Intelligent compaction

OSCILLATION
Oscillation – over 35 years’ experience

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 earthwork. This way, HAMM is responding to the growing demands on high-quality compaction for the most diverse surfaces and building materials.

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.

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

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 force 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 earthwork

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:

<table>
<thead>
<tr>
<th>Tandem rollers</th>
<th>Compactors</th>
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<tr>
<td>Series HD CompactLine</td>
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<td>Series HD+</td>
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Vibrating drum

Oscillation drum

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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
The form of tangential shear forces. In doing so, the compacted ground remains dynamic without interruption. Instead, the ground drum directs its compaction force into the ground in exceptionally smooth surfaces.

Rollers with one oscillation and one vibrating drum never leaves the ground. Instead, the ground drum directs its compaction force into the ground in exceptionally smooth surfaces.

This promotes a rapid increase in compaction. This is because during both forward and backward movements, the drum octave does not lift off the ground. This makes the components last longer, the rollers are marked quieter and work is significantly less tiring for roller drivers.

This means that rollers with oscillation drums can also be used without problems for compaction near sensitive areas (in towns, on bridges, above supply lines, near railway installations, etc.)

Oscillation – the benefits at a glance

**ADVANTAGES**

- Rapid increase in compacts
- Minimal vibrations in the surrounding area
- Self-regulating system
- Neither over-compaction nor grain crushing
- Move time for asphalt compaction
- Optimal, dynamic compaction of the joint
- More time for asphalt compaction
- Larger time window
- Greater flexibility
- Greater driving comfort
- No rippling
- No damage to the cold surface
- Using feeling point

**ADVANTAGES**

- High degree of compaction
- Faster increase in compaction
- Constant dynamic compaction
- Fewer passes
- Minimal vibration in the surrounding area
- No demixing due to drawing-up of bitumen or water
- No reloosening
- Intact granular structure
- Neither over-compaction nor grain crushing
- No over-compaction
- Large time window thanks to oscillation

**ADVANTAGES**

- Operator errors impossible
- Optimum compaction energy
- Operation is not dependent
- Dynamic compaction makes intelligent use of physics
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With vibration compaction, once a certain level of compaction has been achieved, the material structure or grain crushing. However, this is the case with oscillation. Here, the aggregate particles are redistributed non-destructively. In this way, neither over-compaction nor grain crushing occurs, and the bonding of the layers. Oscillation, on the other hand, delivers a non-destructive increase in compaction even at lower temperatures. The compaction quality of the 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 avoids detrimental grain crushing.

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In comparison to vibration compaction, the more rigid the asphalt or ground, the lower the amplitude. This adjustment occurs with every pass. Neither does any undesirable drawing-up of water or bitumen occur with oscillation compaction. Instead, the aggregate particles are redistributed non-destructively. In this way, neither over-compaction nor grain crushing occurs, and the bonding of the layers. Oscillation, on the other hand, delivers a non-destructive increase in compaction even at lower temperatures. The compaction quality of the 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 avoids detrimental grain crushing.

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There are many good reasons for oscillation

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

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.

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.

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 reloosening in the upper region or the drawing-up of water during ground compaction do not occur with this method of compaction.