

Intelligent compaction

OSCILLATION



OSCILLATION

Decades of success

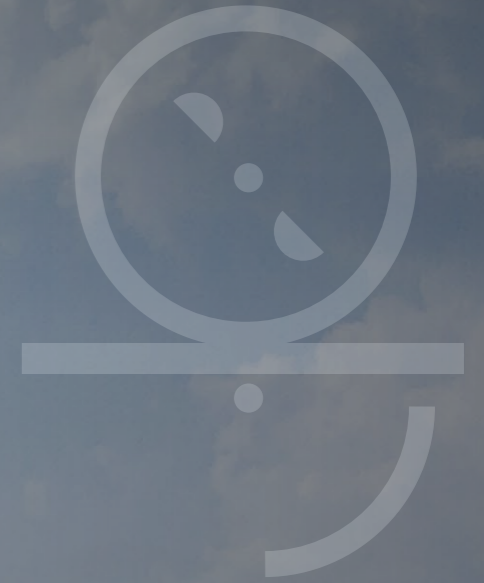


Founded in 1878, HAMM has focused on the manufacture of rollers for road building since the beginning of the 20th century. From that time on, HAMM has been the driving force and trendsetter in the industry. Many technologies and solutions that have become the standard in the compaction sector were developed 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 40 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

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

MAXIMUM PRODUCTIVITY

Oscillation - over 40 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 substrate 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.

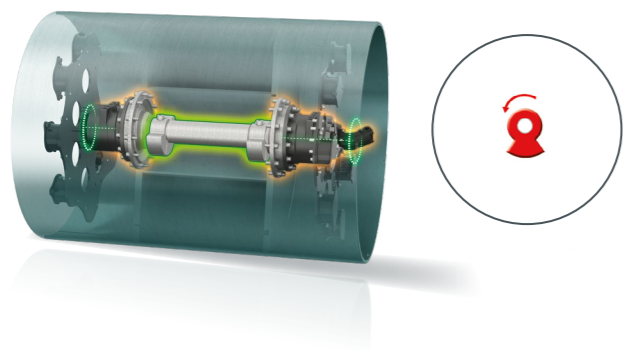
Dynamic compaction uses two effective principles: Vibration and oscillation. They differ in respect of the exciter system used and the resulting direction of force application.



Rollers with oscillation are available for asphalt construction and earthworks.

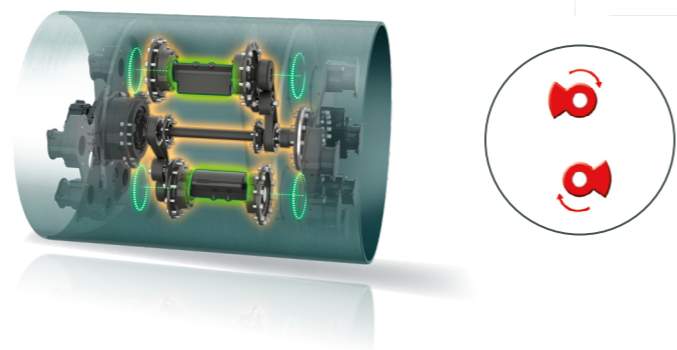
Vibration

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 substrate, achieving a great depth effect. The drum lifts away from the ground after each impact. This means that around 50% of the time, the drum is not in contact with the substrate.



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 substrate 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 substrate. 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

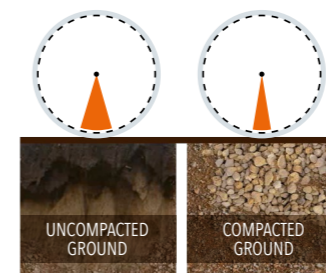
The HAMM programme contains oscillation drums for tandem rollers and compactors. This means: The intelligent compaction technology can be employed in both asphalt construction and earthworks.

Furthermore, the HAMM programme contains VIO drums for tandem rollers and compactors. These combine vibration and oscillation in one system. The operator can switch between the two compaction systems while in motion.

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 principle:
The more rigid the ground,
the lower the amplitude.



ADVANTAGES OF OSCILLATION

Solutions for earthworks and asphalt construction

Asphalt

Asphalt compaction primarily uses tandem rollers and combination rollers. 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

> V-VIO

Tandem rollers with a vibrating roller drum at the front and a VIO drum at the rear

Earthworks

For earthworks, HAMM has developed the VIO drum. This means that oscillation can also be used in compactors. The unbalance 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 unbalance system, which can compact either with vibration or with oscillation. Switching between vibration and scillation is carried out from the operator's platform and can even be done while in motion.



HAMM ROLLERS WITH OSCILLATION

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

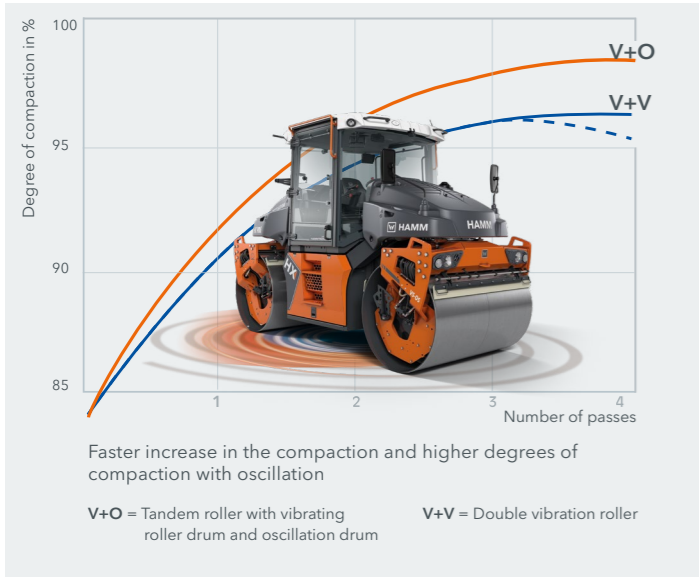
HAMM > ALL OSCILLATION DRUMS ARE MAINTENANCE-FREE

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.

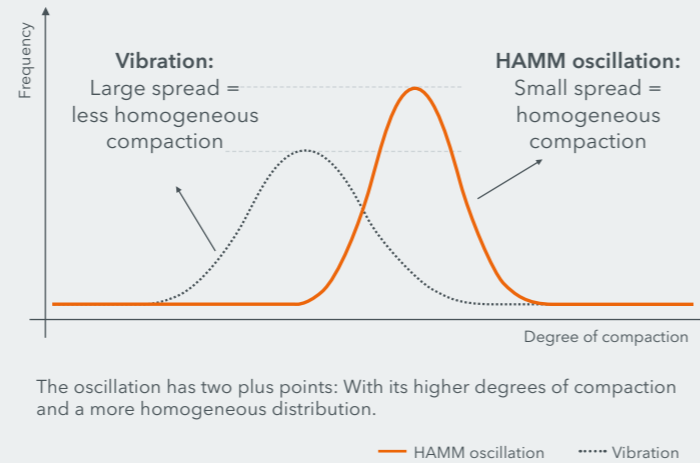
- This results in the following customer benefits:**
- Complex maintenance work is eliminated
 - Operating costs are drastically reduced
 - High level of availability and, therefore, efficiency

MANY ADVANTAGES

High-quality and cost-effective compaction



Statistical evaluation of the degrees of 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 substrate 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

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 away from the substrate and do not cause vertical shocks. In comparison to vibrating drums, with oscillation drums, only around 15% of the vibration is directed into the substrate around the roller. At the same time, this technology also protects the machine components.

Advantages

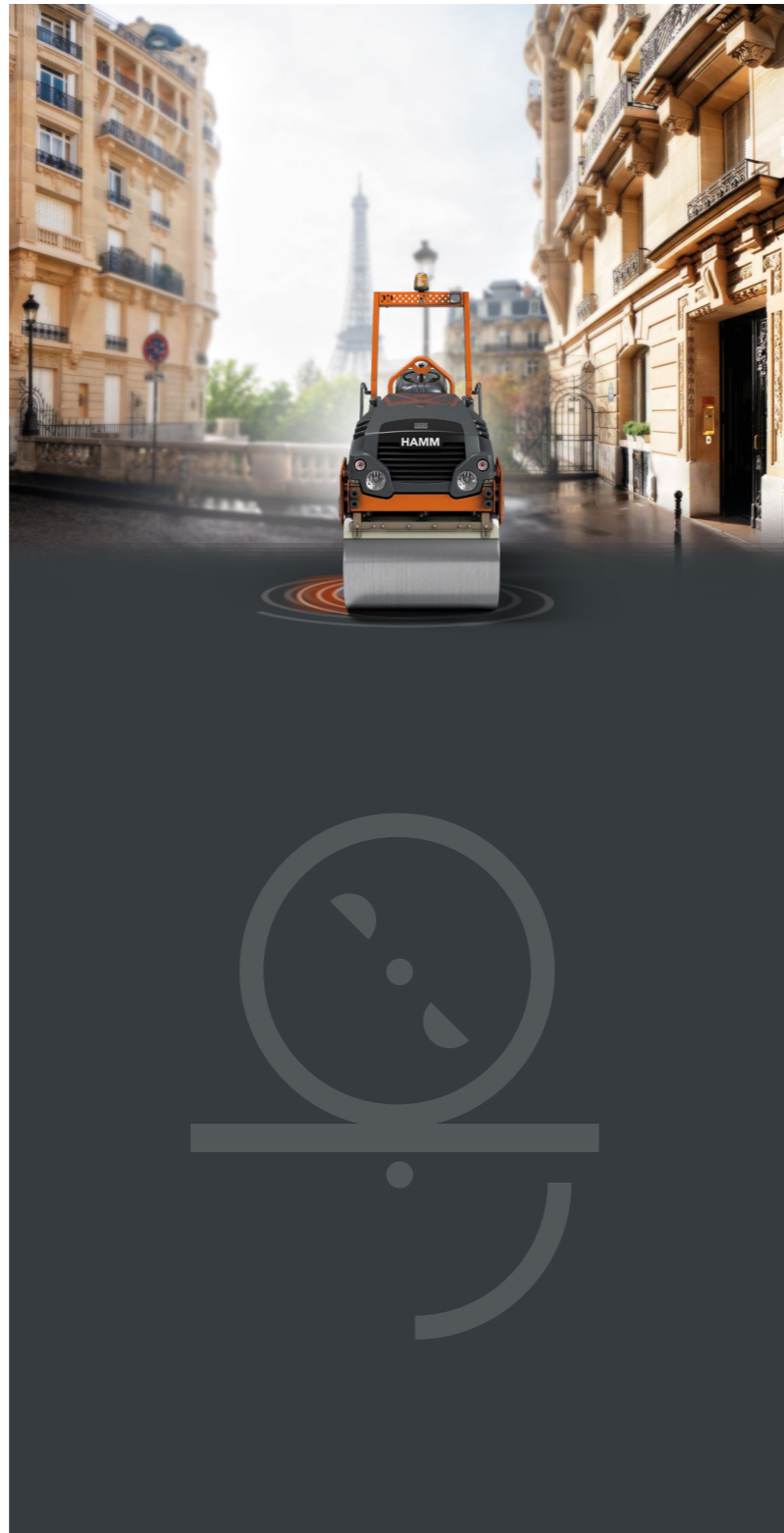
- > Minimal vibrations in the area around the machine
- > Dynamic compaction is also possible in vibrationsensitive areas, such as inner cities, bridges, above supply lines, close to railway infrastructure, etc.

Quieter compaction

Oscillation compaction is significantly quieter than compaction with vibration. This protects the environment and increases the comfort level for the roller operator, by significantly reducing the strain on them.

Advantages

- > Lower noise levels
- > Comfortable for operators



Easy to use

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 substrates, 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 substrates.

Advantages

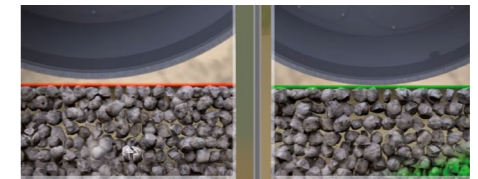
- > Optimum compaction energy
- > Easy operation
- > Operator errors impossible

No 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. However, this is not the case with oscillation. Here, the aggregate particles are redistributed non-destructively. In this way, oscillation avoids detrimental particle crushing. Compaction with oscillation also prevents the unwanted effect of water being drawn up in earthworks or bitumen being drawn up in asphalt construction. 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

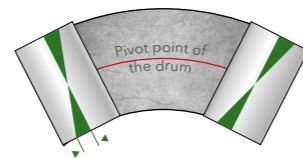
During compaction in curves and on roundabouts as well as with every sharp steering movement such as when changing compaction lanes, there is a risk of material displacement and surface cracks if non-split drums are employed for compaction. This is because the part of the drum on the inside of the curve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

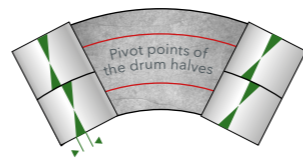
These advantages also come into play when compacting types of asphalt that are prone to displacement, such as stone mastic asphalt or polymer-modified mixes.

Significant reduction in shear stresses

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



Shear stresses during compaction with non-split drum



Shear stresses reduced by 50% when compacting with a split drum



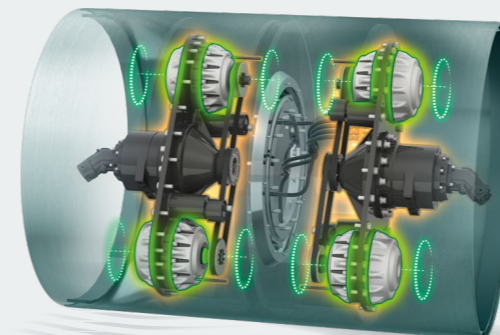
Split oscillation drums deliver the very best in asphalt compaction

HAMM has combined the added value of split drums 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.

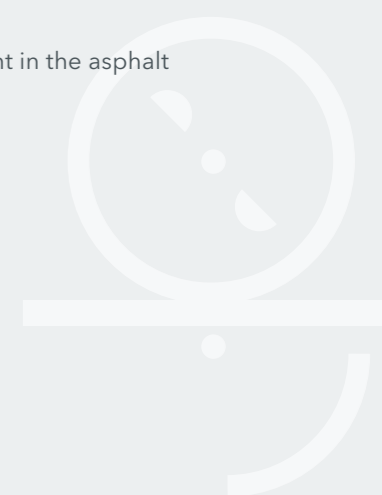
An innovative digital hydraulic system ensures that both drum halves oscillate synchronously in curves at all times despite rotating at different speeds. And this is the crucial factor for high-quality compaction. The high compaction power is not affected by this.

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

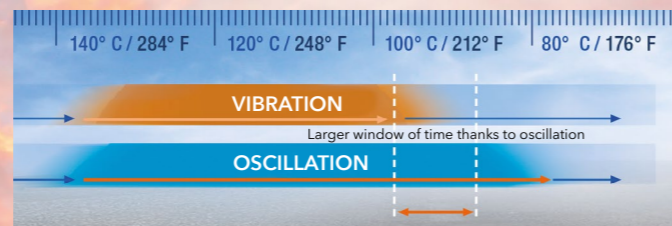
Excellent on large surfaces and in tight curves

More time for asphalt compaction

Only a specific material-dependent temperature range is available for the compaction of asphalt. If the asphalt has cooled down too much, vibration may result in particle crushing or destruction of the granular structure or of the layer bonding. 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 window of time
- > 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 with 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 in the laying of compact asphalt surface courses using the InLine Pave process.



EFFICIENT GROUND COMPACTION

High surface output included

Compacting water-bound surfaces efficiently

In gardening and landscaping, but also in the construction of footpaths and cycle paths, 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.



Compacting 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 are a popular choice: They compact without damaging the lines. A particularly practical feature: With HAMM's VIO compactors, the operator can change the compaction method on the move at the push of a button.

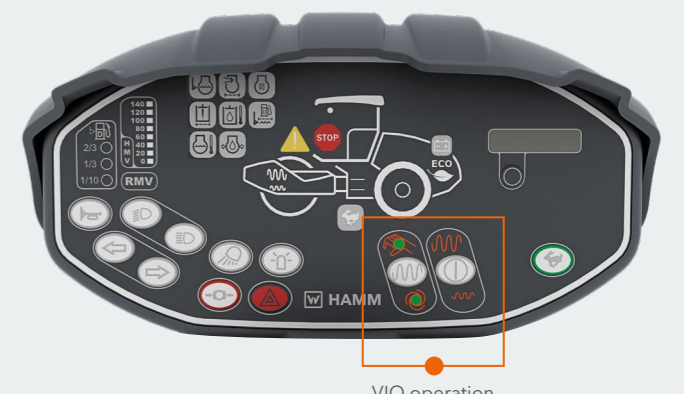
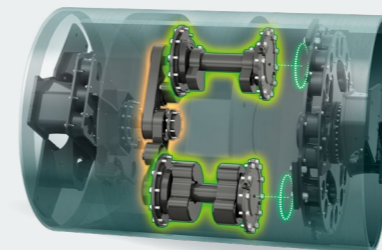


Unique in the world:
Small compactor with VIO drum.

HAMM > VIO

The VIO drum from HAMM combines vibration and oscillation in one system. The operator can switch between the two compaction systems while in motion.

VIO-drum



VIO operation

DIVERSE APPLICATIONS

Ideal on bridges, for thin layers and in cities

Compacting on bridges

Oscillation rollers 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.

Compacting thin layers

Oscillation rollers are the number one choice when compacting thin asphalt layers, because they quickly achieve the desired compaction result. Furthermore, tandem rollers with oscillation are able to compact thin layers without damage 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 recently refurbished, cold carriageway. Since HAMM also offers oscillation rollers in the compact class, even the smallest areas can be compacted to a high standard and a durable quality - including the lateral joints at the start and end of the surfaces.

High-quality compaction in inner cities

On cramped 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.



The HD+ V-VIO has a VIO drum that can switch between vibration and oscillation at the press of a button. This maximises its flexibility.



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: Major construction sites

Oscillation rollers are a popular choice 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 window of time for compacting temperature-reduced asphalt is even shorter than for conventional asphalt. Oscillation rollers can be used to extend this window of time without destroying the grain structure or the aggregate.



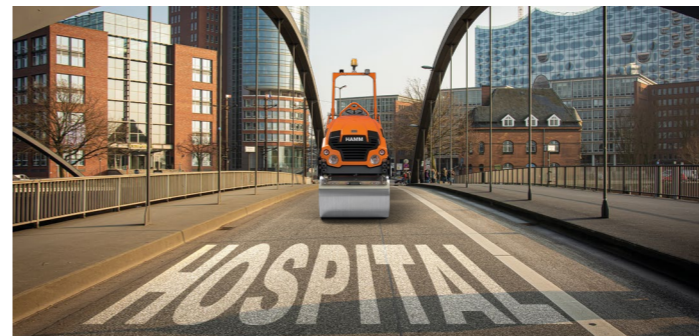
Example 4: Compacting between historical buildings

Historical buildings may be damaged by vibration compaction in the immediate vicinity. This is where tandem rollers with oscillation come in, as they can 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 car parks and pipelines in the substrate 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 the ideal choice for compaction wherever noise is considered particularly critical.

TRIED AND TESTED

Advantageous in every respect

OSCILLATION STANDS FOR ...

... efficient compaction

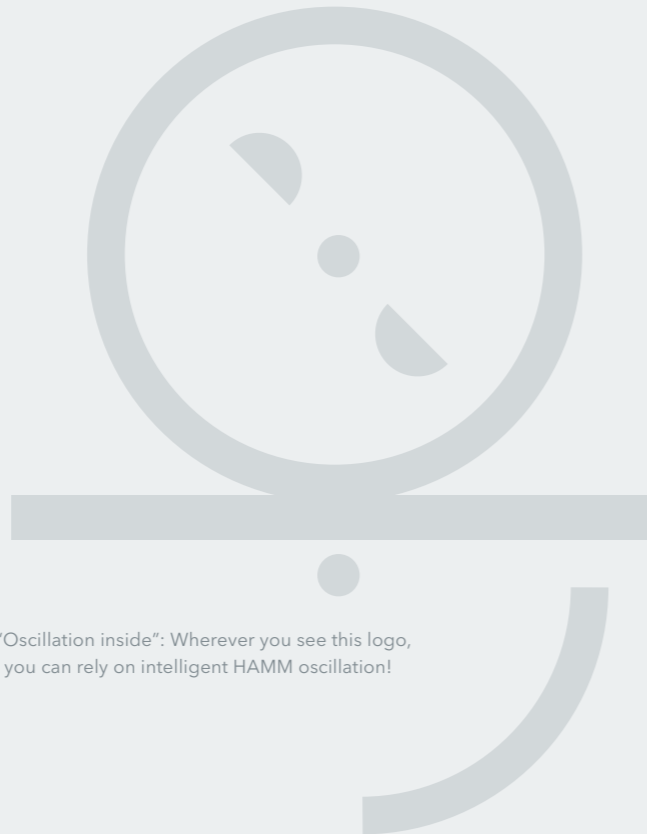
- > High level of compaction power
- > Fewer passes required
- > Dynamic compaction even in vibration-sensitive areas (bridges, supply lines, railway infrastructure, etc.)

... many application benefits

- > Large window of time 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 operators

... high quality

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



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

WIDE RANGE OF APPLICATIONS FOR OSCILLATION

When windy
 Inner city
 Motorway
 Race track
 Airfield
 Historical buildings
 Thin layers
 Bridge
 Multi-storey car park
 Hard-to-compact asphalts
 Joint compaction
 Above gas and water pipes
 Close to railway infrastructure
 When cold

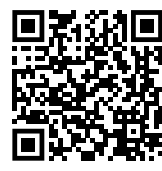


**HAMM AG**

Hammstraße 1
95643 Tirschenreuth
Germany

T: +49 9631 80-0
M: info@hamm.eu

 www.hamm.eu



For further information, scan the code or
visit www.wirtgen-group.com/oscillation-hamm