



Intelligent compaction
OSCILLATION





Oscillation - over 35 years' experience

Oscillation technology delivers homogenous and cost-effective compaction in asphalt construction and earth work.

More than 35 years ago, HAMM developed oscillation and thereby revolutionised compaction technology. Today, HAMM offers more than 35 machine types with oscillation drums in all weight classes. Road construction companies all over the world love using this intelligent technology for asphalt construction and earth work. This way, HAMM is responding to the growing demands on high-quality compaction for the most diverse surfaces and building materials.



Oscillation

Oscillation involves two unbalance shafts rotating synchronously. The unbalances are offset by 180°. This causes the drum to carry out a rapidly alternating forward/backward rotary 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 drum, it acts dynamically on the substrate all the time. Because the drum is always in contact with the ground, there is also a constant static load due to the weight of the machine.

In order to produce homogenous surfaces without cracks even in tight curves and thus also satisfy the highest requirements in asphalt compaction, HAMM is the only manufacturer that has additionally developed a split roller drum with oscillation. There are two exciter units in the drum that function fully independently. The synchronisation is electrohydraulic.

A brief explanation of vibration and oscillation

The compaction effect of rollers is always due to the weight that acts as a static load on the substrate as they travel over it. 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.



Vibration

With vibration, a rotating unbalance 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 deep penetration. 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 for asphalt construction and earth work

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 earth work. All oscillation drums are manufactured in the HAMM drum factory using highly wear-resistant steels.

Asphalt

Asphalt compaction is mainly carried out using tandem rollers. On the models with oscillation, the oscillation drum is normally fitted at the rear. Its exciter system can simply be activated or deactivated by pressing a button.

Earth work

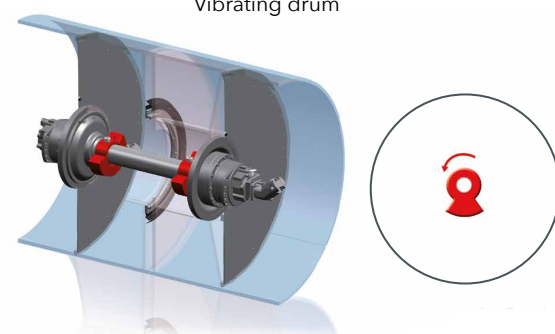
For earth work, HAMM has developed the VIO drum which enables oscillation to be employed in compactors as well. Its unbalance system combines two compaction methods in a single drum, enabling compaction either with vibration or with oscillation. This solution is ideal for earth work, because the VIO drum is able to compact in depth with vibration and in the upper layer 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.

Machine series with oscillation:

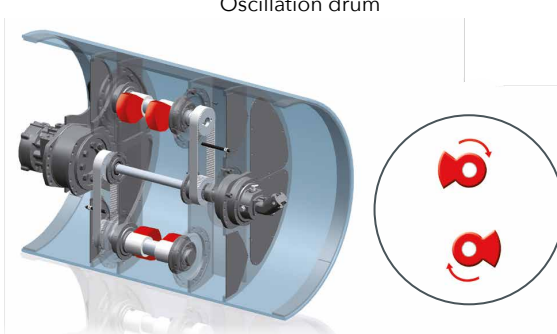
Tandem rollers
Series HD CompactLine
Series HD
Series HD+
Series DV+

Compactors
Series H CompactLine
Series H
Series 3000

Vibrating drum



Oscillation drum





Oscillation compaction brings about an increase in quality – and is highly cost-effective, too.

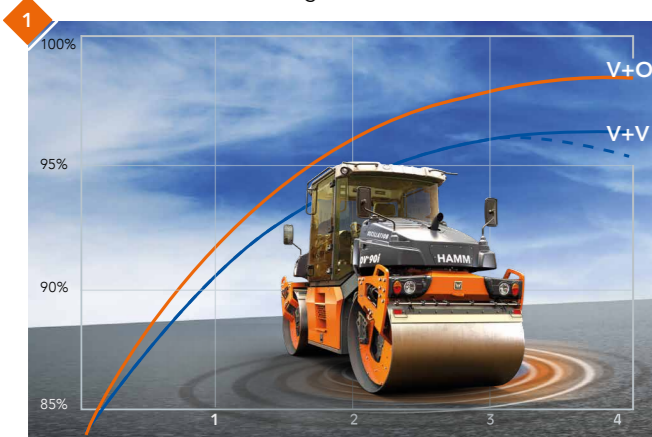
Benefits of oscillation

- High compaction power
- Fewer passes required
- No over-compaction or grain crushing
- High quality thanks to homogenous, smooth carriageways
- Tight seams without damage to cold asphalt
- Dynamic compaction even in vibration-sensitive areas
- Efficient compaction at low asphalt or ambient temperatures enables compaction even within limited working time windows
- Self-regulating system, requires no adjustments
- Environment-friendly thanks to low noise level and reduced vibrations
- Reduced vibrations make the machine components last longer and are less tiring for the driver

Wide application spectrum

- Compaction on major projects (motorways, racetracks, airfields, etc.)
- Compaction on bridges, on ramps and in multi-storey car parks
- Compaction in inner-city areas, in close proximity to historical or vibration-sensitive buildings
- Compaction of thin layers (surface courses or DSH-V thin overlays)
- Compaction of difficult-to-compact asphalt types
- Compaction of joints
- Compaction above gas and water pipes
- Compaction near railway installations
- Compaction under difficult ambient conditions (cold, wind) or at low asphalt temperatures

Using rollers with one oscillation and one vibrating drum, the level of compaction rises faster and achieves higher values than with rollers with two vibrating drums.



V+O = Tandem roller with one vibrating and one oscillation drum
V+V = Roller with two vibrating drums
y axis: Degree of compaction in %
x axis: Number of compaction passes



Self-regulating amplitude (oscillation): the more rigid the ground, the lower the amplitude.



Oscillation - the benefits at a glance



1 Rapid increase in compaction

Rollers with one oscillation and one vibrating drum achieve a much faster increase in compaction than rollers with two vibrating drums. This is because during both forward and backward movements, the drum directs its compaction force into the ground in the form of tangential shear forces. In doing so, the drum never leaves the ground. Instead, the ground is compacted dynamically without interruption. In addition, a static load acts constantly on the asphalt or ground. This promotes a rapid increase in compaction. It speeds up the compaction process and ensures exceptionally smooth surfaces.

ADVANTAGES

- Fewer passes
- Constant dynamic compaction
- Faster increase in compaction
- High degree of compaction

2 Minimal vibration in the surrounding area

Oscillation drums vibrate but neither lift off the substrate nor cause vertical impacts. In comparison to vibrating drums, with oscillation drums only around 15% of the vibration is directed into the substrate around the roller. This means that rollers with oscillation drums can also be used without problems for compaction near vibration-sensitive buildings or installations. This technology makes the components last longer, the rollers are markedly quieter and work is significantly less tiring for roller drivers.

ADVANTAGES

- Minimal vibration in the area around the machine
- Dynamic compaction is also possible in vibration-sensitive areas (in towns, on bridges, above supply lines, near railway installations, etc.)

3 Self-regulating system

Oscillation compaction makes intelligent use of physics. The appropriate amplitude is adjusted automatically depending on the rigidity of the material to be compacted: the more rigid the asphalt or ground, the lower the amplitude. This adjustment occurs with every movement of the drum, that is to say at very short intervals and minimal distances, without the need for an elaborate control system. Operator errors due to incorrect settings are thus excluded. Instead, this principle impresses with its efficient compaction even on changing substrates.

ADVANTAGES

- Optimum compaction energy
- Operator errors impossible

4 Neither over-compaction nor grain crushing

With vibration compaction, once a certain level of rigidity has been achieved, there is a risk of destroying the material structure or grain crushing. However, this is not the case with oscillation. Here, the aggregate particles are redistributed non-destructively. In this way, oscillation avoids detrimental grain crushing. Neither does any undesirable drawing-up of water or bitumen occur with oscillation compaction. Instead, the rigidity, that is to say the compaction, increases with every pass.

ADVANTAGES

- No over-compaction or grain crushing
- Intact granular structure
- No re loosening
- No demixing due to drawing-up of bitumen or water

5 More time for asphalt compaction

Asphalt can only be compacted during a specific, material-dependent temperature window. 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. Oscillation, on the other hand, delivers a non-destructive increase in compaction even at lower temperatures. The compaction time window is thus markedly increased. For this reason, oscillation is particularly suited to the compaction of thin layers or on fast-cooling surfaces such as on bridges.

ADVANTAGES

- Larger time window
- Greater flexibility
- Efficient compaction even at low asphalt temperatures, with fast-cooling thin layers and in adverse weather

6 High-quality joint compaction

Joints with existing asphalt surfaces, such as when refurbishing a single traffic lane, are best compacted using oscillation, that is to say without damage to the cold traffic lane. This allows connecting joints with existing asphalt to be compacted to a high standard of quality.

ADVANTAGES

- Optimum, dynamic compaction of the joint
- No damage to the cold surface
- Long-lasting joint

7 Perfect evenness

Surfaces compacted using oscillation exhibit excellent longitudinal evenness. It comes about because the drum remains in constant contact with the ground and no impacts occur that could produce irregularities in the ground or asphalt.

ADVANTAGES

- High longitudinal evenness
- No rippling
- Greater driving comfort





Whatever the application in earth work or asphalt construction: oscillation compaction is fast and easy on the environment.



Compaction on bridges

Rollers with oscillation drums are trumps 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 there the wind cools the asphalt layers quickly. In addition, tandem rollers with oscillation compact very efficiently even at lower asphalt temperatures.

Compaction of thin layers

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

Top quality even on small asphalt repairs

Joints between new and existing asphalt rank among the critical points in carriageway refurbishment. Here, oscillation avoids damaging the existing or previously repaired cold carriageway. Even the smallest areas can thus be compacted durably and to a high standard of quality – including the transverse joints at the start or end of the area.

High-quality compaction in inner cities

On 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 pipework below the carriageway.

There are many good reasons for oscillation

More efficient compaction in landscape gardening

Oscillation compaction improves many landscape gardening processes. Water-bound paths, for example, can be compacted much more efficiently with oscillation than with other technologies. 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.

Solution for difficult-to-compact asphalts

Rollers with oscillation technology 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 effective direction of the vibrations during oscillation promotes the desired redistribution of the long-chain binding agents. The system has also proven its worth in the laying of compact asphalt pavements using the In-Line Pave process.

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