YOUR RELIABLE PARTNER

• ASPHALT MIXING PLANTS

• KVM ASPHALT MIXING PLANTS

KVM Asphalt Plant 2007

KVM Asphalt Mixing Plant 1967

More than 40 years with KVM Asphalt Plants and still going strong...

Since KVM International A/S designed, manufactured and delivered the first complete asphalt plant from the factory in Kjellerup, Denmark, in 1967, the product programme has gone through a continuous development. The brand of today is recognised among the leading brands in the world. Our ongoing use of the latest technology and knowledge from the industry ensures that the KVM product programme is in front. Thereby your investment in KVM equipment promises you asphalt manufacturing equipment with a guaranteed high output at the lowest possible running costs.

KVM cares for the environment and the KVM Policy is based on a green philosophy, where we aim to reduce energy consumption and minimise emissions of any kind. Long and strong ongoing relationships with our valuable customers have given us an open mind, ensuring that the experience from your world is put into the KVM product programme of tomorrow.

Please allow this short introduction to guide you into the world of the 3 versions of the KVM Asphalt Plants called VIKING, FREJA and ODIN.

• ASPHALT MIXING PLANTS 80 - 320 TPH

Asphalt Mixing Plants

KVM provides a range of top modern static asphalt plants for all purposes. Through years of experience KVM has developed its unique product programme, covering all plant sizes in the range from 80-320 tph. KVM plants are state of the art regarding flexibility, accessibility, performance, a minimum of maintenance and easy operation.

Through 40 years of valuable feed back from our customers, KVM has accumulated experience and knowledge second to none regarding the construction of asphalt plants for the heavy quarry industry. This ongoing development gives you comfort to choose KVM Asphalt Plants now and in the future.

KVM Asphalt Plants

Plant capacity	Plant type	Dryer	Elevator	Screen	Mixer size
80 - 160 tph	Viking	200 - 220	R450	1250-2/1.25	2.0 t
120 - 240 tph	Freja Odin Odin AB	220 250 250	R450 or R500	1500-2/1.5	3.0 or 3.5 t
180 - 320 tph	Odin / Odin AB	280	R500 / R630	2000-2/2.0	4.0 or 5.0 t

• ASPHALT MIXING TOWER TYPE VIKING 80 - 160 TPH

Viking

KVM offers this new smaller type of mixing tower, which still contains all the larger plant facilities. The Viking tower is designed particularly for markets where the expected yearly throughput is moderate and the customer does not want to compromise on quality. The smaller overall dimensions of the mixing tower modules give favourable erecting and freight conditions.

The Viking tower can alternatively be fitted on skids, eliminating the need for normal concrete foundations. The Viking tower can be supplied in both low and high level versions, giving the customer the possibility of direct unloading from the mixer. A strong choice for the future.

Viking

Technical specifications		
Asphalt mixing tower	Viking T12, T20 or T42	
Hot elevator	R450	
KVM screen type	1250-2 / 1.25	4-6 fractions + by-pass
Hot aggregate bin m^3	12, 20 or 42	
Mixer size	2.0 t twin shaft mixer	
Mixed material storage m^3	Horizontal track	Inclined track
	2/26 - 4/120	3/100 - 4/141
RAP	Cold in hot elevator / in mixer	

• ASPHALT MIXING TOWER TYPE FREJA 120 - 240 TPH

Freja

The KVM Freja tower can be installed in many configurations. It is available in a low and a high version with or without sheeting. A semi mobile low version is also available. The high version is often used where the site foot print is limited and the low version is often used where local site height is an important issue.

The Freja tower can be built from a wide range of machine components, meeting your specific wishes for capacity and auxiliary equipment. Equipment for dosing of fibre pellets, colour pellets, free fibre granules, wet fix, flux, latex and RAP is available. Easy and safe access to all plant components for daily inspection and maintenance is a key issue. The unique KVM Scale Check System is available for the Freja tower.

Freja

Technical specifications		
Asphalt mixing tower	Freja 3000 or 3500	
Hot elevator	R450 or R500	
KVM screen type	1500-2/1.5 - 2000-2/2.0	4-6 fractions + by-pass
Hot aggregate bin m^3	20, 26, 43 or 70	
Mixer size	3.0 or 3.5 t twin shaft mixer	
Mixed material storage m^3	Horizontal track	Inclined track
	2/56 - 8/383	3/100 - 7/380
RAP	Cold in hot elevator / in mixer	

• ASPHALT MIXING TOWER TYPE ODIN 180 - 320 TPH

Odin

The Odin tower is the top of the range KVM Asphalt Plant and it has proven its reliability through years of operation. Odin is the natural choice when you are looking for high daily production. Odin gives you luxury access to all corners of the plant, plenty of space and good maintenance conditions for all equipment.

The spacious plant is designed to hold up to 14 hot aggregate bins divided in 2 x 7 rows. The standard aggregate scale is split in 2 compartments making it possible to add fine and coarse aggregates in sequence to the mix. All batching equipment is designed for fast and accurate operation. The full range of auxiliary equipment, like the unique KVM Scale Check System, is available.

Odin

Technical specifications		
Asphalt mixing tower	Odin 3000, 3500, 4000 or 5000	
Hot elevator	R500 or R630	
KVM screen type	1500-2/1.5 - 2000-2/2.0	4-6 fractions + by-pass
Hot aggregate bin m^3	27*, 55, 87, 115, 147*	* not for AB section
Mixer size	3.0 / 3.5 / 4.0 or 5.0 t twin shaft mixer	
Mixed material storage m^3	Horizontal track	Inclined track
	2/56 - 8/400	3/100 - 7/380
RAP	Cold in hot elevator / in mixer	

COLD FEED PLANT

Belt Feeder

Boards and Grids

Elevated Hoppers

Cold Feed Plant

The KVM cold feed hoppers are designed as a flexible and modular system, developed for the rough environment created by the heavy wheel loaders. Three different loading widths are standard, offering you hopper sizes from 12 m^3 to 20 m^3. Excellent discharge facilities are insured by the ingenious design, which includes steep side walls in the bin. A wide range of auxiliary equipment is available i.e. screening grids, man grids, wearing plates, vibrators, level gauges, special low friction liners and sheeted canopies.

The KVM belt feeders are fully galvanized stand-alone units, designed on the basis of decades of experience. The belt feeders are available in several sizes and they are, as standard, fitted with flow switches and adjustable outlet gates. The rubber belt is a strong design, allowing you to use all kinds of aggregates. The electrical motor is, as standard, fitted with a temperature gauge, securing the motor against overheating when running long time at low frequencies.

Cold Feed Plant

Type	Loading width	Hopper volume	Belt feeder type	Collecting conveyor type	Plant capacity
350	3.5 m	12 / 15 m^3	500	650	20 - 240 tph
370	3.7 m	13 / 16 m^3	500		
420	4.2 m	16 / 20 m^3	500 / 650	650 / 800	20 - 320 tph

DRYING PLANT

Friction Drive

Extended Slinger

Drum Lifters

Drying Plant

The KVM drying drum is known to the industry as a well-tested and very reliable machine, giving excellent drying facilities at low energy consumption. KVM offers four standard drum sizes and a wide range of burners for all kinds of known fuel types. The drum is fitted with replaceable lifters, that are bolted in position and the drum shell is made of heavy steel plates ensuring a long lifetime. The lifters have been developed through years of experience and the special KVM design ensures you an excellent heat transfer to the aggregates passing through the drum.

The drum is insulated to prevent heat loss and the special friction drive, fitted with high temperature resistant polyamide drive rollers, gives you a silent plant. The outlet chute is fitted with replaceable liners and a temperature gauge controlling the dried aggregate temperature. A wide range of auxiliary equipment like slinger belts and access platforms for both cold and hot end of the drum is available.

Drying Plant

Type	Diameter	Dryer drive	Burner capacity	Max. dryer capacity
200	2.0 m	2 x 15.0 kW	10 MW	120 tph
220	2.2 m	4 x 11.0 kW	20 MW	180 tph
250	2.5 m	4 x 18.5 kW	25 MW	240 tph
280	2.8 m	4 x 22.0 kW	30 MW	320 tph

BAG FILTER TYPE S - 40M

Adjustable Pre-skimmer

Exhaust Silencer

Exhaust Gas Ducting

Bag Filter

The development of the KVM bag filter is based on our general environmental policy and we are proud that years of environmental concern has given us the opportunity to offer you this excellent bag filter. The KVM bag filter is divided into sections, each holding 52 vertically fitted bags which are pneumatically cleaned by compressed air. The pressure drop over the bags automatically controls the cleaning of the bags. The bag house is made of Corten steel plates, ensuring a long lifetime and it is insulated to minimise temperature loss.

The bags are manufactured of high temperature resistant 500 mg/m^2 Aramid. The bag filter fan is directly driven and inverter controlled to reduce power consumption, and compared to other filter designs in the market, the KVM bag filter offers you a lower running cost. A wide range of auxiliary equipment is available, like pre-skimmers, exhaust gas ducting, stacks fitted with or without attenuator and emission control equipment.

Bag Filter

Type	Filter capacity	Cloth area	Fan motor
S7 - S13	35.000 - 65.000 m^3/h	280 - 520 m^2	30 - 75 kW
S14 - S20	70.000 - 100.000 m^3/h	560 - 800 m^2	75 - 90 kW

• MIXING TOWER

Hot Elevator

The process of lifting the hot aggregate material up into the mixing tower will vary from one plant to another, but the KVM programme has a hot elevator for any application. High reliability, low maintenance and wearing qualities are our main priorities for the elevator. The elevator is designed for friction drive, and as standard REX chains are used with gravity tension. The elevator is equipped with a rotation guard on top and sample taking in bottom.

Screen

KVM screens are closed horizontal screens with dual oscillating elements that ensure accurate direct guided vibrations. The screen is guided by 4 spring suspensions with inclined springs. An indicator shows the amplitude of the vibrations. The screen can optionally have a by-pass gate with two wire-mesh channels that are easily removable thereby providing good working space for fitting or dismantling of the screens.

Mixing Tower

Plant type	Hot elevator		Screen		
	Type	Max. capacity t/h	Type	Fractions	Max. capacity t/h
Viking	R450	240	1250	4 - 6	160
Freja	R450 / R500 or R630	240 - 330	1500	4 - 6	210
Odin			2000	4 - 6	320

• MIXING TOWER





Hot Aggregate Bin

The aggregate bins have compartments that correspond to the screen and the fractions of hot material passing through it. Should further compartments be needed, this can be obtained by dividing all of the compartments lengthwise into A- and B-sides and at the same time adding a diverted section below the screen. Discharge from the aggregate bin is possible via a number of pneumatic gates, actuated by dual step cylinders to ensure coarse and fine dosing at the highest accuracy. Each compartment has equipment for continuous level control, while a temperature sensor, can be built into each compartment.

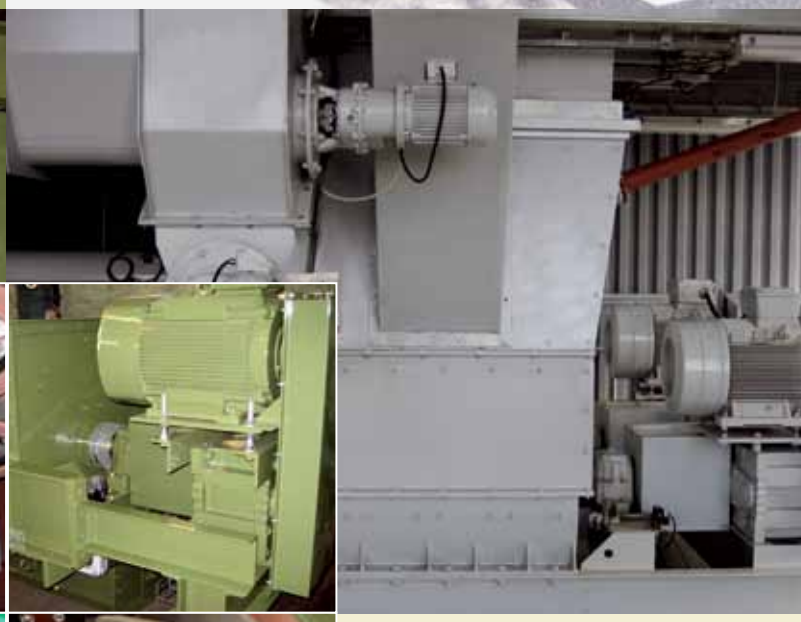
Scale and Mixer Sections

The most significant differences between the Viking, Freja and Odin models, are the shape of the scale and mixer sections. While the Viking and Freja models have scale and mixing units combined in one section, the Odin model differs by having these units built in two separate sections. One section with much space for the mixer and the second section with scales for aggregate, filler, additive supply and a free standing bitumen scale. It applies to all three models that the aggregate scale is suspended freely inside its cover, so the weighing process is not affected by the common exhaust system.

Mixing Tower

Plant type	Aggregate bin		Aggregate scale
	Bin volume max. m^3	Total bins	Max. capacity
Viking	42	5 + by-pass or 6	2,000 kg
Freja	70	6 + by-pass	3,500 kg
Odin	147	6 + by-pass	3,500 - 5,000 kg

MIXING TOWER



Scales

The mixing tower holds three scale hoppers, suspended on load cells above the mixer; one for aggregate, one for bitumen and one for filler. Additional weighing and dosing equipment can be fitted according to requirements. The Odin model has its aggregate scale divided into two compartments, thereby enabling the discharge of stone fractions in sequence. The bitumen scale is fitted with thermostatic controlled electrical heating elements. All the scales can be equipped with an automatically activated Scale Check System.

Mixers

Sturdy, reserves of power, minimum of wearing, and long lifetime are key words for the KVM twin-shaft mixers. Our asphalt mixers are constructed with a belt-drive between the electric motors and the gear boxes, which has the advantage of absorbing extreme peaks of loads and consequently protecting the gear boxes. Wear parts for mixing arms, claws and walls are cast using a hard wearing alloy and the shapes of these replaceable parts are designed to minimise wearing and tearing. The pneumatic operated discharge gate is designed as an upside down sector gate.

Mixing Tower

Plant type	Aggregate scale	Filler scale	Bitumen scale	Mixer size
Viking	2,000 kg	440 dm^3	200 kg	2.0 t
Freja	3,500 kg	520 dm^3	400 kg	3.0 or 3.5 t
Odin	3,500 kg - 5,000 kg	710 dm^3	400 kg	3.0 / 3.5 / 4.0 or 5.0 t

FILLER STORAGE

Single Standing Silos

Filler Tower

Filler Rack

Filler Storage

KVM has developed tree different types of filler storage systems which can fulfill all types of demands. The single standing silo where each filler silo is fitted on a dedicated structure, gives a flexible positioning of the filler storage compared to the rest of the plant. The filler tower is a combination of several silos built on top of each other, standing directly on the ground at a dedicated spot, allowing up to three different types of filler to be stored. The filler rack can support up to three silos, which can be full or divided, allowing you to store different types of filler or fibre/colour granules.

The filler rack offers you available storage space in the support structure e.g. RAP weighing equipment and/or fibre dosing equipment can be placed. All filler silo systems are available with top filters, continuous level measurement, high level alarm and hot filler first system. Reclaimed filler is normally transported to the silo by a bucket elevator or alternatively transported by air. KVM offers a range of excess reclaimed filler handling equipment for dry bulk delivery or for water treated delivery.

Filler Storage

Type	Volume	"Hot filler first" system	Silo partition
290	38 - 64 m^3	Yes	To be agreed
320	46 - 85 m^3	Yes	To be agreed
290 Tower	Up to 120 m^3	Yes	To be agreed
320 Tower	Up to 150 m^3	Yes	To be agreed

MIXED MATERIAL STORAGE

Cylindrical silos and inclined skip track

3 compartment square silo and inclined skip track

Square silos and horizontal skip track

Mixed Material Storage

KVM offers a wide range of mixed material storage silos meeting all requirements: Square and cylindrical silos to be placed under horizontal or inclined skip tracks. The horizontal skip system is designed for high level plants where silos are filled by means of a frequency controlled skip. All square silo sections and cylindrical silos can be delivered with load cells.

The inclined skip system is designed for low level plants and an inclined travelling skip, powered by a frequency controlled electrical hoist, loads the silos. All types of silos are insulated with 100 mm insulation and covered by metal sheet for the final finish. All silos have a large discharge opening. All discharge doors are fitted with temperature controlled heating elements to ease discharge under all conditions.

Standard Mixed Material Storages

Type	Min. capacity	Max. storage capacity	Number of silos	Skip size
Square silo horizontal skip track	2 x 13 m^3	100 - 400 m^3	2 - 8	2 - 5 t
Square silo inclined skip track	19 + 23 m^3	360 m^3	7	2 - 5 t
Cyl. silo 320 inclined skip track	15 m^3	462 m^3	7	2 - 5 t
Cyl. silo 350 inclined skip track	18 m^3	438 m^3	6	2 - 5 t

BITUMEN STORAGE

Horizontal Bitumen Tanks

Vertical Bitumen Tanks

Bitumen Clean Fill System

Bitumen Storage

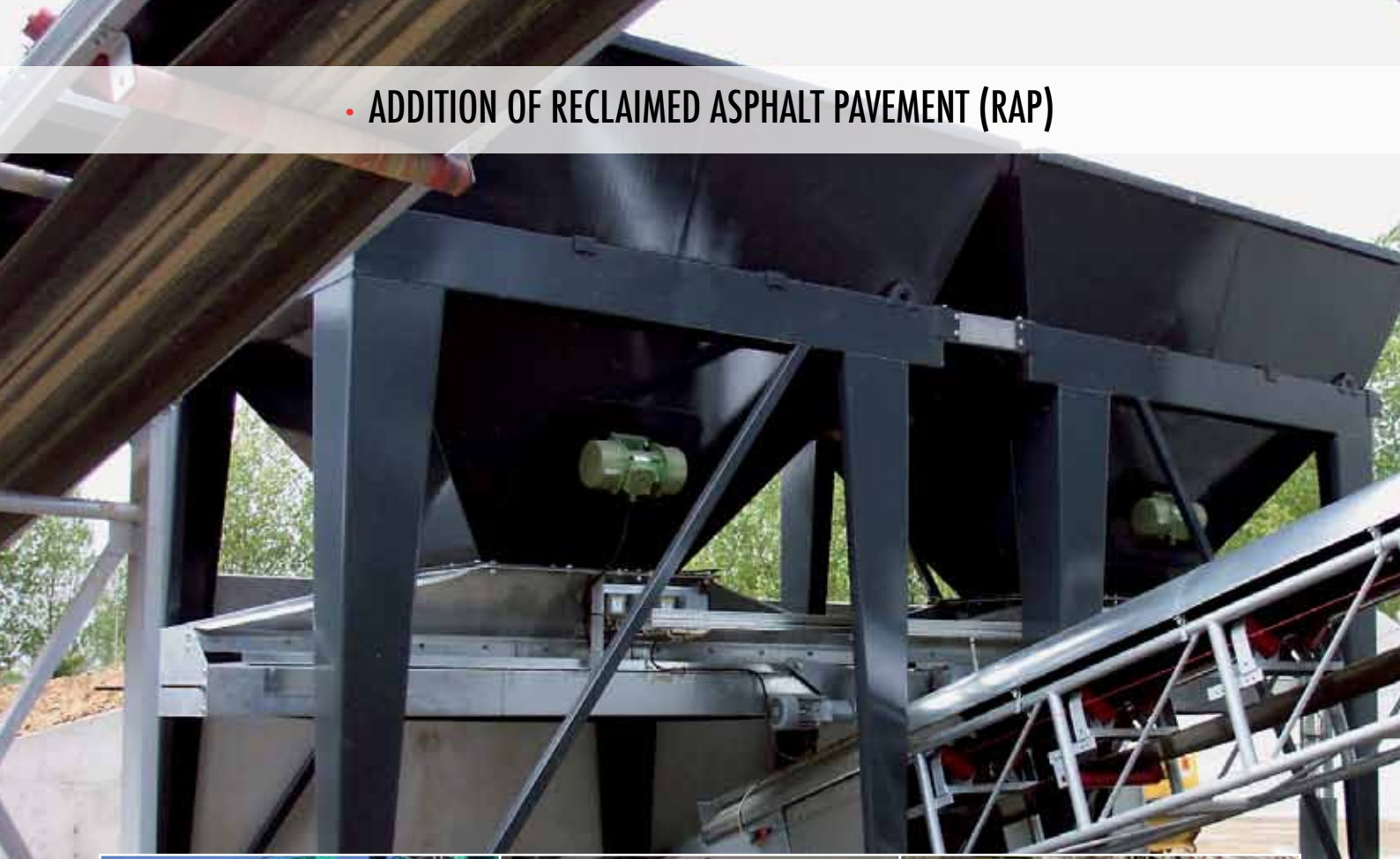
The KVM bitumen storage system is available with either horizontal or vertical installed tanks. All tanks are insulated with 300 mm insulation and a single metal sheet gives the final finish. The tanks are heated by electrical heating elements which are submersed in the lower part of the tank. Each tank is fitted with a control panel, watching and controlling the temperature in the tank. KVM can offer 2 types of pumps: the free standing type, which can serve several tanks, or the submersed type, which can serve one tank only.

The free standing pump is trace heated and insulated, and the submersed pump is heated by the circulation of the bitumen. A wide range of bitumen valves and pipes are available, designed for each particular job. The Bitumen Clean Fill System ensures spillage is avoided when filling the tanks. Access ladders and platforms are available as auxiliary equipment. KVM offers different kinds of safety equipment to go with the bitumen storage.

Bitumen storage

Tank type	Max. capacity	Heating	Insulation	Pump motor	Pump capacity
Horizontal	48 - 131 m^3	33 - 66 kW	300 mm	5.5 - 11 kW	16 - 44 m^3/h
Vertical	51 - 112 m^3	28 - 68 kW	300 mm	5.5 - 11 kW	16 - 44 m^3/h

ADDITION OF RECLAIMED ASPHALT PAVEMENT (RAP)



RAP Elevator

Sludge Conveyor

Hopper with Canopy

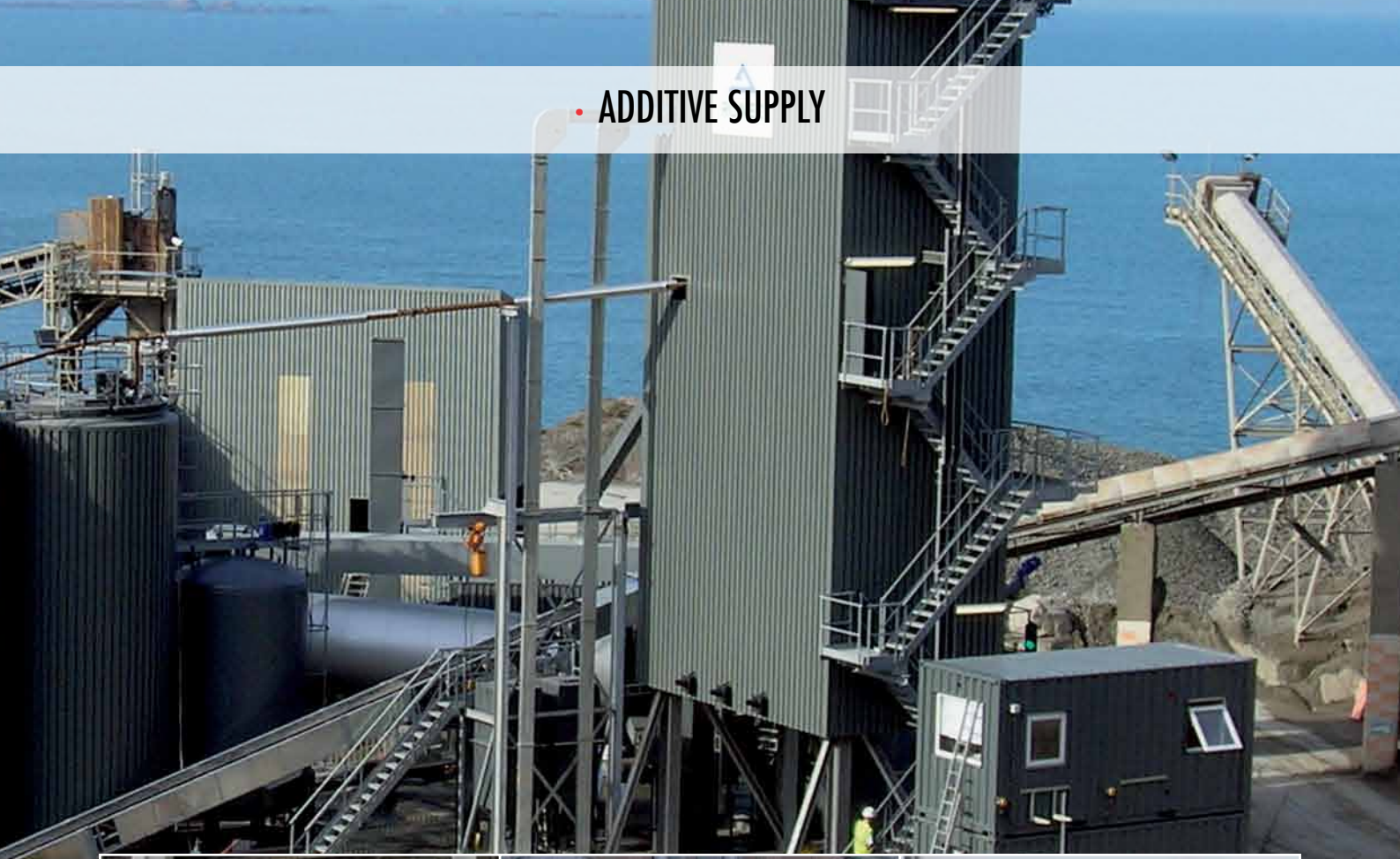
Reclaimed Asphalt Pavement (RAP)

Addition of RAP to modern asphalt production is increasing and KVM has developed several methods of adding RAP. RAP can be added cold into the hot elevator (10%) or directly into the mixer (25%). Furthermore RAP can be added hot (50%). In order to add RAP into a wide range of recipes, it's important to control the RAP fractions. One type of the KVM RAP feeders is designed so it can reverse to empty the hopper. Alternatively more feeders can be installed. RAP addition to the hot elevator is based on volumetric batching and the RAP fraction is counted as a cold feed fraction added after the drying drum. The RAP is heated and dried in the hot elevator and then put into the by-pass silo in the tower. RAP addition to the mixer is based on weight batching. The RAP is transported from the feeder to a weigh belt, fitted at mixer level, by an inclined belt conveyour or by a bucket elevator. A preset amount is batched on to the weigh belt and then added swiftly into the mixer. The water in the RAP will vaporize and KVM has developed a fast acting evacuation system for that purpose.

RAP

	Hopper	Feeder	Weigh belt	Elevator
Type	350 / 370 / 420	650-5.6 / 800-1.8 / 800-3.5	800 - 1000	400
Capacity	15 / 16 / 20 m^3	40 - 90 m^3/h	750 - 1,250 kg / batch	90 m^3/h

ADDITIVE SUPPLY



Fibre - and Colour storage

Latex hose pump

Liquid pump

Additive Supply

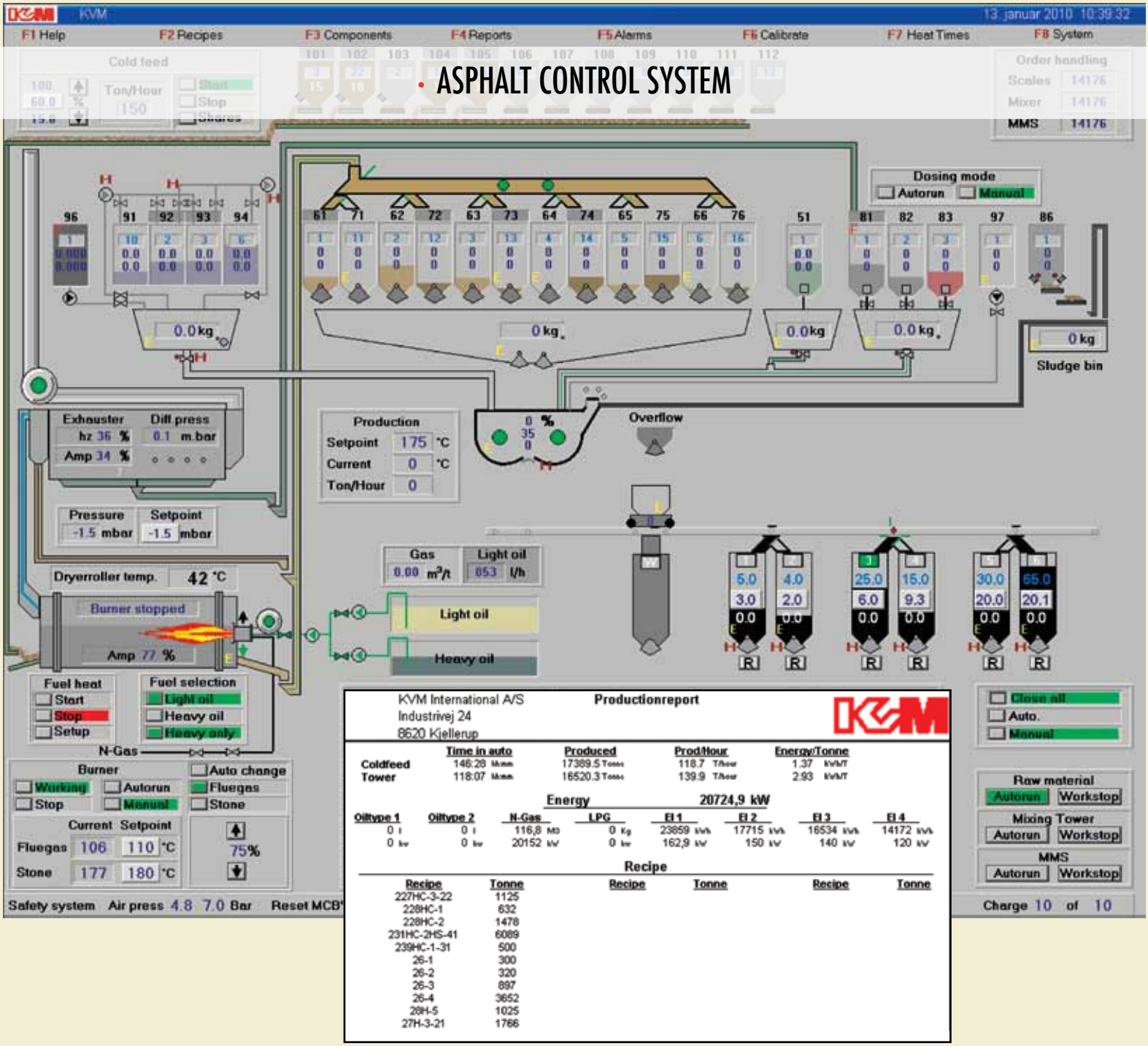
In advanced asphalt production the addition of small ingredients with specific qualities has increasingly become the way for a better product. Characteristic for most additions are the small quantities and the need for special equipment for storage and dosing. The handling and dosing methods will vary according to the nature of each component. Different components means different types of storage bins, conveying systems and scale systems.

For example the handling of fibre pellets is completely different from handling loose powdered fibres. In other words making the right choice of equipment becomes crucial for obtaining exact dosing accuracy, even when it comes to handling plain colour granulates, polymers, wet fix or softening additives. Regardless of the additions being powders, granulates, pellets or liquids, KVM has a comprehensive equipment programme for the application.

Additive Supply

Equipment	Fibre / colour	Latex	Amin (Chemical)	Flux (Oil)
Dosing method	Scale	Volumetric	Flowmeter	Flowmeter
Part of batch	0.1-0.5% / 5.0%	0.1 - 0.2%	0.01 - 0.03%	0.3 - 0.5%

• ASPHALT CONTROL SYSTEM



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Industrivej 24
8620 Kjellerup

Productionreport

	Time in auto	Produced	Prod/Hour	Energy/Tonne
Coldfeed	146:28 h:m:s	17389.5 Tonns	118.7 T/hour	1.37 kWh/T
Tower	118:07 h:m:s	16520.3 Tonns	139.9 T/hour	2.93 kWh/T

Energy 20724,9 kW

Oiltype 1	Oiltype 2	N-Gas	LPG	El 1	El 2	El 3	El 4
0 l	0 l	116,8 M3	0 Kg	23859 kWh	17715 kWh	16534 kWh	14172 kWh
0 kw	0 kw	20152 kW	0 kw	162,9 kW	150 kW	140 kW	120 kW

Recipe

Recipe	Tonne	Recipe	Tonne	Recipe	Tonne
227HC-3-22	1125				
228HC-1	632				
228HC-2	1478				
231HC-2HS-41	6089				
239HC-1-31	500				
26-1	300				
26-2	320				
26-3	897				
26-4	3652				
28H-5	1025				
27H-3-21	1766				

Controls

The main purpose of the KVM control system is to provide the operator with an overview of the production, as well as assuring a high consistent quality of the products being made. The asphalt process control system from KVM gives the operator the perfect overview of the current plants status; providing the operator with the ability to make, find and run recipes and continuously carry out corrections to optimise the end-result. Reports are generated continuously, including production reports documenting material usage, alarms, variations, production capacity, fuel consumption and power consumption. Data from the drying process are logged every 10th second, so the operator can optimise this process too.

The system is made as a classical PC/PLC system, based on a Windows platform and a central Allen Bradley PLC with decentralized I/O modules positioned in the high voltage panels. The software is based on Allen Bradley's RS view with active-X files and the database is a structured DB4 system, consisting of standard Windows components. All collected data can easily be processed further in an Excel spreadsheet. Data transmission between units in the plant is done via Control Net, Device Net and Ether Net. Therefore it is possible from the operator computer to see the status of inverters, weighing transmitters etc. Our online support is either based on traditional modem connection or a secure Cisco VPN internet connection that enables our technicians to support the control system.

CONTROL CABIN - SWITCH HOUSE

Control cabin

Switch house with panels and compressor

Cabins made for control cabin and switch house

Control Cabins

KVM has a range of prefab. cabins operating as operators cabin, switch house, compressor house or work shop. The cabins are very flexible and they can be fitted on top of each other or side by side depending on the available space at the actual site. The operators cabin is as standard the "high cube" version. All cabins are preinstalled in our workshop to minimise installation time at site and are fitted with various equipment depending on requirements. The switch house is fitted with the electrical panels designed and manufactured according to IEC regulations. It is insulated and fitted with air condition and electrical radiator. The compressor house is fitted with low noise screw compressor and the air drying unit as well as the air buffer tank. All houses are fitted with lighting and approved electrical installations.

Cabins

Application	Type	Length	Width	Height	Air conditioning
Operators cabin	20' - 40'	6.1 - 12.2 m	2.44 m	2.9 m	Yes
Switch house	20' - 40'	6.1 - 12.2 m	2.44 m	2.6 m	Yes
Switch house and compressor	20' - 40'	6.1 - 12.2 m	2.44 m	2.6 m	Yes
Compressor	20' - 40'	6.1 - 12.2 m	2.44 m	2.6 m	No
Workshop	20' - 40'	6.1 - 12.2 m	2.44 m	2.6 m	No

YOUR RELIABLE PARTNER

• EFFECTIVE SERVICE KEEPS THE WHEELS RUNNING

Service

Downtime is very expensive for any company and even the very best plants need regular maintenance to obtain optimum efficiency. Customer service is a crucial issue for KVM. Our service department is offering 24-hours hotline service, 7 days a week, which means that our qualified service engineers are ready to help you at any time and wherever it is necessary.

With all our service vans being well-equipped with tools and spares, our well educated service engineers are able to solve any problem on short notice. KVM knows the customers need for quick and accurate assistance. Mechanical maintenance, support for control systems and burner services are important parameters for fail-safe operation at optimum capacity. Spare parts are readily available from the KVM stocks or from one of our service centres or partners in several countries. With our experience and know-how in hand you are certain to have the highest level of technical ability and service.

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