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GETTING STARTED WITH WARM MIX ASPHALT IN SOUTH AFRICA

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ABSTRACT

In 2008 the South African asphalt industry took its most definitive step to join the Warm Mix Asphalt revolution that is sweeping through the other progressive countries in the world. The industry put together a broad representation of industry experts to drive WMA, including public sector clients, asphalting contractors, academia, bitumen producers, consulting engineers, WMA technology owners, paving equipment manufacturers and asphalt laboratory specialists - the group became known as the Warm Mix Asphalt Interest Group. The industry also decided that the appropriate approach to initiate the use of WMA in the country was to undertake national WMA trials.

The WMA Interest group formulated a template for the trials and to date three successful trials have been undertaken using the template. The template employs risk management as its guiding principle and covers matters from the first interaction of all participants in the trials all the way to the long term monitoring protocol in a phased manner.

The South African WMA trials have encompassed the use of both batch-mixing and continuous feed drum mixing plants, four different WMA technologies, polymer modified bitumen, as well as various quantities of reclaimed asphalt in the mixes. The latest trials handled 18 different mixes. The trials will culminate in the first iteration of a national guideline document and specification for the use of WMA in South Africa.

This paper discusses the South African approach to initiating the use of WMA in the country, the trial template, organizational arrangements peculiar to that used by South Africa’s construction industry, as well as pertinent aspects of the trials and their outcomes.
INTRODUCTION

Warm mix asphalt (WMA) has been sweeping the international asphalt industry allowing a leap forward to improve worker health and safety conditions, as well as reduce asphalt’s impact on the environment. These benefits, coupled with engineering benefits, made WMA a prime technology for South Africa to implement and move its asphalt industry forward.

The objective of the paper is to convey the current status of WMA in South Africa as well as how it is intended to move forward with this technology.

This paper discusses South Africa’s journey with WMA, commencing with some of the events that acted as catalysts, the formation of the Warm Mix Asphalt Interest Group (WMAIG), and the rigorous WMA trials that culminated in the publication of the country’s WMA Best Practice Guideline & Specification. It also touches on the structure of South Africa’s asphalt industry and how this has influenced the introduction of WMA into the country.

EVENTS THAT SHAPED THE INTRODUCTION OF WMA

The South African Bitumen Associate (Sabita) first initiated interest in Warm Mix Asphalt in South Africa; their efforts in investigating this technology and discussing it with their counterparts in other countries inspired them to arrange a seminar on WMA. This seminar, which was hosted Society for Asphalt Technology’s Western Region and included speakers from various international WMA Technology suppliers, proved to be a watershed event. The seminar convinced the industry to take further action on WMA. As a result, a further meeting was held in South Africa’s eastern coastal city of Durban, where the WMA Interest Group was formed and a National Coordinator for WMA was elected. As with most seminal movements in South Africa’s roads industry, the formation of the WMA Interest Group and the election of the National Coordinator were ratified at the Roads Pavement Forum (RPF).

At the same time some of the country’s major asphalt producers began to formulate business cases for investment in WMA. They recognized that WMA presented a major opportunity and that they had to be at the forefront in understanding the potentials of WMA, ready for routine implementation. National Asphalt and Much Asphalt decided to take leading roles in the implementation of WMA, evidenced by their significant contribution to the trials, the funding necessary to develop their in-house WMA technology, as well purchasing plants with built-in WMA producing capabilities. SABITA’s ongoing drive to improve the Health, Safety and Environmental performance of its members found WMA as a most natural fit to realize these goals.

SOUTH AFRICA’S ASPHALT INDUSTRY STRUCTURE

The structure of the Asphalt Industry in South Africa is similar in most aspects to that of the world’s developed countries. However there are some distinct differences that need to be taken into account in order to understand the way in which WMA was introduced into the country.

Three institutions in South Africa, already mentioned above, that have been intimately involved in the implementation of WMA technology are:

- The South African Bitumen Association
- the Society of Asphalt Technologists as well as,
- the Road Pavement Forum.
The functions of Sabita, RPF and SAT, are:

**South African Bitumen Association (Sabita)**

Sabita (1) was established in 1979 as a non-profit organization that represents producers and applicators of bituminous products, consulting engineers and educational institutions. Its main activities are in the fields of advancing best practice in Southern Africa in the
- use and application of bituminous materials
- in worker safety and environmental conservation;
- education and training;
- and contact with government on the value of road provision and preservation.

**Road Pavement Forum (RPF)**

The RPF (2) is one of Southern Africa’s most influential road forums and is sponsored by many of its roads industry representative bodies. Specific goals to be achieved by the RPF include:
- Providing a perspective of overarching strategic issues as it affects pavement engineering.
- Promoting best practice;
- Co-ordination and linkage with other groupings;
- Establishment of task groups with specific national objectives;
- Provision of sufficient time for participation/discussion/advice and for social interactions;
- Dissemination of new technologies;
- Provision of a forum for acceptance of technological changes;
- Provision of a forum for interaction between theory and practice and for identification of technology development needs.

**Society for asphalt Technology (SAT)**

The Society for Asphalt Technology (3) is an association of individuals committed to the advancement of technical excellence, and to the development of professional capacity in the understanding and application of bituminous products and services in South Africa.

The aims and objectives of SAT focus on member development by:
- Promoting the knowledge of asphalt technology and ensuring that this technology is accessible to all members;
- Stimulating discussion, debate and interaction between members on all questions affecting the asphalt industry;
- Supporting and protecting the status of SAT members.”

In general asphalt is specified to comply with national, provincial or municipal specifications and propriety products are seldom used, except for Ultra-Thin Friction Courses (UTFC). These propriety UTFC mixes are however required to be certified through the Agrément certification process. When a new asphalt technology is introduced in South Africa it would generally be investigated by Sabita and if it is found to have merit, and can benefit the South African asphalt industry, it would be tabled at the Road Pavement Forum (RPF). At the RPF a working group would be established to further investigate the technology and if found to be feasible, Sabita would draft a guideline document for its implementation in the country. Previous examples are: the introduction of bitumen rubber asphalt, bitumen rubber surfacing seals as well as cold foam and emulsion stabilized materials - to name but a
few. The draft guideline would then be presented at various workshops around the country by SAT and the feedback received would then be incorporated into the final guideline.

Figure 1 WMA journey through the South African roads industry

THE WMA INTEREST GROUP

The WMA Interest Group (WMAIG) was formed in 2008. From the very start, WMA’s overarching impact on the road industry was very evident to the interest group. Even at the time of the interest group’s formation this was evident in that the interest group consisted of representatives of client bodies, asphalt producers, consulting engineers, bitumen producers, paving equipment manufacturers, as well as WMA technology owners. All parties volunteered their time and expertise at no cost, the objectives of the Interest Group being to:

- Increase South Africa’s understanding and knowledge of WMA
- Draw up a best practice guideline and specification for use of WMA in South Africa
- Promote WMA for routine use in South Africa

With each member of the interest group being an expert and professional in their field, a “round table” approach made facilitation by the WMA National Coordinator relatively easy; all members were convinced regarding the potential of WMA and the improvements it would bring to the asphalt industry.

WMA Trial Template

The WMAIG decided that the most appropriate way of realizing its objectives was to carry out full-scale WMA trials on a national basis. This method of gaining acceptance in the industry for a new technology contrasted with the more traditional approach of introducing proprietary products using South Africa’s “fit-for-purpose” certification body, Agrément South Africa, mentioned above.
A unique situation arose as the asphalt paving trials were also full-scale routine road rehabilitation projects. As with all public sector projects risk had to be minimized and well managed. The first trial provided a steep learning curve and resulted in the formulation of the WMA Trial Template (4). The template provided a structured approach to undertake the trials with risk being managed and progressively reduced – the major risk being WMA using a proprietary technology for the first time. The trial was divided into phases and each phases into sub-phases. The trial moved onto the next phase only once consensus had been reached that the phase in question was a success and that the risk of going forward was acceptable and manageable.

The other important principle of the template and the trials was that risk was shared and so was the cost. In terms of cost, the template was structured that at initial stages the cost was in “sweat equity” and that the costs would increase in terms of plant and materials as the trials progressed. The template acted as a detailed checklist, also ensuring momentum and that every aspect that affected WMA was given attention. Perhaps most importantly it kept decision making simple and everyone’s feet on the ground.

The following two figures are extracts of two portions of the template; Figure 2 is the first level detail of the template being the Broad Overview. Figure 3 illustrates a third level of detail being phase 2 of a trial; Agreements and Protocols.

Figure 2 WMA Trials Template: Broad Overview
A cautious approach was adopted when the first trial that was carried out in November 2008, using a F-T wax based WMA technology (Sasobit®), on a 2 km section of moderately trafficked road. After the results of this trial had been properly evaluated and the trial had been concluded a success, the second trial was carried out on a much more heavily trafficked section of dual carriageway, this time using two different WMA technologies, Sasobit®, and a surfactant based WMA Technology, Rediset WMX.

This trial, carried out in May and June 2009, proved to be as successful as the first trial, and provided confidence for the WMA Interest Group to go ahead with a much larger third trial.

The first two trials included only surfacing mixes but in the third trial, which commenced in October 2010, both base and surfacing mixes were used, utilising a total quantity of approximately 15 000 tons of asphalt. This time, a water technology was used in addition to the previously used WMA technologies, NA Foamtec™. As in the two previous trials, reclaimed asphalt (RA) was incorporated into the mixes. Also, due to popular use of polymer modified binders (PmB) in HMA in South Africa, PmB mixes were included in the third trial.

The various mixes used in the third trial are shown in Tables 1 and 2.

WMA TRIALS

It can be seen that “control” sections were included where the asphalt was manufactured and paved at conventional HMA temperatures. The PmB mixes are shown as A-E indicating the use of elastomer type polymer (SBS), or A-P, where a plastomer type polymer (EVA) was used in the binder.
TABLE 1  Details of Asphalt Base Mixes Used in the Third Trial

<table>
<thead>
<tr>
<th>ASPHALT BASE</th>
<th>TYPE</th>
<th>TEMPERATURE REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix B (40/50 pen bitumen)</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td><strong>10% RA MIXES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix BA-E2 (Sasolwax Flex™) + 10% RA</td>
<td>WMA</td>
<td>At least 20°C</td>
</tr>
<tr>
<td>Mix B A-E2 + 10% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td>Mix B A-P1 + Redset WMX + 10% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td>Mix B A-P1 +10% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td>Mix B A-P1 NA Foamtec + 10% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td><strong>40% RA MIXES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix B A-E2 (Sasolwax Flex™) + 40% RA</td>
<td>WMA</td>
<td>At least 20°C</td>
</tr>
<tr>
<td>Mix B A-E2 + 40% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td>Mix B A-P1 + Redset WMX + 40% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td>Mix B A-P1 + 40% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
</tbody>
</table>

TABLE 2  Details of the Asphalt Surfacing Used in the Third Trial

<table>
<thead>
<tr>
<th>ASPHALT SURFACING</th>
<th>TYPE</th>
<th>TEMPERATURE REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix D (60/70 pen bitumen)</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td><strong>10% RA MIXES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIX D Sasobit® + 10% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td>MIX D NA Foamtec +10% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td>MIX D Redset WMX + 10% RA</td>
<td>WMA</td>
<td>At least 30°C</td>
</tr>
<tr>
<td><strong>20% RA MIXES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix D A-E2 (Sasolwax Flex™) + 20% RA</td>
<td>WMA</td>
<td>At least 20°C</td>
</tr>
<tr>
<td>Mix D A-E2 + 20% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
<tr>
<td>Mix D A-P1 + Redset WMX+ 20% RA</td>
<td>WMA</td>
<td>At least 20°C</td>
</tr>
<tr>
<td>Mix D A-P1+ 20% RA</td>
<td>Control</td>
<td>Conventional HMA temperatures</td>
</tr>
</tbody>
</table>

Aggregates used in asphalt mixes in South Africa are crushed from sound, igneous or metamorphosed sedimentary rock. Besides crusher sand that is generated in the crushing process, some quartzitic river sand is generally included in the continuously graded mixes used in the WMA trials. In these trials, 1% of hydrated lime was included as an active filler and to assist in promoting bitumen adhesion. Hydrated lime is normally found to be necessary when these types of aggregates are used in conventional hot mix asphalt mixes.

The binder recovered from the reclaimed asphalt (RA) tended to be severely aged, with typical penetration values of 7 and Ring & Ball Softening Point temperature in the order of 85°C. While 60/70 penetration grade bitumen was used in the mixes containing 10% RA it was necessary to use softer grades of bitumen in the mixes with 20% and 40% of RA; a waxed based rejuvenator especially developed for high RA content mixes, together with 80/100 pen bitumen, was used in the mixes containing 40% RA. The RA was crushed and screened into two fractions, minus 16mm plus 8 mm, and minus 8mm.

It was found that the required reduction in mix temperature, together with the required level of compaction (minimum 92% of voidless density), could be achieved.
The various steps that were carried out during the laboratory mix design stage for all the mixes except those manufactured using foamed bitumen are illustrated in the flow diagram in Figure 4.

![Flow diagram showing laboratory mix design process](image)

As suitable laboratory apparatus to produce and mix foamed bitumen mixes were not available, this process had to be modified by following the same initial steps shown in Figure 4 and then manufacturing the mix full-scale in the asphalt plant. A simplified flow diagram showing the process used for the foamed bitumen mixes is shown in Figure 5.

It should be noted that a standard two hour “curing” period was applied, where the samples were maintained in the oven at mid-range mixing temperatures, before laboratory compaction. This requirement was implemented in all the laboratory mix design work, including the mixes using foamed bitumen. It was also applied to the samples taken off the full-scale manufactured mixes throughout the trials.
Besides routine laboratory testing, tests to indicate moisture susceptibility and rutting, as well as fatigue, were included in the testing programme. The outcome of this testing is summarised in Table 3.

**TABLE 3 Analysis of Non-routine Test Results**

<table>
<thead>
<tr>
<th>TEST PARAMETER</th>
<th>SURFACING MIXES</th>
<th>BASE MIXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Lottman</td>
<td>Results of “warm” mixes using pen grade bitumen lower than equivalent “control” mix. Prudent to add anti-stripping agent.</td>
<td>All mixes show satisfactory Mod Lottman results. Results vary considerably; there are no distinct trends to enable comparison of “warm” and “control” mixes.</td>
</tr>
<tr>
<td>Resilient Modulus</td>
<td>“Warm” mixes show significantly lower resilient moduli than “control” mixes, particularly mixes containing pen grade bitumen. Less binder hardening during manufacture of “warm” mixes at lower temperatures could explain this.</td>
<td>“Warm” mixes show significantly lower moduli compared to “control” mixes. Less binder hardening during manufacture of “warm” mixes at lower temperatures could explain this. Moduli of 40% RA mixes higher than that of 10% mixes – influence of RA content evident</td>
</tr>
<tr>
<td>Dynamic Creep</td>
<td>Similar levels of rut resistance shown in both “warm” and “control” mixes. Dynamic Creep moduli of the</td>
<td>Similar levels of rut resistance are reflected for “warm” and “control” mixes. Dynamic Creep moduli</td>
</tr>
</tbody>
</table>
polymer modified mixes tend to be higher than those of the mixes using pen grade bitumen. achieved in the 10% RA mixes, particularly the “warm” mixes, may be slightly higher than those of the 40% RA mixes.

Indirect Tensile strength

“Warm” mixes containing penetration grade bitumen show significantly lower ITS values compared to the “control” mix. The ITS of the polymer modified mixes with 20% RA tend to be higher than those of the penetration grade bitumen mixes but no clear trend is evident between “warm” and “control” mixes. Polymer characteristics are likely to contribute to the differences in ITS values obtained in these mixes.

The polymer modified “warm” mixes containing both 10% and 40% RA show substantially lower ITS values compared to the “control” mixes. The ITS values of the 40% RA mixes are shown in the plot to be well above those of the 10% RA mixes, further evidence of the stiffening effect that increased RA contents have on mix properties.

MMLS Rutting

All the trial mixes, except the “control” mix containing penetration grade bitumen, achieve rut depths of less than 2 mm; the “warm” mixes clearly perform better than the HMA in this respect. The polymer modified trial mixes tend to be rut less than the mixes made with penetration grade bitumen, but the results are variable and no clear trend is evident between “warm” and “control” mixes.

With the exception of 40/50 pen control mix border-line results, the rutting of all trial base mixes is well below the maximum 2 mm depth. There are no obvious trends between “warm” and “control” mixes and the overall degree of rutting between the two is similar.

The moisture content of the newly manufactured mix was monitored throughout the trials using both simple oven drying as well as the Dean & Stark test method (ASTM D 1461), which uses a reflux method to measure the moisture present in asphalt mixes. All the mixes were found to have moisture contents well below the 0.5% maximum specified value.

The outcome of the trials gave a clear indication that Warm Mix Asphalt could be produced satisfactorily using several technologies and incorporating RA contents of up to 40%, while maintaining a quality a least as good as that of HMA.

Stringent monitoring of the mix temperatures, after manufacturing and at the paving site, was carried out throughout the trials, while compaction was measured during the paving operations using a nuclear gauge and was later checked in the laboratory using core samples. Careful attention was paid to the compaction process, with a monitoring team at the paving site recording the rolling pattern and number of passes required to achieve compaction. The same field compaction processes and effort were used for both HMA and WMA.
INFLUENCE OF THE TRIALS ON THE ASPHALT INDUSTRY

The extensive WMA trials provided the opportunity to have a fresh look at how asphalt is routinely produced and paved. Some of the most pertinent areas that came under scrutiny are:

- **Moisture contents of aggregate and RA.** Much energy is wasted in heating and drying these materials, and the trials showed the need to keep the finer aggregate fractions and especially the RA under cover, preferably in open sided shelters, in order to reduce their moisture contents.

- **Mixing plant efficiency.** The trials highlighted the need to carefully monitor, adjust and maintain the balance of the mixing plant’s heating, drying, exhaust and emission control systems.

- **Maximum utilization of RA.** The benefits of incorporating significant amounts (>15%) of RA, in terms of savings on the purchase of new aggregates and bitumen, while maintaining the same quality of mix, became readily apparent from these trials.

- **WMA quality compared to that of HMA.** The trials did much to dispel the lingering opinion that the quality of WMA is less than that of HMA. There is ample proof in the trial results that the quality of WMA is at least the same as that of HMA.

- **Haulage distances/times.** Haulage distances can be stretched when WMA mix is manufactured at conventional HMA temperatures, making it practical to transport asphalt over longer distances. In the same way WMA can be utilised where traffic congestion causes delays between the mixing plant and the paver.

- **Ambient weather conditions.** The trials proved that WMA has a longer compaction window than HMA, making it possible to pave at lower air temperatures compared to HMA.

- **Polymer modified binders (PMB).** Polymer modified binders are regularly used in asphalt mixes in South Africa. PMBs were therefore purposely included in the trials and the results showed that they could be successfully used in WMA mixes.

- **Working conditions.** The significantly lower temperature of WMA, particularly in South Africa’s hot summer weather conditions, makes for more pleasant working conditions at the paving site, as done the noticeable lack of fumes.
HOLISTIC APPROACH

From very early stages of the trials it was clear that there was the need to involve several elements of
the road construction industry together.

These included:
- The quarry industry; supply the crushed stone products,
- The oil refineries; provision of bitumen,
- WMA Technology suppliers,
- Testing laboratories; asphalt suppliers, and specialist laboratories,
- The asphalt suppliers; manufacturing and paving of the trial mixes, and,
- The road authorities; provide the trial sites

In order to increase inertia and to gain sufficient confidence to implement and realize the benefits of
WMA in the least possible time, co-operation between all these parties was essential; this requirement
of strong teamwork was imperative.

WMA BEST PRACTICE GUIDELINE

Following the successful national WMA trials, SABITA commissioned the compilation of a state of
the industry “WMA Best Practice Guideline”.

The guideline, compiled by a panel of WMAIG members, is styled as a “best practice” document,
with strong emphasis on gaining practical experience from early full-scale implementation of WMA
(5). In compiling this document the extensive information already available on the internet was used,
as well as that gained from a study tour of some countries in the EU by members of the WMA
Interest Group.

The initial strategy for the guideline is to utilise the experience gained on the continuously graded
base and surfacing mixes as well as the WMA Technologies used the trials before embarking on other
mix types and technologies.

The opportunity was taken to provide practitioners with a “one-stop-shop” type of document, by
including pertinent “best practice” items that normally apply to HMA, together with information that
is more specific to WMA.

Topics in the main body of the Best Practice Guideline include:

- **Benefits of WMA.** These include environmental, health, as well as engineering and
economic benefits

- **Overview of WMA Technologies.** An overview of the main categories of WMA
Technologies is given

- **Classification of WMA Technologies.** This chapter provides a more detailed
description of some of the WMA Technologies that are available in each of the
categories, and how they function and are utilised

- **Considerations regarding HSE.** Similar precautions and procedures to those given
for HMA are recommended

- **Handling and quality assurance of mix components.** This major chapter in the
document covers the handling of all the components used in the mixes. It includes a
section on the milling, stockpiling, and preparation of reclaimed asphalt (RA), as well as the handling of the various categories of WMA Technologies

- **Quality Assurance of mix components** is covered. This includes lists of appropriate tests to be undertaken on aggregates and fillers, RA, and binders

- **The mix approval process** comprises another major chapter in this guideline. The four distinct steps in the mix approval process are explained. These steps include laboratory mix design, full-scale plant mix design, and final approval based on the consideration of all the results. Each of these steps, as well as appropriate testing, are described in detail

- **Manufacture.** The mix requirements for both batch and continuous drum mixer type plants are given. The binder storage facilities, WMA Technology addition system, as well as monitoring and control systems are also covered in this chapter.

- **Quality assurance during the manufacturing process.** Recommendations are given for the range of tests to be carried out on mix sampled at the mixing plant. A statistical judgement scheme for acceptance is recommended for binder content and well as voids-in-mix.

- **Construction.** This chapter covers the necessary preparation work at the paving site, as well as paving and compaction equipment. Recommendations are given for minimum paving conditions, based on ambient air temperature, substrate temperature, and wind speed

- **Quality assurance at the paving site.** These requirements are generally the same as those for HMA. A statistical judgement scheme for acceptance control of binder content, voids-in-mix, and field compaction, is recommended

- **Protocol for introducing new WMA Technologies.** WMA Technologies that have already been tested and thoroughly assessed by the Warm Mix Asphalt Interest Group are listed. A three phase approach to approving other new WMA Technologies is recommended:

  **Phase 1** – The WMA Technology supplier provides full information on their product, including recommended usage, effect of varying dosage rates, materials safety data sheets, documentation of previous field applications, as well as temperature ranges for mixing and compaction

  **Phase 2** – Carry out the 4 step mix design approval process

  **Phase 3** – Approval may be given by the Warm Mix Asphalt Interest Group after assessment of all the available information

While this Best Practice Guideline contains a wealth of practical knowhow there is no doubt that new lessons will be learnt as WMA becomes more the normal way than the exception of producing asphalt in South Africa. It is highly likely that several new WMA Technologies will be introduced and other ways of improving the energy efficiency of asphalt production, such as the use of half-warm mixes, will be explored and implemented.
WMA SPECIFICATION

The specification for hot mixed asphalt most commonly used is South Africa is included in “Standard Specifications for Road and Bridge Works for State Road Authorities” South Africa’s (6) and is a combination of an end product and method specification. This has served the road building industry well, with South Africa’s relatively thin layer asphaltsurfacing consistently exceeding its design life.

With WMA being generically defined as equal to, or better than HMA, it was natural that there would be debate as to whether the WMA specification should consist of variations to the standard HMA specification in this document or a stand-alone specification.

It was finally decided to compile the first iteration of the WMA specification as an annexure to the WMA Best Practice Guideline and to style it as a stand-alone specification as this allows the flexibility and freedom to include direction on:

- Recycling asphalt
- Changed mix design procedures
- Use of polymer modified binder in WMA mixes
- Incorporation of WMA Technologies
- Mixing plant monitoring systems
- Binder storage temperatures
- Manufacturing and paving temperature limits
- Requirements for trial sections

Additionally, it became apparent from the trials that requirements for material handling, such as crushing and screening reclaimed asphalt into separate fractions, as well as moisture control of the fine aggregates and reclaimed asphalt, should be contained in the specification.

This interim specification will be updated following the practical experience gained in its implementation. It is also sure to generate comment as it is a significant departure from the current HMA specification. However, as with the guideline, the WMAIG is well aware that as additional WMA technologies enter the South African market, the specification will be reviewed.

ROUTINE IMPLEMENTATION OF WMA

The dissemination of trial findings at RPF meetings and SAT seminars and workshops have been preparing the industry for the publication of the WMA Best Practice Guideline, which is due to be launched at CAPSA 11. This document, which includes an interim specification, is intended to promote the routine use of WMA on a national basis.

However, in the meantime, based on the experience and competence gained from the WMA trials, a major client body – eThekwini Municipality, has commenced with routine implementation of WMA and other client bodies are willing to consider design proposals for use the of WMA.
INTRODUCTION OF ADDITIONAL WMA TECHNOLOGIES

The trials’ thoroughness, robustness, as well its success in generating practical information, improving knowledge and its quick turn-around time has made it the accepted methodology for additional WMA technologies to be considered for use in South Africa. In doing so, the rigorous WMA Trial Template will be used whilst being supported by the South Africa’s WMA guideline and the specification.

CONCLUSIONS

From the first trial in November 2008 to full-scale routine implementation in May 2011, South Africa’s journey with WMA is changing its asphalt industry. WMA has brought together and focused the industry in a manner it has not experienced before; it is now assisting in driving health, safety, environmental, and engineering improvements in the flexible pavement discipline. WMA’s synergy with the reuse of reclaimed asphalt has added new impetus to asphalt recycling. Furthermore, the WMA specification and guideline provides a unique opportunity for an overall review of South African asphalt “best practice”. As the country stands at the threshold of routine full-scale use of WMA, it is looking forward to additional WMA technologies joining the Southern African market.

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