



Intelligent compacting

# OSCILLATION



# OSCILLATION

Decades of success



Founded in 1878, HAMM has focused on the manufacture of rollers for road building since the beginning of the 20th century. From that time on, HAMM has been the driving force and trendsetter in the industry. Many technologies and solutions that have become the standard in the compaction sector were developed by HAMM.

One milestone was the development of oscillation. HAMM brought this compaction technology to series production and established it on the market in the 1980s. Today, HAMM offers more than 30 machine types with oscillation drums in all weight classes - more than any other manufacturer worldwide.

The intelligent technology is used by construction companies around the world in asphalt construction and earthworks. This way, HAMM is responding to the growing demands on high-quality compaction for the most diverse applications and building materials.

## OSCILLATION ROLLERS IN THE HAMM PRODUCT RANGE



- **TANDEM ROLLERS**
  - > HD CompactLine series
  - > HD+ series
  - > HX series

- **SOIL COMPACTORS**
  - > HC CompactLine series
  - > HC series

# MAXIMUM PRODUCTIVITY

Oscillation - over 35 years' experience

## A brief explanation of vibration and oscillation

The tandem rollers and compactors compact the soil using their weight, which acts as a static load on the ground during the double pass. If the drums are caused to vibrate at the same time, the compaction effect increases significantly. This is described as dynamic compaction.

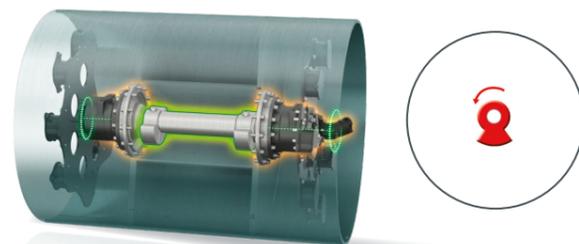
Two successful principles are employed: Vibration and oscillation. They differ in respect of the exciter system used and the resulting direction of force application.



Rollers with oscillation are available for asphalt construction and earthworks.

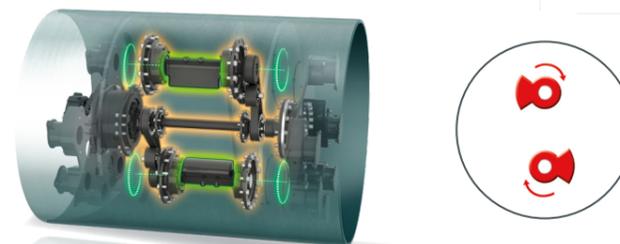
## Vibration

With vibration, a rotating unbalanced mass forces the drum to undergo a rapid circular motion. This results in the bulk of the compaction energy being directed vertically into the ground, achieving a great depth effect. The drum lifts off the ground after each impact. This means that around 50% of the time, the drum is not in contact with the ground.



## Oscillation

Oscillation involves two unbalance shafts rotating synchronously. The unbalanced masses are offset by 180° relative to one another. This causes the drum to carry out a rapidly alternating forwards/backwards rotational movement, as a result of which the compaction energy is directed into the ground tangentially to the front and rear in the form of shear forces. In contrast to a vibrating roller drum, it continuously acts dynamically on the ground. The drum is always in contact with the ground in this case. This also results in constant static compaction using the machine weight.



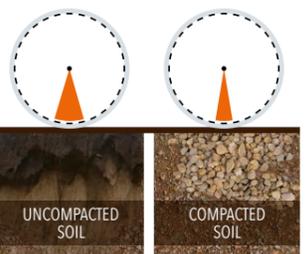
## Oscillation for asphalt construction and earthworks

The HAMM programme contains oscillation drums for tandem rollers and compactors. This means that the intelligent compaction technology can be employed in both asphalt construction and earthworks.

## Self-regulating system

HAMM makes use of the laws of physics to generate vibrations because the appropriate amplitude is adjusted automatically during the oscillation depending on the rigidity of the material to be compacted: The more rigid the asphalt or ground, the lower the amplitude. This adjustment takes place with every movement of the drum without complex control technology.

The oscillation control principle: The more rigid the ground, the smaller the amplitude.



# ADVANTAGES OF OSCILLATION

Solutions for earthworks and asphalt construction

## Asphalt

Tandem rollers and combination rollers are mainly used in asphalt compaction. In all of these rollers, the oscillation unit in the drums can be activated or deactivated at the push of a button from the operator's platform. The HAMM range includes various models with oscillation drums:

### > VO

Tandem rollers with a vibrating roller drum at the front and an oscillation drum at the rear.

### > OT

Combination rollers with an oscillation drum at the front and a set of wheels at the rear.

### > VS-OS

Tandem rollers with a split vibrating roller drum at the front and a split oscillation drum at the rear.



## Earthwork

For earthworks, HAMM has developed the VIO drum. This means that oscillation can also be used in compactors. The imbalance system of the VIO drums combines two types of compaction. You can therefore compact with either vibration or with oscillation. In earthworks, this allows the VIO drum to compact with vibration deep underground and with oscillation in the upper layer.

### > VIO

Compactor with special imbalance system, which can compact either with vibration or with oscillation. Switching between vibration and oscillation is carried out from the operator's platform and can even be done with the roller in motion.



## HAMM ROLLERS WITH OSCILLATION

Machine model	Tandem rollers	Combination rollers	Tandem rollers with split oscillation drum	Compactors
<b>Asphalt</b>				
HD CompactLine	VO	OT		
HDe CompactLine	VO	OT		
HD+	VO	OT		
HX	VO-S		VS-OS	
<b>Earthworks</b>				
HC CompactLine				VIO
HC				VIO



## HAMM > ALL OSCILLATION DRUMS ARE MAINTENANCE-FREE

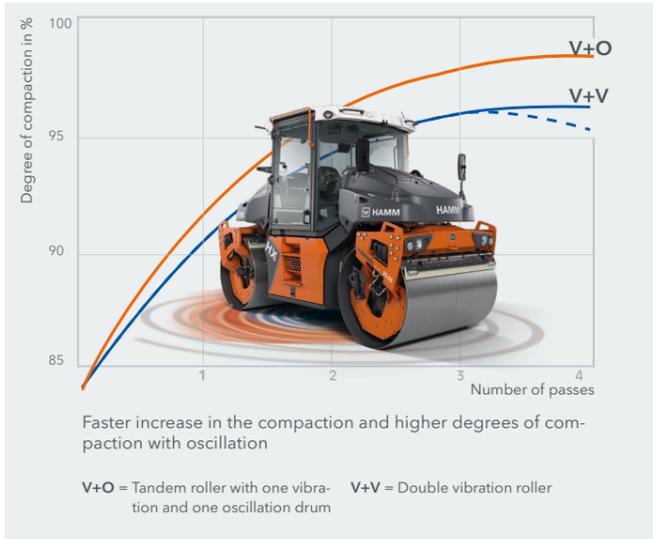
All oscillation drums produced by HAMM since 2019 are maintenance-free. This applies for non-split and split drums. This is possible because HAMM uses highly wear-resistant steel for the drum shells of the oscillation drums. Furthermore, temperature-resistant special belts in all oscillation drums take over the power transmission.

- This results in the following customer benefits:
- Complex maintenance work is eliminated.
  - Operating costs are drastically reduced.
  - High level of availability and, therefore, efficiency.



# MANY ADVANTAGES

High-quality and cost-effective compaction



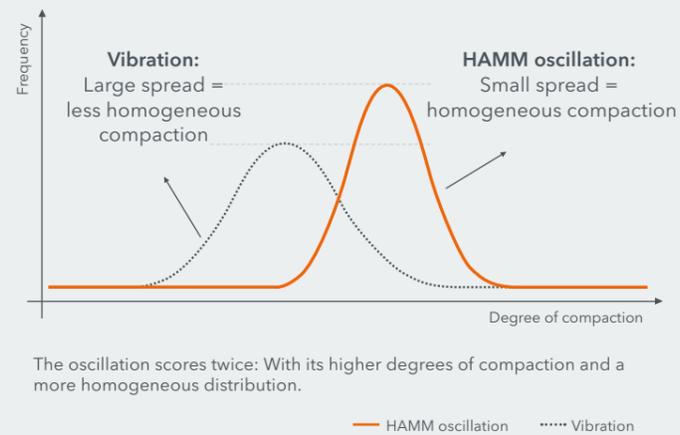
## Rapid increase in compaction

For tandem rollers with one oscillation drum and one vibrating roller drum, the compaction increases considerably faster than for double vibration rollers. This is because, during both forwards and backwards movements, the oscillation drum directs its compaction force into the ground in the form of tangential shear forces. In doing so, the drum never leaves the ground but continues to compact dynamically. Furthermore, a static load acts constantly on the asphalt or ground. All of this favours the rapid increase in compaction and accelerates the compaction process.

### Advantages

- > Fewer double passes
- > Rapid increase in compaction
- > High degree of compaction

## Statistical evaluation of the degrees of compaction



## Homogeneous compaction

Scientific studies have directly compared oscillation and vibration and compacted equal-sized, adjacent areas with the same number of double passes. The degree of compaction was then determined at 50 locations on each surface. The graphic shows the frequency of the determined degrees of compaction. In this case, the highest degrees of compaction were achieved with oscillation. Furthermore, the measured values were significantly closer to each other. This means that compaction with oscillation has been proven to be significantly more uniform.

In short: Oscillation rollers compact very homogeneously with a high degree of compaction.

### Advantages

- > Durable, since there are no weak points
- > High degree of compaction



## Team player with high compaction power

Thanks to the superimposition of dynamic shear forces with the permanent load from the roller's own weight, significantly fewer passes are required, especially for the compaction of large areas. Oscillation is therefore highly cost-effective for major projects: Fewer double passes or fewer rollers are required due to the rapid increase in compaction.

### Advantages

- > Fewer double passes
- > Fewer machines

## Surfaces with a high level of evenness

Oscillation rollers create surfaces with excellent longitudinal evenness because the drum remains in contact with the ground or asphalt at all times. No rippling is produced - not even at high working speeds.

### Advantages

- > High longitudinal evenness
- > No undulation formation
- > High driving comfort



Perfect evenness thanks to oscillation

# MANY ADVANTAGES

## Simple operation and reduced noise emissions

### Minimal vibrations in the surrounding area

Oscillation rollers can even compact without problems close to vibration-sensitive buildings or plants, because oscillation drums vibrate but do not lift from the ground and do not cause vertical shocks. In comparison to vibrating drums, with oscillation drums, only around 15% of the vibration is directed into the ground around the roller. At the same time, this technology also protects the machine components.

#### Advantages

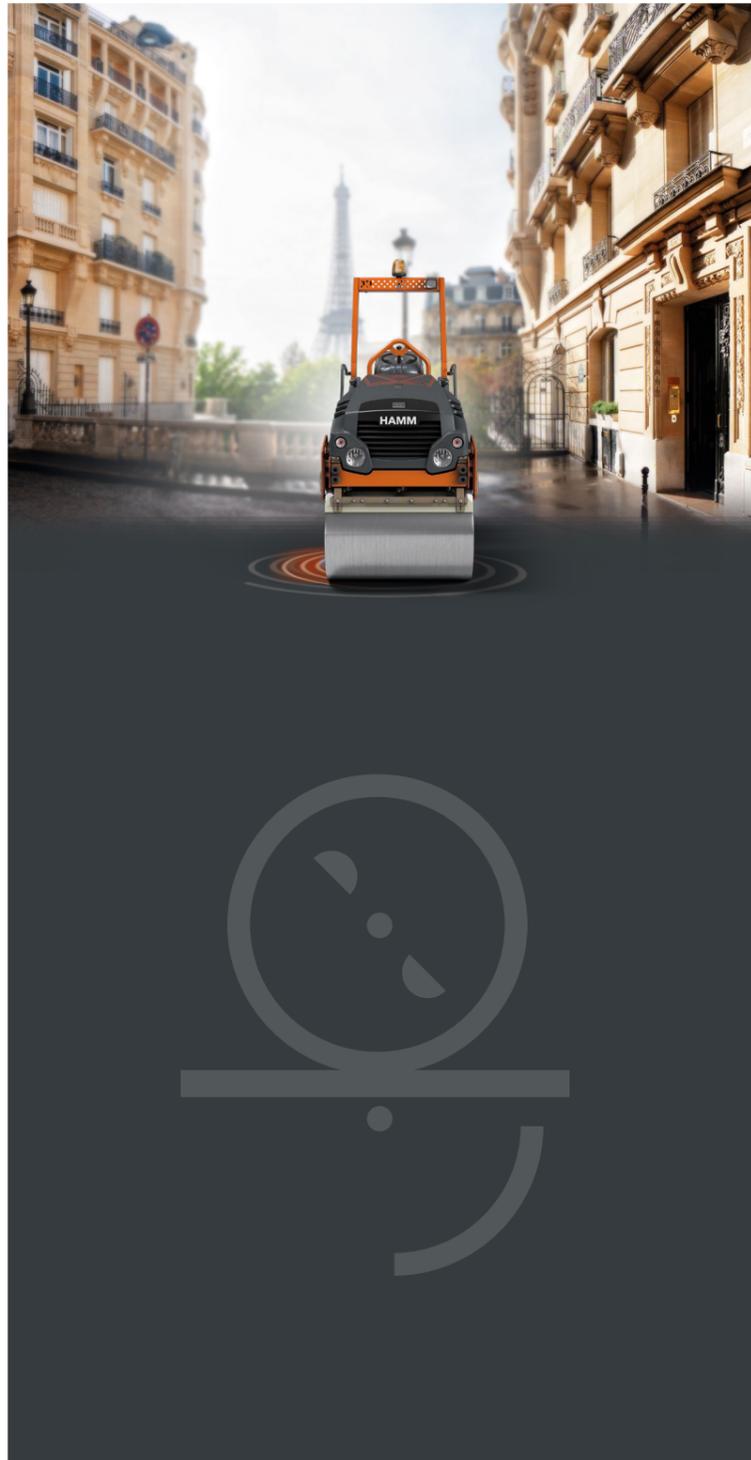
- > Minimal vibrations in the area around the machine
- > Dynamic compaction is also possible in vibration-sensitive areas, such as inner cities, bridges, above supply lines, close to railway stations, etc.

### Quieter compaction

Oscillation compaction is significantly quieter than compaction with vibration. This protects the environment and increases the comfort level for the roller driver, for whom it is perceptibly less tiring.

#### Advantages

- > Lower noise levels
- > Comfortable for drivers



### Easy operation

Oscillation rollers are extremely easy to operate. Simply switch on the machine - the drum is then set automatically depending on the rigidity of the material to be compacted. Even with varying ground, the amplitude is always adjusted perfectly. HAMM has therefore eliminated the risk of operator errors due to incorrect settings. Instead, this principle impresses with its efficient compaction even on changing ground.

#### Advantages

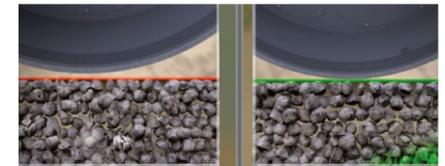
- > Optimum compaction energy
- > Easy operation
- > Operator errors impossible

### Neither over-compaction nor particle crushing

With vibration compaction, there is a risk of destruction of the material structure or particle crushing above a certain rigidity. This is not the case with oscillation. Here, the aggregate particles are redistributed non-destructively. In this way, oscillation avoids detrimental particle crushing. Neither does any undesirable drawing-up of water in earth-works or bitumen in asphalt construction occur with oscillation compaction. Instead, the rigidity and/or the compaction increases with every double pass.

#### Advantages

- > No over-compaction or particle crushing
- > Intact grain structure
- > No re-loosening
- > No decomposition due to the drawing-up of bitumen or water



# UNIQUE IN THE WORLD

## Split oscillation drums

### Split drums

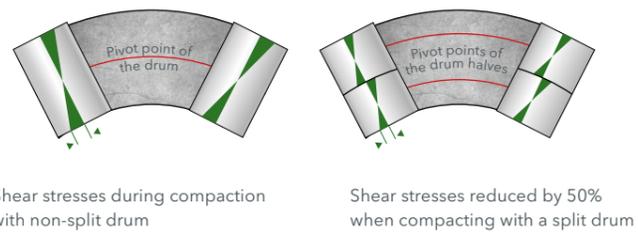
During compaction in curves and on roundabouts as well as with every sharp steering movement such as when changing compaction lanes, there is a risk of material displacement and surface cracks if non-split drums are employed for compaction. This is because the part of the drum on the inside of the curve always travels a shorter distance than the part of the drum on the outside of the curve.

These problems can be avoided with a split drum because the two halves rotate at different speeds when cornering. This minimises the shear stresses in the asphalt to be compacted and prevents material displacements and cracks.

These advantages also come into play when compacting asphalts which are prone to displacement, such as stone mastic asphalt or polymer-modified mixes.

### Significant reduction in shear stresses

The split drum only generates low shear stresses in the asphalt during compaction.



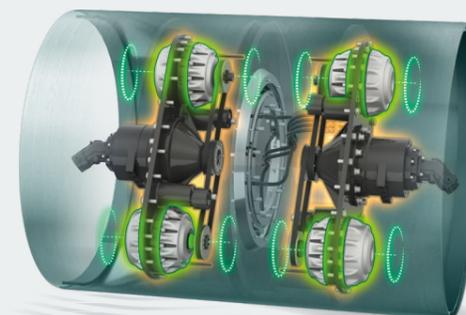
### Split oscillation drums offer first-class asphalt compaction

HAMM has combined the added value with the advantages of oscillation compaction and developed a split drum with oscillation. In the drum, two oscillation units operate mechanically independently of each other. An integrated control mechanism adapts the position of the unbalanced masses quickly and precisely to the position of the two drum halves.

An innovative digital hydraulic system ensures that both halves of the drum swing synchronously at all times despite different speeds of rotation in curves. And this is the crucial factor for high-quality compaction. The high compaction power is not affected by this.

### Advantages

- > Highest quality surfaces
- > No surface cracks
- > No material displacement in the asphalt



Unique in the world:  
Split drum with oscillation.



# MORE TIME FOR QUALITY

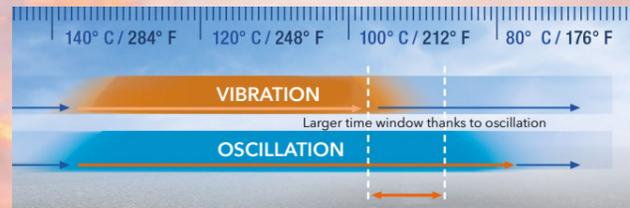
Excellent on large surfaces and in tight curves

## More time for asphalt compaction

Only a certain, material-dependent temperature range is available for the compaction of asphalt. If the asphalt has cooled down too much, vibration may result in grain crushing or destruction of the granular structure or of the bonding of the layers. In contrast, oscillation delivers an increase in compaction, without damaging the structure of the asphalt, even at lower temperatures. This significantly increases the compaction time window. For this reason, oscillation is particularly well suited to the compaction of thin layers or on fast-cooling surfaces such as on bridges.

## Advantages

- > Larger time window
- > Increased flexibility
- > Efficient even at lower asphalt temperatures
- > Efficient when compacting thin layers and in adverse weather conditions



## High-quality joint compaction

Joints with existing asphalt surfaces, such as when refurbishing a single traffic lane, are best compacted using oscillation rollers - without damage to the cold carriageway. This results in high-quality compacted and, therefore, durable joints to the existing asphalt layer.

## Advantages

- > Optimum, dynamic compaction of the joint
- > No damage to the cold layer
- > Durable connection

## Solution for difficult-to-compact asphalts

Rollers with oscillation drums achieve excellent compaction even of difficult-to-compact construction materials such as stone mastic asphalt or polymer-modified mixes. This is because, in contrast to vibration compaction, the operating direction of the vibrations during oscillation promotes the desired redistribution of the long-chain binders. The system has also proven its worth when compacting asphalt surface courses using the InLine Pave process.



# MANY APPLICATIONS

Ideal on bridges, for thin layers and in cities

## Compaction on bridges

Rollers with oscillation are the trump card for compaction on bridges. There, they are able to compact dynamically and efficiently because there is no risk of the compaction work inducing dangerous vibrations at the bridge's resonant frequency. Another benefit is the rapid increase in compaction. This is especially important on bridges because the wind cools the asphalt layers quickly there. In addition, tandem rollers with oscillation compact very efficiently even at lower asphalt temperatures.

## Compaction of thin layers

Rollers with oscillation rollers are the number one choice for compaction of thin asphalt layers because they quickly achieve the desired compaction. Furthermore, tandem rollers with oscillation are able to compact thin layers perfectly even at lower asphalt temperatures.

## Top quality even for small asphalt repairs

Joints between new and existing asphalt are among the critical points in carriageway refurbishment. The oscillation prevents damage to the existing or already milled, cold carriageway. Since HAMM also offers oscillation rollers in the compact class, even the smallest areas can be compacted to a high-quality and in a sustainable manner - including the lateral joints at the start and end of the surfaces.

## High-quality compaction in inner cities

At confined construction sites in city centres, dynamic compaction with oscillation is advisable. It is particularly safe because oscillation induces only minimal vibration in the adjacent area. For this reason, it avoids damage to the surrounding buildings as well as to infrastructure facilities and pipework below the carriageway.



# EFFICIENT SOIL COMPACTION

High surface output included

## Efficient compaction of water-bound surfaces

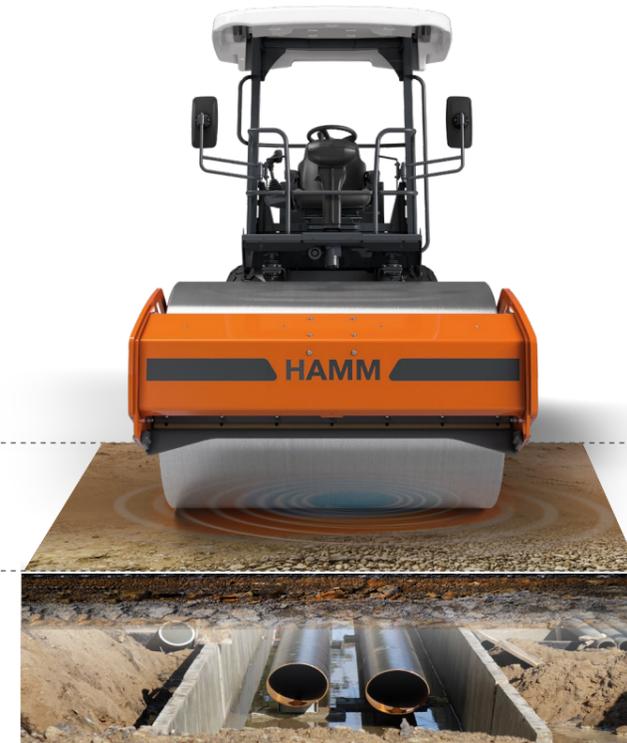
In gardening and landscaping, but also in the construction of footpaths and cycle paths, the oscillation compaction helps with the compaction of water-bound road surfaces. Problems such as re-loosening in the upper region or the drawing-up of water

during ground compaction do not occur with this method of compaction. As a result, oscillation can be used to compact considerably more efficiently than other technologies.



## Compaction above gas and water lines

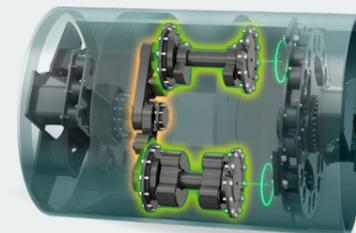
When compacting the sub-base, surfaces above infrastructure lines often also have to be compacted. This is where oscillation rollers come in: They compact without damaging the lines. Particularly practical: With HAMM's VIO single-drum compactors, the driver can change the compaction method on the move at the push of a button.



Unique in the world:  
Compact compactors with VIO drum.

## HAMM > VIO

The VIO drum from HAMM combines vibration and oscillation in one system. The driver can switch between the two compaction systems while the roller is moving.



VIO-drum



VIO operation

# PROVEN WORLDWIDE

Internationally successful in compaction in asphalt construction and earthworks

Dynamic compaction with oscillation leads to higher quality in road-building projects. This is common knowledge among building authorities and private customers alike. Oscillation has also proved its worth in major projects. In this case, the rapid increase in compaction allows for fewer double passes. This optimises the process. Accordingly, oscillation rollers are increasingly being mandated for compaction in projects where quality and longevity are paramount.

### Example 1: Large construction sites

Oscillation rollers are in demand for the refurbishment and construction of motorways, runways and other major projects. Since they compact very efficiently, the number of machines can sometimes be reduced. Furthermore, they still achieve a compaction effect on rapidly cooling asphalt even when vibration rollers can only work statically.



### Example 2: Bridge construction

When paving asphalt on bridges, oscillation rollers can dynamically compact even very thin asphalt layers to a high quality. This therefore prevents damage to the bridge structure caused by vibrations.



### Example 3: Temperature-reduced asphalt

The time window for the compaction of temperature-reduced asphalt is even shorter than for conventional asphalt. Oscillation rollers can be used to extend this time period without destroying the grain structure or the aggregate.



### Example 4: Compaction between historical buildings

Historical buildings may be damaged by vibration compaction in the immediate vicinity. There, tandem rollers with oscillation compact all layers of the asphalt surface courses to a high quality and with high evenness.



### Example 5: Compaction in cities

In cities where underground garages and pipelines in the ground could be damaged by compaction with vibration, compactors with VIO drum and/or tandem rollers with oscillation compact the frost protection layers as well as the sub-base to a high quality and produce surfaces of high evenness.



### Example 6: Noise-sensitive areas

Oscillation rollers are significantly quieter than vibration rollers. They are therefore predestined for compaction wherever noise is considered particularly critical.

# TRIED AND TESTED

Advantageous in every respect

## OSCILLATION STANDS FOR ...

### ... efficient compaction

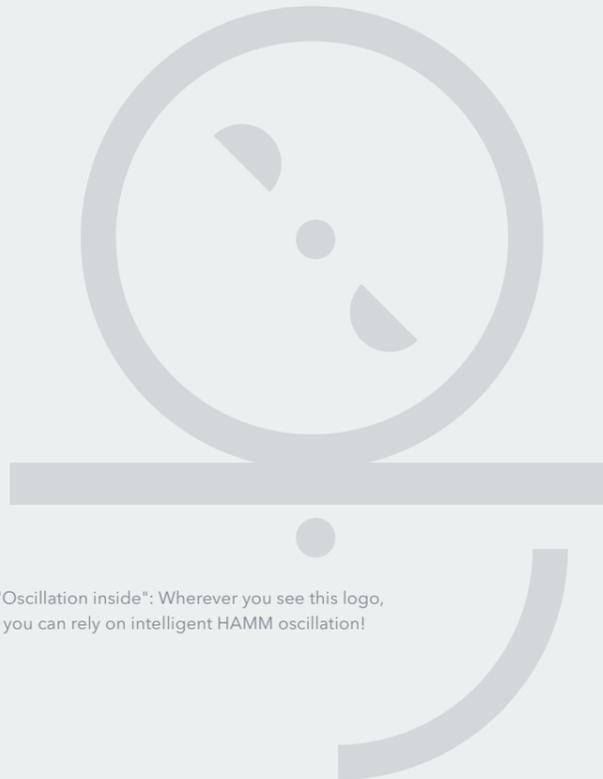
- > High level of compaction power
- > Fewer passes required
- > Dynamic compaction even in vibration-sensitive areas (bridges, supply lines, railway infrastructure, etc.)

### ... high quality

- > Homogeneous density in final compacted asphalt
- > No over-compaction or grain crushing
- > Good evenness of the carriageways
- > Tight joints without damage to cold asphalt
- > Long-lasting joints

### ... many application benefits

- > Large time window for compaction
- > Self-regulating system, requires no adjustments
- > Operator errors impossible
- > High flexibility
- > Environmentally friendly due to low noise level
- > Reduced vibration load for buildings and drivers



"Oscillation inside": Wherever you see this logo, you can rely on intelligent HAMM oscillation!

## WIDE RANGE OF APPLICATIONS FOR OSCILLATION

- In wind
- Inner city
- Motorway
- Race track
- Airfield
- Historical buildings
- Thin layers
- Bridge
- Multi-storey car park
- Asphalts that are difficult to compact
- Joint compaction
- Above gas and water pipes
- Close to railway infrastructure
- When cold





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