



## REPORT WMA TRIALS

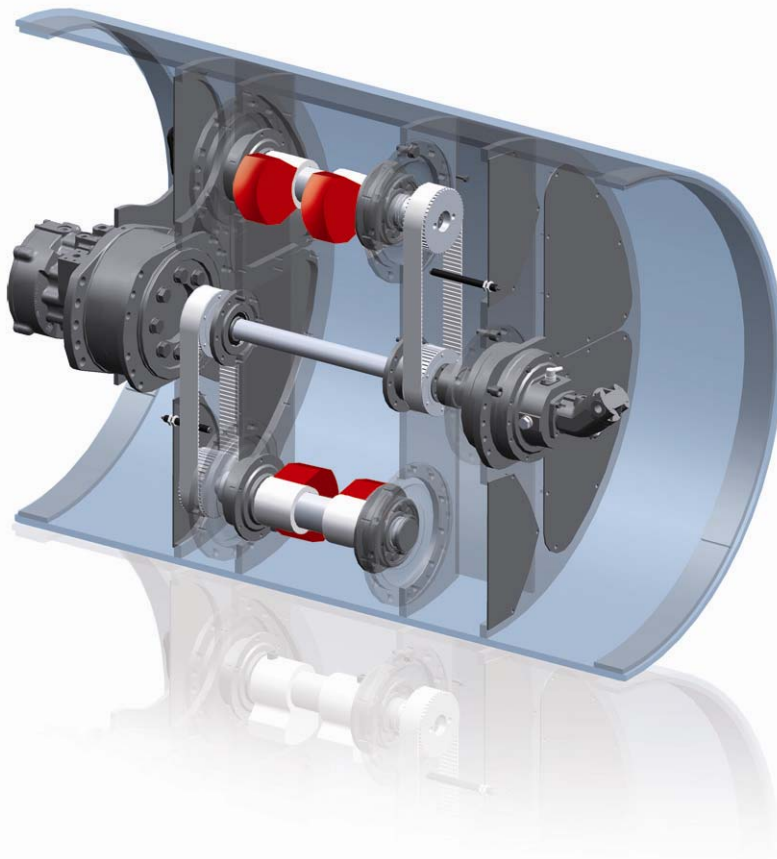
- Construction site: Leicester Road - Durban 1 km divided into 3 sections overlay of ~ 5 cm wearing course
- Client: ETHEKWINI - Durban Municipality
- Equipment used: HAMM Tandem Roller HD O 90 V
- Technique: Oscillation, Vibration, Density measurements

### GENERAL

The task was, to achieve required compaction and best possible ride-ability. For all three sections a continuous graded mix with max 13 mm stone size and 10 % reclaimed asphalt included in the mix. In the first section 2% of the bitumen content was the additive REDISET and in the second section 1.5 % was the additive SASOBIT. Both additives caused the mixing-temperature of ~130° C and a laying temperature of ~ 120° C. The third section was the same mix with 10 % reclaimed asphalt but without any additive and the mixing temperature was ~ 150° C. The wearing course layers as Warm Asphalt with a lower mixing / laying temperature, required compacting the asphalt in a lower temperature window than asphalt mixed with normal temperature as the third section. In order to achieve compaction with 1 tandem roller at a paving speed of ~ 5m/min, both systems, Oscillation and Vibration were utilized in low amplitude settings. The pattern to achieve the required densities were obtained with 6 passes. Finally a Pneumatic roller was used for another 2 passes to get the wanted surface appearance.

### OSCILLATION

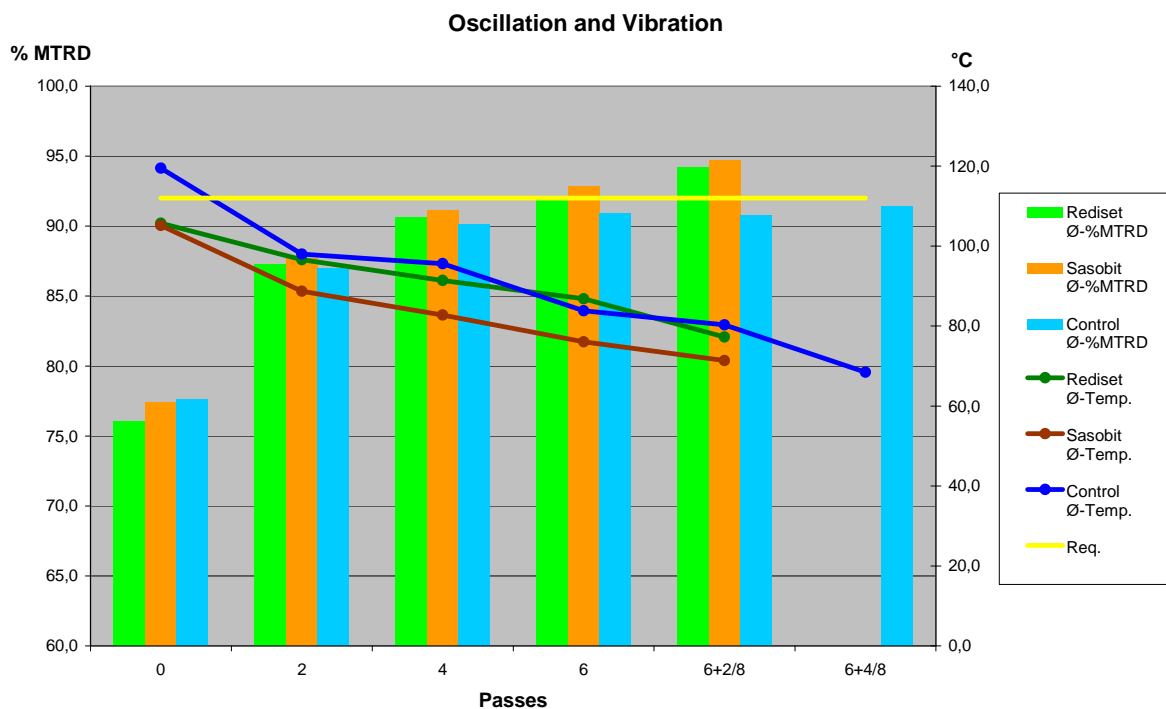
An Oscillation drum is equipped with two eccentric imbalance shafts rotating in synch. The imbalance weights on the two shafts are arranged opposite to each other. They force the roller drum to rotate in a rapidly alternating forwards-backwards movement. In contrast to a vibrating roller drum, the oscillating roller drum never lifts off the ground (permanent ground contact). During oscillation compaction, both the forward and the backward rotating movements of the roller drum transmit shearing forces into the soil or asphalt. This "double frequency" causes the material to compact more quickly. On the other hand, the vibration drum executes an up and down movement and each time the imbalance weight rotates it only transmits forces into the material once. When Oscillation is used, the high compaction rate is also increased by the effect of the roller's own weight (static linear load) 100 percent of the time.



Oscillation is suitable for all layer types in asphalt construction. Especially on thin asphalt courses or surfaces that are difficult to compact or are already well cooled down, the tandem Oscillation rollers from HAMM have significant advantages over other compaction systems. Today, a great deal of the work that was previously done using rubber wheeled rollers or static rollers are accomplished using oscillation rollers, often with much greater efficiency. In the case of difficult construction sites (e.g. on bridges that are sensitive to vibration or near to buildings), where previously only static compaction could be used, oscillation rollers can compact using full dynamic performance, without damaging sensitive structures in the surrounding area.



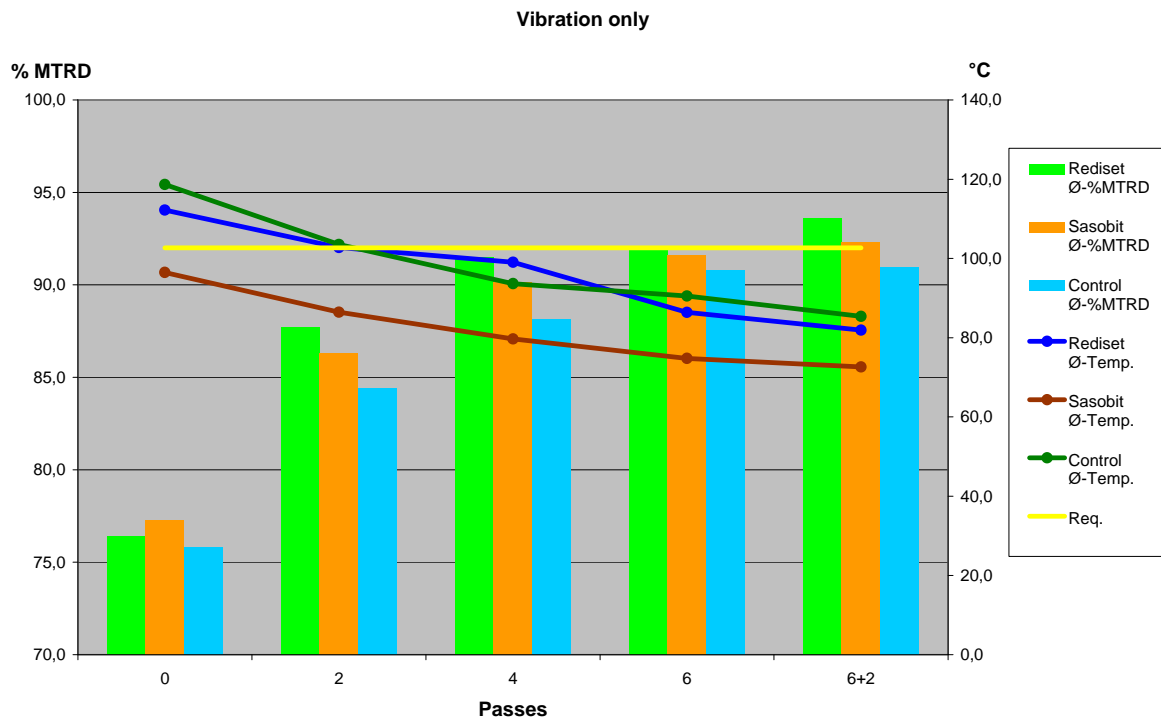
## TEST RESULTS OSCILLATION AND VIBRATION



- Rediset and Sasobit modified asphalts are easier to compact at low temperatures than an unmodified asphalt
- The required compaction degree of 92 %MTRD was achieved for both (Rediset and Sasobit) after 6 passes
- Sasobit seems to work a little bit better, but also had the advantage of a higher compaction degree after the paver compared to Rediset (+1,4%)
- The unmodified asphalt, which was compacted at the same, very low temperatures as the modified asphalts, was very difficult to compact. The required compaction degree of 92 %MTRD could not be achieved for the unmodified asphalt



## TEST RESULTS VIBRATION ONLY



- Rediset and Sasobit modified asphalts are easier to compact at low temperatures than an unmodified asphalt
- The required compaction degree of 92 %MTRD could only be achieved for Rediset after 6 passes  
After 2 additional passes with a PTR the required compaction degree of 92 %MTRD was achieved for both (Rediset and Sasobit)
- In this case Redesit seems to work a little bit better, although the compaction degree after the paver was again lower than the one for Sasobit (-0,9%)
- The unmodified asphalt, which was compacted at the same, very low temperatures as the modified asphalts, was very difficult to compact. The required density could not be achieved for the unmodified asphalt. Even additional passes with a PTR did not bring up the required compaction degree.



## CONCLUSION

1. Warm-mix-asphalts (WMA) are easier to compact at lower temperatures than an unmodified Hot-mix-asphalt (HMA).
2. WMA with Sasobit or Rediset are equally well compactable with either Vibration or Oscillation.
3. Oscillation widens the temperature window towards lower temperatures. This applies to HMA and also to WMA. Oscillation works perfectly with WMA.
4. When Oscillation-technology is used, PTRs are not necessary. The required compaction degree can be achieved easily and the surface-quality and ride-ability are outstanding with Oscillation.
5. HMAs have to be compacted at higher temperatures. Even with Oscillation and PTRs it is not possible to achieve the required compaction degree at such low temperatures at which the WMA mixes could be compacted.