To respond to competition from other industries, we need to ensure our product is of a high standard.

Egbert Beuving
Secretary General, EAPA

“Setting the standard
Discussing product specifications to demonstrate end performance

KEEPING ON TRACK
The special requirements of race track surfaces

A LIFETIME OF BENEFITS
Modelling whole lifecycle cost

STANDING THE TEST OF TIME
A close look at polymer modified binders

Egbert Beuving discusses establishing Performance Related Specifications for bitumen
In this issue we explore the benefits of using high performance products to address current and future challenges facing our roads. One way in which the asphalt industry has helped to increase the performance of its products is through polymer modified bitumen (PMB). We offer an overview of the benefits and the different types of PMBs in our Guide section.

We also highlight the advantages of using PMBs on high stress sites – in particular, race tracks. This can be seen in the Site Profile, which spotlights Rudskogen Motorpark in Norway and ATP’s test track in Papenburg, Germany.

Using high-quality products is only part of the equation; being able to measure and demonstrate their benefits to customers is also vital. This issue’s Feature Article, ‘Setting the standard’, discusses the progress made in the industry to develop Performance Related Specifications (PRS) for bitumen binders which will help to define more clearly the associated end performance of the products.

Egbert Beuving, Secretary General of the European Asphalt Pavement Association, also weighs in on this topic in our ‘Talking point’ interview.

Of course, these higher quality products come at a cost. Given the global financial situation, budgets are tight and companies are trying to keep costs low. You will read about a model in the Focus On article which aims to demonstrate more tangibly the long-term benefits of high performance products. ‘The Edge’ is a lifecycle cost benefit tool for Nynas’ premium products that we partnered with the Transport Research Laboratory in the UK to develop.

We hope you enjoy the issue, and encourage you to take advantage of our LinkedIn page to discuss the themes in this edition.
Spotlighting the unique demands of race track surfaces

Keeping on track

Setting the standard
Addressing the need for product specifications related to end performance

A lifetime of benefits
Reviewing how a new modelling tool known as The Edge is helping to demonstrate the long-term cost benefits of performance products

Standing the test of time
How performance products measure up to the evolving needs of roads and other surfaces
Setting the standard

The bitumen industry is continuing its dialogue with asphalt producers surrounding product specifications that better demonstrate end performance.

The bitumen industry is changing. Developments in technology, social change and evolving road design mean there is a need for Performance Related Specifications (PRS) for bitumen. Current specifications do not meet all of the needs of today’s market and customers. So in order for customers to be confident in the materials they choose and for suppliers to demonstrate the key features of their products, specifications must measure characteristics that best reflect the properties relating to the product’s use.

Working in harmony
The European Committee for Standardisation (CEN) is responsible for establishing PRS and ensuring bitumen standards are consistent across the EU. Currently, empirical test methods are used and standards are based on past experience with traditional binders. However as the industry continues to develop, there is a need for standards that are more directly related to performance.

Using PRS would be an enhancement on current methods as they would cover a broader range of products and could stimulate innovation. One major reason for introducing PRS is that it is required by the European Union and the Construction Products Regulation (CPR) in order to minimise technical barriers to trade. As an open market, EU member countries should be able to trade freely and harmonised standards ensure a common set of criteria regardless of origin. Currently, specifications are harmonised across Europe, but not all of them are performance related.

“A working, proper PRS will enable binder producers to demonstrate more effectively the benefits of using enhanced performance products.”

Mike Southern
Technical Director, Eurobitume

Preparing for PRS
The development of PRS goes back a long way but there have been some key milestones achieved in recent years to develop them. In 2002 the BiTSpec (Bituminous Binder Testing and Specifications) project was initiated. Its aim was to support the development of European standards and the preparation of a suitable and performance-related specification system for bituminous binders used in road construction. During 2006 the BiTVal (Bitumen Test Method Validation) Project was conducted. It reviewed binder tests together with conditioning and ageing procedures that might be used to assess binder durability. The results of these two projects were compared to make recommendations for future CEN specifications. …>
PRS has been discussed for over a decade
• New specifications will facilitate bitumen trading across Europe
• Standardised test methods will ease the engineering process
• PRS will better indicate bitumen performance
The CEN Technical Report 15352 on bitumen and binders was published in 2005. The report recommended that data should be collected using new test methods that might form the basis of a new specification. Perhaps the most significant step taken was the start of the Eurobitume data collection project. Over the course of 4 years, 146 datasets on binders were collected, analysed and measured with new EN test methods to establish typical data ranges. The database covers bitumen properties for many commercially available bitumens in Europe including paving grade, hard paving grade, polymer modified bitumens (PMB) and special bitumens, such as multigrades. More recently Eurobitume published their position paper on PRS for bituminous binders.

The next step is to create harmonised test methods which will add to the development of PRS. Many current standards use older empirical methods which do not provide data in engineering units. Using fundamental methods instead will enable the use of engineering calculations and provide a common measurement that can be used across the industry. Mike Southern, Technical Director at Eurobitume, explains how these new methods will rationalise the engineering process: “New test methods which measure fundamental properties should give a better indication of the way in which the quality of enhanced performance products can be demonstrated.”

He continues: “For example, we know that testing the softening point for PMB does not give an accurate picture of performance. Yet, up until recently we have not had a better indicator of high temperature performance than softening point. Now that we may have a better test, we can look to introduce it into a harmonised standard.”

Analysing performance
In the future, the development of PRS will be made far easier by identifying binder properties linked to asphalt performance. As Wim Teugels, Technical Manager Nynas Continental and member of Eurobitume’s task force on PRS, notes, assessing bitumen performance is complex. “We should not forget that the level of specification is only one aspect. The binder has an important role in the performance of the asphalt mix, but it is not the only factor. The way the asphalt is used and how it is laid also have an important role in the final performance.”

In the coming years there will be a further review of specifications, including a systematic review of the European Specification for PMB in 2014. Following any recommended revisions, the standard will be sent for CEN enquiry, revision and then a formal vote.

For bitumen customers, the change may require some getting used to, but support will be available from suppliers and the industry. “We in the industry can help to educate our customers on how to use new types of tests.”

Wim Teugels
Technical Manager
Nynas Continental

For more information on PRS, visit www.eurobitume.eu/technical/standardisation
Customising asphalt for traction, smoothness and durability puts the material in pole position when used at high stress sites such as race tracks.

Race track surfaces face extreme pressures – from speeds that can easily reach 300 km/h to hairpin turns at more than 80 km/h. The safety of the drivers in these intense conditions depends on a high quality pavement that protects against skidding, cracking and deformities.

A smooth surface is essential for race tracks, and asphalt pavements can offer this quality better than any other surface types. This is possible because designers can customise an asphalt mix to fit specific conditions and requirements using carefully selected aggregates and binders. When choosing these properties, race track pavement designers want a blend that resists deformities and cracking, offers good tyre friction and is durable.

Conventional asphalt products are not designed to withstand the high speeds and lateral stresses of a racing circuit, and therefore premium paving solutions are needed. Polymer modified bitumens (PMBs) are special binders that are flexible, stable and durable and can guarantee that the asphalt will be able to withstand harsh conditions. By adding a polymer to an asphalt mix, the bitumen mixture becomes more cohesive, and therefore stronger and more resistant under high stress situations. In particular, PMBs offer greater rigidity, improved resistance to permanent deformation and cracks, water resistance and higher durability. In addition to race tracks, PMBs have proven to be ideal for a number of other high stress sites, including bus depots, airport runways and docks.

The following pages profile two sites where PMBs have proven successful.
Victory in Norway

In 2011 Rudskogen Motor Park in southeast Norway decided to expand and repave its racing circuit.

The park’s management opted for a tailored mix using a highly polymer modified hot mix from Nynas’ Endura range. Nynas Endura F1 offers optimum workability and was developed to deliver the toughness and flexibility required by race tracks.

Kjell Arne Juul, Nynas Managing Director for Norway, expands on the product’s properties: “Nynas Endura F1 was the best choice because of its ability to prevent, and even heal cracks after the harsh winter. This is especially important in the eastern part of Norway where cold winters and warm summers challenge the pavements.”

Long-lasting results

When repaving the surface, the contractor Veidekke Industry was tasked with improving the drainage of the base layers and ensuring the uniformity and evenness of the surface. Inline paving, which allowed the second and third layers of the asphalt to be paved simultaneously, meant the resurfacing only took one month to complete and downtime was minimised.

Per Sunde, Technical Manager at Rudskogen Motor Park is pleased with the results of the project. “After two years, we are very satisfied with the pavement. The joints are all in a perfect condition and the pavement is very homogeneous.” The pavement will have better resistance to ageing, giving an expected lifetime of more than 15 years.

Follow Rudskogen Motor Park on Twitter @rudskogen

Top results for ATP Germany

When a test race track in Germany required renovating, a tailored mix of Nynas paving grades and PMBs provided a fitting solution.

Last year Automotive Testing Papenburg GmbH (ATP) decided to renovate their test race track in northern Germany. The site is designed for car manufacturers to test their vehicles and equipment, and is frequently used by Mercedes-Benz.

The refurbishing project consisted of an update to the track’s safety devices, electrical expansion of the test site areas and reconstruction and maintenance of the asphalt on the track’s high speed oval circuit. A key requirement given to the contractor, Johann Bunte Bauunternehmung GmbH & Co. KG, during the repaving process was to ensure the evenness of the track’s surface. This is important as it ensures that cars tested on the track present accurate results for the testing equipment.

In addition to the technical requirements, the timing of the project proved to be a major challenge. The work was tendered and carried out in November, a time of year when it can be difficult to acquire the necessary bitumen. The risk of snow during the winter months also means that it is often not possible to finalise a project until spring.

Tough under stress

ATP opted for a mix of Nynas paving grades and PMBs, such as Nypol RX 47/4 and Nypol 47. These were selected because of their proven reliability in high performance sites. “For the top layer, a normal PMB was used, but for the binder course a special PMB was chosen that has a greater polymer content to ensure the properties of the final mix including RAP,” explains Lars Hanschke, Chief Construction Manager at Johann Bunte Bauunternehmung GmbH & Co. KG, headed this high risk project. His construction team put forward great effort to adapt the paving technology and ...>
work to tight time constraints due to the winter season. Tendering a project of this extent at the end of the year requires great confidence in the performance of the material and the companies. Quality control tests have confirmed the project’s success.

The entire renovation was completed in less than six weeks. An approximately 120,000 m² expanse and more than 36 kt of asphalt were renewed, and the track was re-opened in January as planned.

Subscribe to ATP’s newsletter to stay up-to-date at www.atp-papenburg.eu
A lifetime of benefits

Performance products present a number of advantages for society and the asphalt industry, which can only be realised by shifting focus from a lower unit price to long-term solutions.

Selecting the ideal paving material is complex, with many factors to take into consideration. One desire every purchaser has in common is to get the best value for money. While less expensive options are more appealing at the point of purchase, higher performance materials can be a better investment in the long term, depending on the end performance requirements.

This can be seen in the use of polymer modified bitumen (PMB). Adding polymers to an asphalt mix presents a number of advantages that may not be evident when looking at their higher up-front cost. Jukka Laitinen, Asphalt Engineering Support Manager for Nynas UK, explains, “Using polymers increases durability because the asphalt’s characteristics are enhanced. By doing this, sustainability is promoted because the road does not have to be renewed as soon as if conventional materials were used.”

A competitive edge

In order to show evidence that the initial higher purchase price of performance products will be offset by a lower whole lifecycle cost (WLCC), Nynas initiated the development of a tool that demonstrates the cost of a product over its lifetime. The result was a modelling tool known as The Edge. It was created exclusively for Nynas by the Transport Research Laboratory (TRL).

The Edge allows the user to specify a road type, initial pavement condition, traffic levels and deterioration relationships derived from asphalt and binder test properties. The software then generates a construction and maintenance cost profile over a defined time horizon, highlighting the cost benefits of different binder options.

The resulting data shows the short-term benefits of higher performance products over conventional binders – faster installation, reduced delays and labour costs – and long-term advantages, such as reduced maintenance requirements. “Although the customer might spend more money at the point of purchase, they’re spending a lot less over 40 years because the product is performing far better. That is what The Edge is all about,” Jukka Laitinen explains.

Modelling features

• Variable analysis period
• Includes work and traffic management costs and a road user delay cost calculator
• Built-in traffic growth model
• Separate lane and carriageway modelling of traffic and deterioration
• Depth-first or breadth-first optimisation of maintenance profile

“Although the customer might spend more money at the point of purchase, they’re spending a lot less over 40 years.”

Jukka Laitinen
Asphalt Engineering Support Manager, Nynas
Harmonising bitumen standards and specifications holds a number of benefits for producers and consumers, highlights Egbert Beuving, Secretary General of the European Asphalt Pavement Association.

“Standardisation creates better communication between the producer and the user of a product.”

Egbert Beuving
Secretary General, EAPA

Why is the European Asphalt Pavement Association (EAPA) working towards establishing Performance Related Specifications (PRS) for bitumen?

There are several reasons we are working on PRS for bitumen, beyond the fact that they are required by the European Commission to avoid barriers of trade. The industry is facing increasing performance requirements for roads and new contract types. The present empirical standards are based on experience gained in the past and that makes it difficult to characterise new and innovative binders. PRS is an improved binder evaluation method.

Through European standards, certain characteristics of bitumen are defined, and a common language is created so everyone understands each other. PRS also standardises the tests that are performed to characterise products using performance related characteristics, meaning producers and customers are able to exchange information more easily. Also, we should not forget that PRS is very important for the bitumen producers who want to show the benefits of their products. Establishing new standards is a good way to show those advantages and it will also stimulate innovation.

How can standardisation lead to an improved relationship between bitumen producers and consumers?

International agreement on how to characterise a product provides a good tool to demonstrate its real characteristics. This is important because customers like to know the relevant characteristics of products they buy, and producers like to inform customers about this. This can be seen with normal paving grade bitumen too, not just premium products. Standardisation creates better communication between the producer and the user of a product.

Could you highlight the future challenges facing the asphalt industry?

The future challenges for the asphalt industry are performance, durability, sustainability and climate change. Better durability of asphalt pavements can help to reduce road closures due to maintenance, and having a product that lasts longer can reduce CO2 and save natural resources. Improving durability gives better sustainability and performance, which are needed to take on climate change. Moreover, to respond to competition from other industries such as concrete, we need to ensure our product is of a high standard.

What still needs to be done before PRS for bitumen is a reality?

I have been a member of the task group working on PRS for bitumen since it started and in 2003 we organised the BiTSpec seminar in Brussels where we outlined our plan to create PRS. So, we have been developing PRS for over 10 years, and I think it is time to finalise and publish the drafts. We have made progress, and although sometimes it is quite slow, we will get there. People always hesitate to change because they are used to the old way of doing things, but without change, we will not make any progress.
Today’s road and surface requirements call for more resilience, and polymer modified binders can deliver enhanced performance.

Standing the test of time

PMB advantages include:
• Improved performance
  – Less rutting and fatigue
• Increased pavement lifetime
• Solve pavement problems
  – Point loading
  – Torque stress
• Allow changes in design
  – Reduced thickness

Fast facts
Heavy traffic, extreme weather and high temperatures can put a lot of strain on standard bitumen roads and surfaces. To accommodate these challenges, bitumen can be modified to improve performance and resilience under high stress.

**Enduring tough conditions**
The history of bitumen modification goes back further than a lot of people think, with some patents published way back in the 1800s. Now, the most common category of polymers used for bitumen modification is thermoplastic elastomers. Their benefits include greater rigidity, improved resistance to permanent deformation, higher resistance to spreading cracks and increased durability.

“Thermoplastic elastomers improve bitumen performance by increasing the softening point whilst decreasing the brittle point.”  
Dr. Ian Lancaster  
UK Technical Manager, Nynas

PMBs suit a diverse range of applications, from bridges and race tracks to noise reducing roads. They are particularly well suited to very stressed pavements, draining pavements, and areas with high traffic volume, loading, temperature or altitude.

One of the problems facing the industry today is finding the balance between initial cost and value in pavement. To answer this problem, Nynas UK has developed a lifecycle cost benefit software tool called The Edge (see page 10), which compares the upfront cost of the pavement to its performance long term using Nynas premium products. Almost without exception, high performance polymers have shown themselves to be the most economical solution overall.

Learn more about PMBs by checking out our site profiles at [www.nynas.com/endura](http://www.nynas.com/endura)
Enduring success

A recent resurfacing project carried out on the Kessock Bridge, north of Inverness in Scotland, is a perfect example of where PMBs offered the most economical, long-lasting approach

For this resurfacing project, the client chose Gussasphalt, laid by Aeschlimann and incorporating Nynas Endura N5 binder. This solution had already been tried and tested on the Avonmouth and Tamar bridges in England. “Gussasphalt was specified by the client because they wanted a long-lasting solution for this bridge. It has been used successfully on steel-decked bridges around Europe and it has just come to the UK recently,” explains Nigel Hardy, Scotland Area Sales Manager.

During the resurfacing work, the main challenges were to lessen the bridge’s movement by providing a smooth running surface, and to reduce noise. Additionally there was a need to ensure continuous supplies of asphalt were readily available to beat the vagaries of the Scottish weather and avoid an unnecessary transverse joint.

For this task, Aeschlimann selected Leiths (Scotland) Ltd as its partner to manufacture and supply Gussasphalt from its nearby asphalt plant. “The surfacing for the bridge provides a smooth running surface such that bridge movement under load will be significantly lessened compared to the old surfacing. The new surfacing material designed specifically for this contract will, in my opinion, provide the stiffness and durability needed for a life in excess of 20 years,” states Neil Anderson, Technical Director for Leiths (Scotland) Ltd.

The work is being carried out in two phases, with the first stage completed in June 2013. The final stage will be conducted between February and June 2014, the objective being that the renovations to the bridge will result in a long-lasting solution and lead to many years of maintenance-free service.
Reduction the temperature

Some of the greatest sustainable developments in the mastic asphalt industry have occurred in Germany, and a new paper presented by the Nynas Competence Centre Antwerp has assessed these developments over the past 15 years. The paper discusses Nynas’ response to these changes and how this led to the development of new binders for different mastic asphalt applications.

Contributing to sustainability

A paper presented by the Nynas Competence Centre Antwerp examines how bitumen producers such as Nynas can contribute, through specific products and solutions, to the three pillars of sustainability: economic, ecological and social interests.

New test for rutting evaluated

A new Multiple Stress Creep Recovery Test (MSCRT) has been introduced as a fast and user-friendly bitumen specification test for rutting. A Nynas study analysed whether this MSCRT relates to rutting and how the test can identify the presence of a polymer network in a bituminous binder.

Bringing new life to fatigue tests

Asphalt mixture fatigue tests are widely used but are time consuming and expensive. Alternatively, binder fatigue tests might be an effective preliminary evaluation of material for mixture fatigue life testing. An interlaboratory test was performed to investigate the repeatability as well as the reproducibility of binder fatigue tests.


Reading between the layers

Assessment of interlayer bonding is of primary importance but research is needed to better harmonise test methods. In this study, 14 laboratories from 11 countries participated in an interlaboratory test to compare the different test procedures for assessing the interlayer bonding properties of asphalt pavement.


More information on these studies can be viewed online at www.nynas.com/knowledgetankbitumen
NaBin Binder Seminar

The Norwegian Association of Asphalt binder group hosted a seminar in Oslo on October 15, 2013 promoting the latest industry developments. Nynas presented on foam bitumen and the adhesion of bitumen emulsion.

Learn more at www.norskasfaltforening.no

IRF World Meeting and Exhibition

From November 9-14, 2013, the International Road Federation congress will unite public and private delegates, sharing best practice experiences from every sector of the ground transport industry. Nynas will be present in an area created to represent Europe as a bitumen specialist.

Discover more at www.IRF2013.org

Asfaltdag 2013

Nynas will exhibit at this year’s Asfaltdag in Amersfoort, Netherlands on December 10. The event is organised by Vakgroep Bitumineuze Werken (VBW) and Eurobitume.

Explore at www.vbwasfalt.nl/ABD2013

German Asphalt Days

On February 10-12, 2014 Nynas will attend the German Asphalt Days in Berchtesgaden, Germany. It will be an opportunity to meet Nynas and network with the German asphalt industry.

Learn more at www.deutsche-asphalttage.de

www.nynas.com

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