# YOUR RELIABLE PARTNER



Asphalt milling









RECLAIMED ASPHALT PAVEMENT (RAP)

## **RECLAIMED ASPHALT PAVEMENT (RAP)**

The **GREEN** way to produce asphalt and earn money is to use reclaimed asphalt. Over the years KVM has delivered RAP systems for new asphalt plants, but also as "stand alone" for already existing plants.

Therefore we have produced more than 100 RAP plants today.

The technological development within production of asphalt runs very fast and we work on a production of a more environmental type of asphalt.

There will be fewer raw materials available in the future, and therefore it is necessary to reuse as much as possible.

Adding of RAP in the production of new asphalt is therefore a very important part of the materials.

#### Advantages:

- · Reduced use of raw materials
- Reduced use of bitumen
- · Less waste
- Low costs

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 (15%) or directly into the mixer (35%). Furthermore RAP can be added in the inlet ring on the drying drum (50%).



In order to add RAP into a wide range of recipes, it is important to control the RAP fractions.

Cold 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. RAP is heated and dried in the hot elevator and then put into the by-pass silo in the tower.

Cold RAP addition in the mixer is based on weight batching. RAP is transported from the feeder to a weighing belt, fitted at mixer level, by an inclined belt conveyor or by a bucket elevator. A preset amount is batched on to the weighing belt and then added swiftly into the mixer. Water in the RAP will vaporise and KVM has developed a fast acting evacuation system for that purpose.

RAP addition to the inlet ring on the drying drum is based on volumetric batching and the RAP fraction is counted as a cold feed fraction. RAP can be added with a conveyor or a bucket elevator. The KVM 2/3 drying drum meet the requirement to add large amounts of RAP materials and at the same time ensure an ecofriendly drying process. KVM's patented temperature measure system has 3 measuring points, where point 3 is showing the temperature for the virgin materials just before adding RAP. The drying process / burner is regulated after measuring point 3 depending on how high RAP % is added.

Temperature requirements of the virgin materials with different volumes of recycled materials and moisture content.



## RAP ADDING METHODS



**Dosing of RAP** is done via a belt scale. Since the batch is small the variation of each dosing is large. It can result in large variations of RAP in each batch. Today's high tech asphalt technologies do not leave gaps for inaccuracies of that scale.

After the belt scale, each RAP batch will temporarily be stored in the intermediate hopper for RAP. When the RAP must be added into the batch, a bottom gate valve opens and the RAP should via gravity fall down into the mixer. The intermediate hopper often clogs up and manual workforce is needed to get the clogged RAP to flow into the mixer.

Steam

To filter

When the cold RAP gets in contact with the aggregates and bitumen. hot а steam explosion will occur. The water trapped in the RAP will boil away in seconds and a fast evacuation is needed to lead the thousands of litres of steam away from the mixer in just a few seconds. During this steam explosion bitumen and filler will also be sucked away into the vent piping. During the long travel to the filter the water in the air condenses and transforms into a sludge of water, bitumen and fine filler. Result is that pipe ducting clogs up with sludge and the amount of possible RAP % will decrease accordingly. Ducting must be cleaned manually and regularly.

#### The KVM RAP "in motion" way

The first major difference is the dosing of RAP on our static, frequency controlled belt conveyor which is fixed on load cells. Each batch will be accurately weighed up and will prior to adding lay on the stopped belt conveyor. When the accurate portion of RAP is added to the mixer, the belt conveyor runs fast and the RAP will be added "**in motion**" into the mixer.



# COLD RAP VIA WEIGHING BELT

**Adding cold RAP** to the mixer via a KVM weighing belt provides the possibility to use up to 35% of the overall production. This option will require additional exhaust from the mixer with a sludge return system.







## Advantages:

- Basic or advanced control systems available
- Low investment
- High recycling %
- Short return of investment

## **Disadvantages:**

- Exhaust from mixer is needed
- High filter capacity is needed
- High demand on operator



## RAP VIA INLET RING ON DRUM

Adding cold RAP into the inlet ring on the drying drum provides the possibility to use up to 50% of the overall production. The patented KVM 3 point temperature measuring system secures high quality production.





### **Advantages:**

- Basic or advantages control system available
- 3 point temperature measurement
- Adding up to 50 % RAP
- Medium investment
- Short return of investment

### **Disadvantages:**

- High filter capacity is needed
- Screen by-pass operation



drum and RAP on weighing belt.

## DIFFERENT RAP METHODS



## KVM RAP EXHAUST SYSTEM

#### Exhaust and sludge return system

For equalisation of vapour pressure by RAP addition, the exhaust duct connects the mixer and the flue gas exhaust system. To catch the sludge from the vapour, KVM has developed an unique and effective system. In a vertical buffer the sludge falls down and a horizontal screw conveyor is taken the sludge directly back into the mixer and then avoid the waste.





#### The difference

The major difference is KVM's unique water and sludge returning system back to the mixer. In the bottom of the oversized ducting "buffer" the screw conveyor is leading the condensed water and sludge back to the mixer. Between the screw conveyor and the ducting there is a gate to regulate the exhaust. Followed by a vertical "buffer" pipe and then an inclined pipe to the exhaust system near the bag house. This ensures a trouble free process and higher percentage of RAP addition into the mixer. Even with high moisture contents (8%) in the RAP, the KVM sludge return system will vent the many thousands of litres of steam that expand from the water in seconds. The KVM solution is an unique system to avoid daily cleaning, problems and production limitations.



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### **Advantages:**

- Heated RAP
- High recycling %
- Known technology

#### **Disadvantages:**

- Complex mechanical solution
- Complex control solution
- High filter capacity needed
- High demand on operator
- Much drum cleaning needed
- High maintenance cost
- High production cost
- Long return of investment

## **RAP VIA RECYCLING DRUM**

# **KVM INTERNATIONAL A/S**

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