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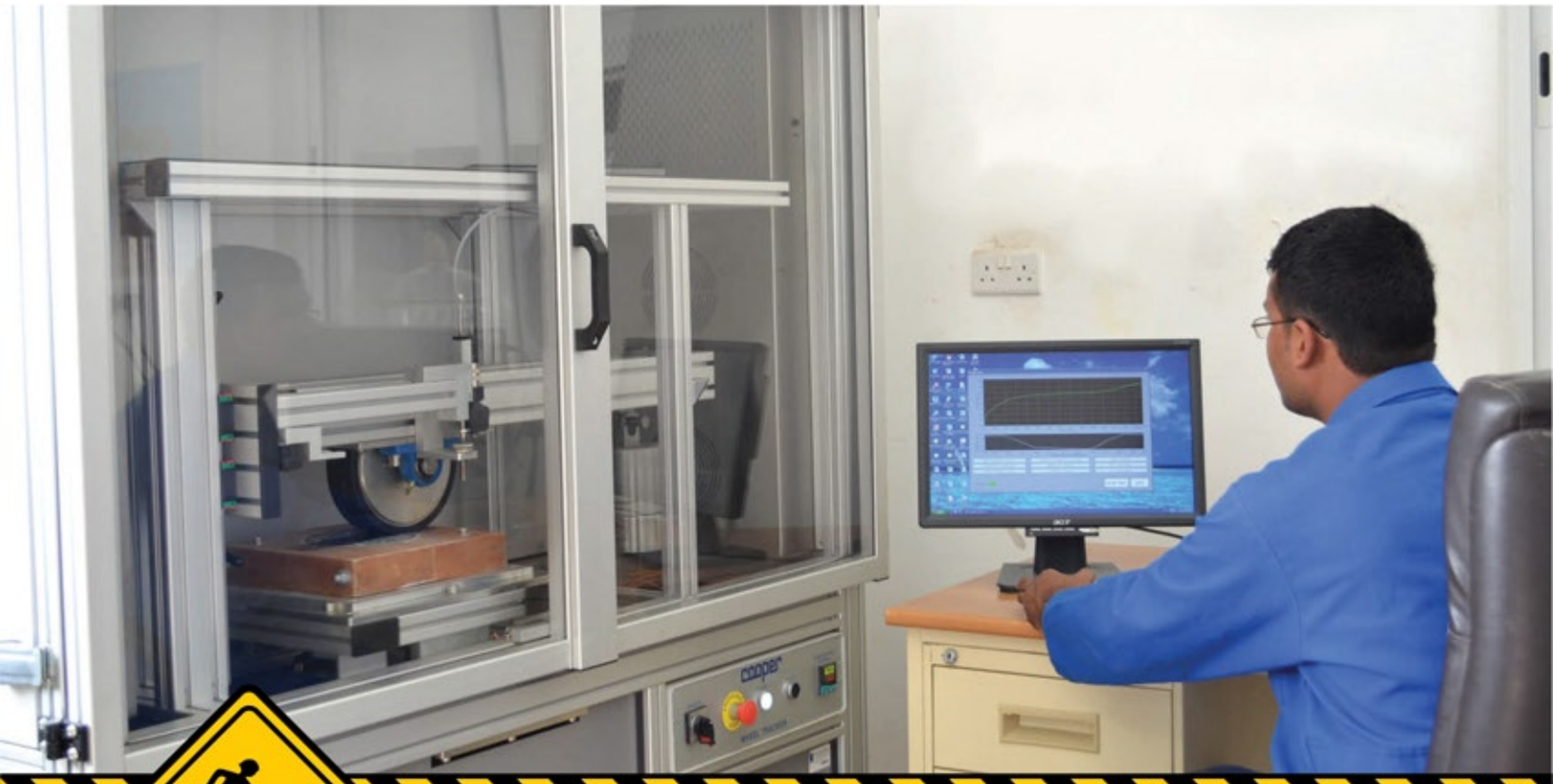

PERFORMANCE SOLUTIONS

Deformation, the rutting of asphalt is the main cause of road failure in the Gulf Region. Nass Asphalt looked to find a solution to this problem. To do this Nass Asphalt underwent a series of designs, trials and assessments of both conventional asphalt at different binder contents and asphalt that had an addition of polymer modifier.

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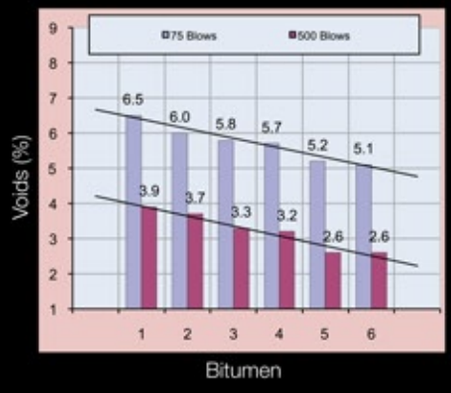
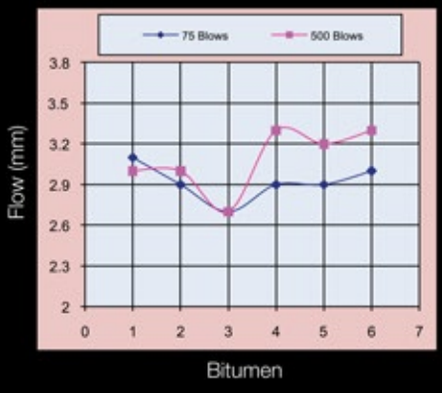
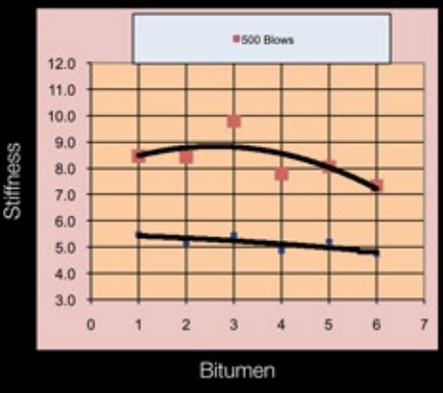
PERFORMANCE

Rutting is caused when the asphalt becomes plastic and this is generally understood to be the effect of a reduction in the voids in the mix towards 2%. In this region the main instigator of this void reduction is secondary compaction, due to the high ambient summer temperatures and heavy axle loads.

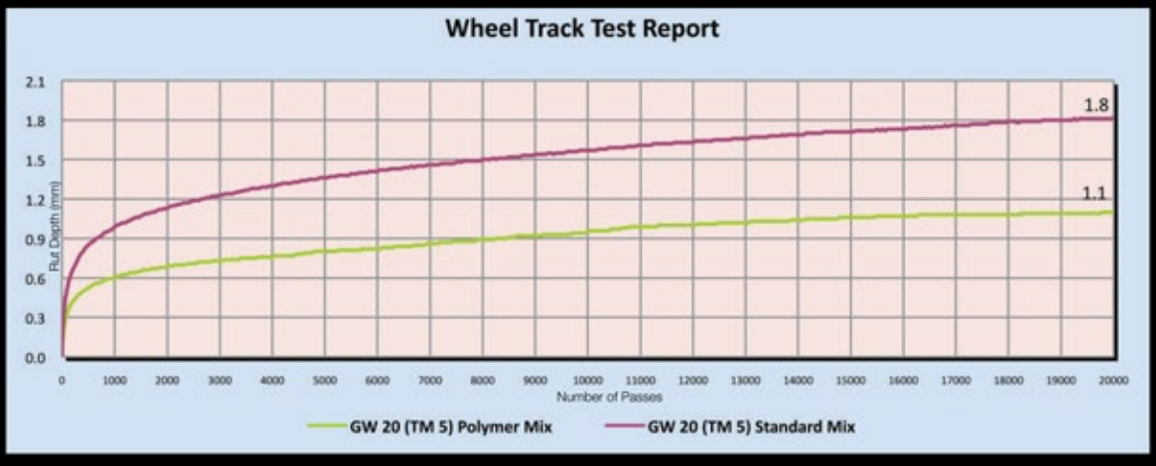
Initially we looked to find how we could maximise the performance of the conventional asphalt. For the reasons already stated, control of the void content was crucial to this. We determined that the maximum refusal compaction number was 500 blows of the marshal compaction hammer and we compared molds produced at different binder contents compacted at both 75 and 500 blows.







If we look at the above graphs we see that the flow is lowest at binder content 3. High flow can be associated with plasticity. Also binder content 3 exhibited the highest stiffness. Binder content 3 had 5.8% voids at 75 blows and 3.3% at 500 blows. From this we gave ourselves a voids target of approx 6% at 75 blows and a minimum of 3.0% at 500 blows. We have found that by using these parameters our asphalt has resisted rutting extremely well.



After determining the best method of maximising the performance of conventional asphalt, we looked to see how we could improve on this by adding a polymer modifier to the bitumen.

The adjacent graph shows wheel tracking tests carried out on conventional asphalt and on asphalt with a polymer addition to the binder. The asphalt with the polymer modifier shows a 39% reduction in rut depth.

The same modified binder design asphalt was laid at Al Hekma Junction and at Sitra traffic lights These areas are both high stress areas which have failed due to rutting in the past. They have been tested using a 3 meter straightedge at regular intervals over the last 30 and 20 months respectively and have shown absolutely no signs of any rutting.

The following Table illustrates how sensitive rutting is to even a relatively low increase in bitumen content.

Binder Content	Target	Target +0.4%
Rut Depth (mm)	1.8	3.3
VIM at 75 Blows	5.9	4.9
VIM at 500 Blows	3.3	2.4

SOLUTIONS