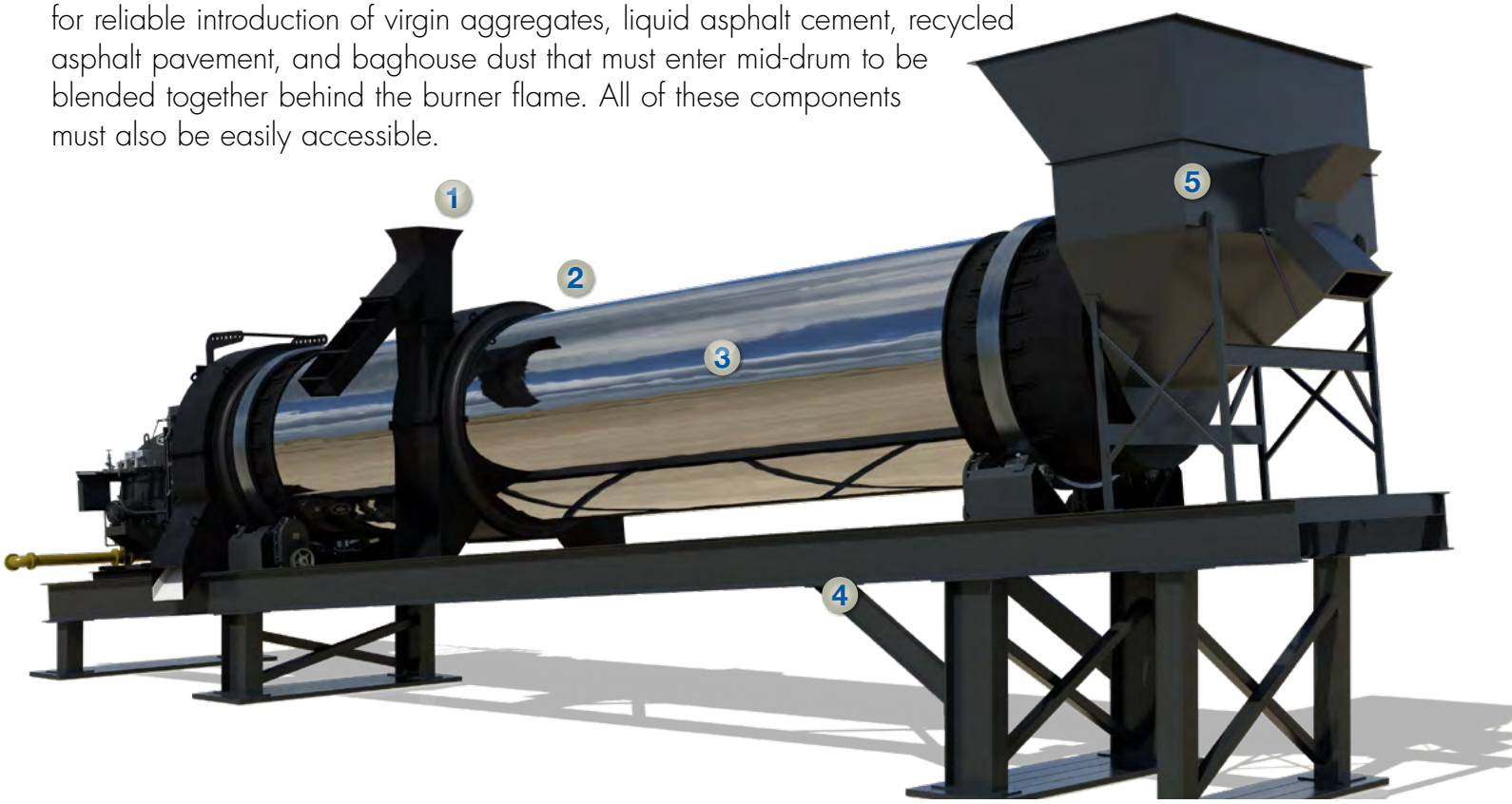
The drum is centered on four heavy-duty trunnions, fitted with adjustable, double-row Timken™ bearings and ring fitters that ensure reliable operation; the drum can continue operating even if one drive breaks down.

SINGLE POINT TRUNNION ALIGNMENT

Single point trunnion adjustment eliminates the time-consuming procedure of trunnion alignment and ensures proper equipment operation. The key to this industry exclusive feature is the unique pivot pin system, which allows an operator to easily dial in the dryer in a matter of minutes without the need of any specialized equipment. The end result is a properly rotating dryer without excess wear to the tires, trunnions, and thrust roller assemblies. The single point trunnion adjustment significantly reduces excess trunnion wear, premature deterioration of hardened tire surfaces, broken trunnion shafts, bearing failures, and thrust roller assembly damage.

ADDITIONAL FEATURES

While the internal components of a drum are what make the plant work, the external components support and protect the drum. Asphalt plants face harsh environments, so tough skin is crucial. The drum collar must be well-designed for reliable introduction of virgin aggregates, liquid asphalt cement, recycled asphalt pavement, and baghouse dust that must enter mid-drum to be blended together behind the burner flame. All of these components must also be easily accessible.



1 RAP INLET

The extra wide RAP inlet design has an access door for easy entry. It also has replaceable wear edges and diggers for simple service.

2 DUST INLET[1]

A screw auger returns baghouse fines to the RAP collar. This is done behind the burner to keep the dust from being sucked back out into the baghouse.

**Dust metering systems also available.*

1. Not shown on illustration

3 INSULATION

The drum is wrapped with 4" of fiberglass insulation greatly reducing heat (energy) loss. The drum is then wrapped in stainless steel to protect the insulation.

4 FRAMES

Astec offers two styles of heavy-duty, industrial steel frames: relocatable frames feature foundation plates to support the drum, and portable models are supported by axles to make moving the drum simple.

5 ACCESS

The interior of the dryer drum and mixer is reached through an access door at the inlet breeching.

DRUM TIRES

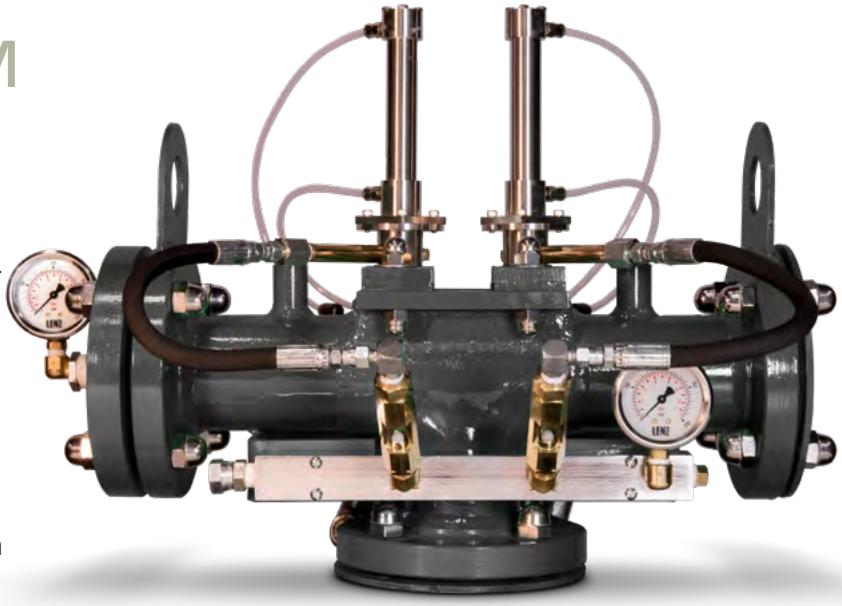
The UniDrum dryer/mixer rotates on two heavy-duty drum tires. The tires are forged and then hardened to take the beating of everyday use. Single point trunnion alignment minimizes tire wear.

TIRE SUSPENSION

Each drum tire is mounted to the UniDrum dryer/mixer with suspension bars. These bars not only keep the drum tire in place, but also allow some flexibility from heat expansion to prevent warping the tire.

ASTEC

WARM MIX SYSTEM



The benefits of warm mix asphalt, such as reduced energy consumption, lowered emissions, and elimination of visible smoke, are well-known in the asphalt paving industry. Warm mix technology allows mix to be prepared and placed at lower temperatures than conventional hot mix. To achieve this, the viscosity of the liquid asphalt cement (AC) must remain low at the reduced temperatures. Maintaining a low viscosity at lower temperatures allows mix to flow freely through storage, transfer, and placement equipment and is more easily compacted.

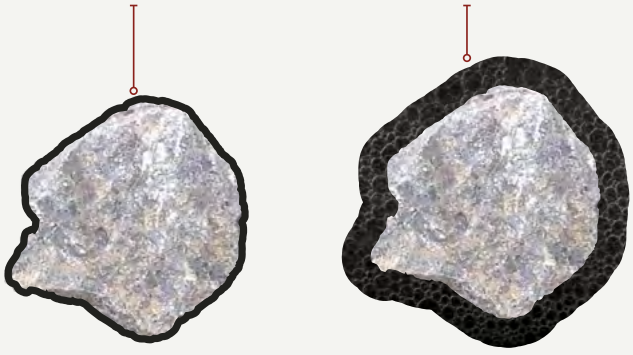
The Astec warm mix system achieves a lower temperature at a lower cost by eliminating the need for additives or special asphalt cement. Instead, the Astec warm mix system injects a small amount of water into the liquid AC to create microscopic steam bubbles. These small bubbles act to reduce the viscosity of the liquid AC, allowing the mix to be worked at lower temperatures.

BETTER COATING

Foamed liquid AC has a greater volume, which allows it to cover a greater surface area, while using the same amount of liquid. This means that the liquid is better distributed over the aggregate. Lower mix temperatures can also increase maximum production rate.

Normal hot mix coating

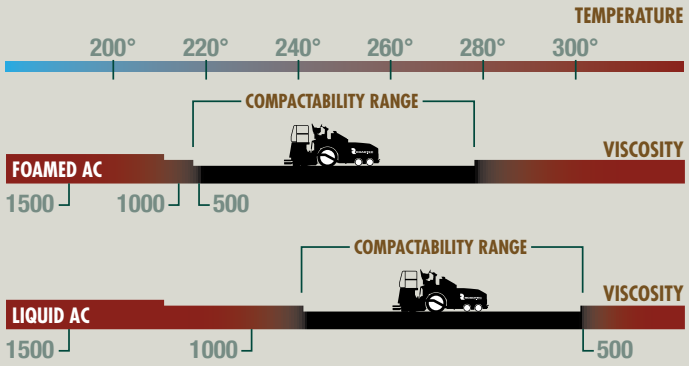
Foamed warm mix coating



Low-viscosity mix achieves easier compactibility.

LESS OXIDATION

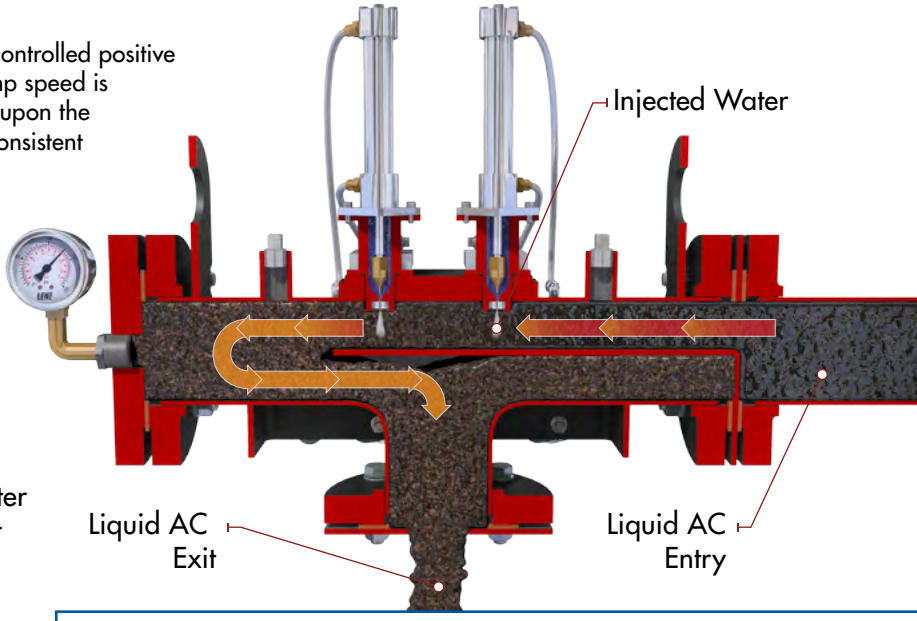
Producing asphalt mix at lower temperatures leads to less oxidation resulting in longer pavement life. Every 25°F increase in temperature doubles the rate of oxidation of liquid AC.



SOLENOID INJECTION

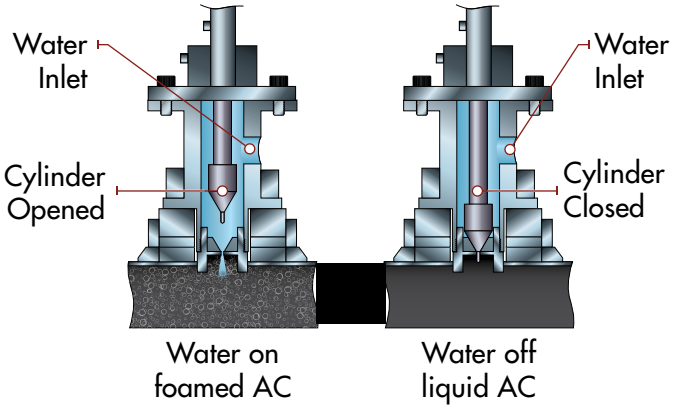
Water is accurately metered into the system by a feedback-controlled positive displacement piston pump. Using feedback controls, the pump speed is modulated to maintain the appropriate flow of water based upon the flow of the liquid AC. PLC controls provide for smooth and consistent water flow as production rates increase or decrease.

Water is injected into the liquid AC through two stainless steel water injectors which continuously inject high-pressure water into a foaming chamber.



AC MANIFOLD

Field-proven and highly reliable.



As the water is injected into the liquid AC, the water droplets quickly flash to steam, creating microscopic bubbles of steam necessary to achieve reduced viscosity.

BLUE SMOKE REDUCTION

In the silos pictured below, the left silo contains traditional hot mix asphalt. The right silo contains asphalt mixed at lower temperatures using the Astec warm mix system. It is apparent that there is less blue smoke coming out of the right silo. Less blue smoke means less visible emissions and reduced odor.

The lower amount of blue smoke is not only applicable to the asphalt when it is exiting the silos, but also at the job site where the asphalt is being laid.

WATER RESERVOIR

A skid-mounted, corrosion-free water reservoir is included with warm mix system packages. An optional cold weather package is available to prevent damage to components during cold weather operations. If supply water is lost, then a low-water alarm alerts plant personnel, so the problem may be resolved quickly without wasting mix. Water reservoir systems are sized based on customer needs.

ASTEC
BURNERS

Astec offers the most technologically advanced burners in the industry with the Phoenix® and Whisper Jet® burner lines.

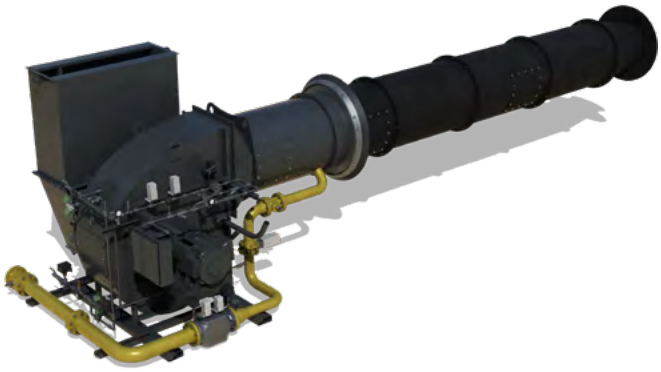
WHISPER JET® BURNER

The Whisper Jet burner delivers unmatched reliability and hassle-free maintenance. The Whisper Jet cleanly and efficiently burns oil or gas and has a compact flame.

THE MOST TECHNOLOGICALLY ADVANCED BURNERS

PHOENIX® FURY™ BURNER

A robust build and simple, accessible construction makes the Astec Phoenix Fury burner a great cost-effective choice. Compared to other open-fired designs, the Fury burner achieves better emissions and fuel efficiency by putting 50% more combustion air through the burner.



PHOENIX® TALON II™ BURNER

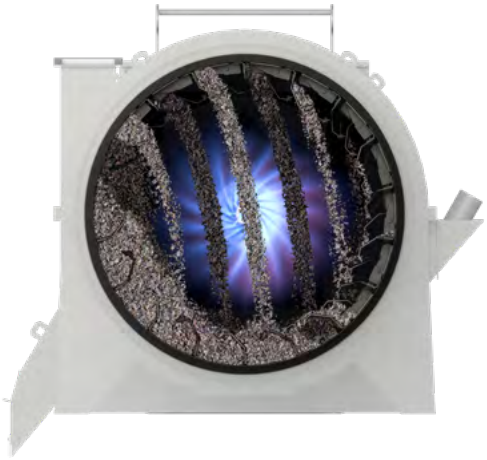
The Astec Phoenix Talon II burner sets the standard for power and efficiency, while maintaining very low emissions. With the optional silencing package, it is quiet enough to have a phone conversation on the burner platform while it is firing.

Optional

V-PAC™ SYSTEM

In today's market, many asphalt plants produce a wide range of mixes. Switching between mixes or significantly varying tonnage rates can cause swings in stack temperatures. If these temperature swings exceed the limits of the baghouse adjustments to the flighting arrangement must be made to prevent baghouse damage. These changes can be costly and time consuming, especially if changes are needed when the mix type changes.

The V-PAC combines Astec's v-flights and a drum VFD (variable frequency drive) to enable optimization of stack temperature for a broad range of mix types without costly flighting changes. V-flights are uniquely designed to maximize heat transfer by exposing more material to the heat produced by the burner.

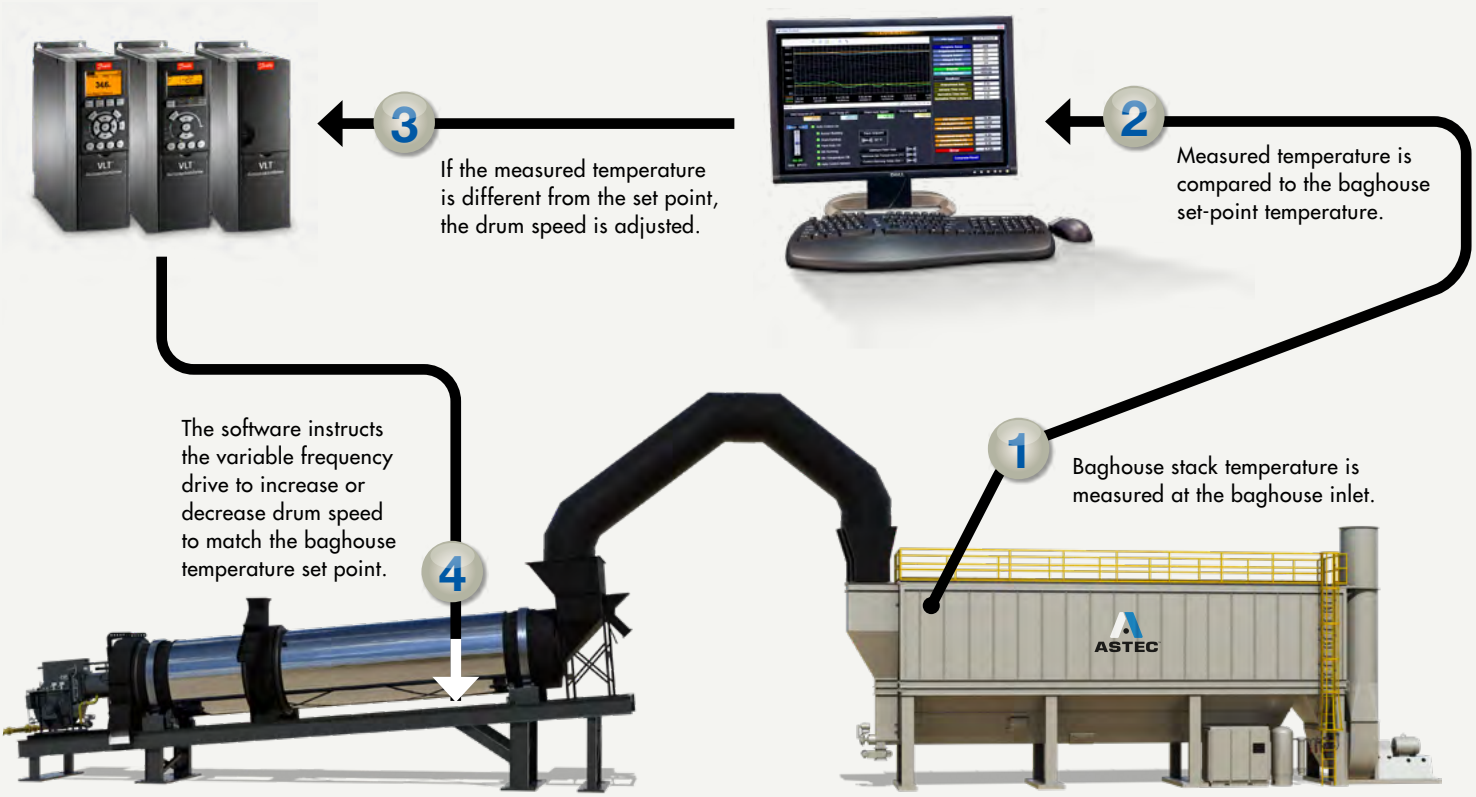


V-FLIGHT VEIL

The Astec v-flight is wider and incorporates a v-shaped notch. The increased size allows the v-flight to carry the same amount of material as a standard flight. Material begins to veil through the notch sooner and, instead of just showering from the tip, v-flights shower along the edge of the notch, as well as the tip. The result is a more even veil at both higher and lower tonnage rates, which increases the effectiveness of the veil by exposing more material to hot gases.

V-PAC

STACK TEMPERATURE CONTROL SYSTEM



ASTEC Drum Comparison Chart

		DILLMAN UNIDRUM	DOUBLE BARREL	DOUBLE BARREL X	DOUBLE BARREL XHR
MAX RECYCLE*	0%				
	30%				
	40%				
	50%	X	X	X	
	65%				X
PRODUCTION RANGE (TPH)	150		X		
	180		X		
	200		X	X	X
	250		X	X	X
	300	X	X	X	X
	400	X	X	X	X
	500	X	X	X	X
	600	X	X	X	X
KEY FEATURES	Enhanced Materials?	NO	NO	NO	YES
	Veiling End Drum Shell Material	Heat-Resistant Steel	Structural Steel	Structural Steel	Structural Steel
	Burner End Drum Shell Material	Heat-Resistant Steel	Heat-Resistant Steel	Heat-Resistant Steel	Stainless Steel
	Combustion Flighting Materials	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
	Warm Mix System	Optional	Optional	Optional	Standard
	V-PAC	Optional	Optional	Optional	Standard
	Self-Cleaning Drum	NA	Yes	NA	NA
	Mixing Location	All Constituents Mixed Behind the Extended Burner Nose	All Constituents Mixed in Outer Shell of Double Barrel	Recycle, Baghouse Dust, and Additives Mixed in Outer Shell of Double Barrel; AC Added in External Mixer	Recycle, Baghouse Dust, and Additives Mixed in Outer Shell of Double Barrel; AC Added in External Mixer

* Max Recycle at 5% RAP Moisture
50% is achieved with patented V-Pac

ASTEC™

www.astecindustries.com

Rev. 5/21