Testing Solutions for Success

Nynas has opened a new asphalt engineering facility to reinforce the design support service already being offered with great success to pavement designers, material suppliers and contractors.

Changes to the political landscape in road building and maintenance are encouraging asphalt producers in conjunction with their suppliers to develop new innovative pavement solutions, as never before. But, the stakes are high and incorporating new materials technology has increased the risk placed on suppliers as they strive to optimise design value.

Nynas' range of bitumens is a common ingredient in many new asphalt developments and the company has therefore found itself in an ideal position to provide asphalt design expertise for its customers. This is intended to help them validate new ideas and manage the inherent risks associated with innovation.

Nynas Materials Engineer Steve Harris has been providing customers with asphalt engineering support on a one to one basis since he joined the company in January 1997. This service has now been expanded by the opening of a fully equipped and staffed Asphalt Engineering Facility near Nynas' Eastham refinery site (see box).

"The new laboratory enables us to carry out research into the fundamental behaviour of asphalts, evaluate how our products work with our customers' materials and develop ways of optimising performance and durability," says Harris.

The idea to develop an asphalt engineering support service was prompted by the need for higher performance products to provide optimum solutions and best value for our customers, says Nynas Sales and Marketing Director Willie Hunter.

"The move to Design, Build, Finance and Operate (DBFO) road contracts under the Private Finance Initiative (PFI) during the early 1990s coincided with the swing away from recipe based asphalt specifications to those based on end performance," says Hunter. "At the same time there was increasing pressure to get roads to last longer and perform better.

"The introduction of performance specifications and DBFO contracts called for more indepth asphalt design and more consideration for value added solutions. The whole industry was diversifying its thinking on the way it builds roads."

As new materials technologies emerged and communication between companies and all round awareness got better, Nynas recognised there was a need for a central point of expertise that could further technology development for the benefit of its customers, Hunter says.

"We were in the ideal position to provide this service. We already had a great deal of invested knowledge on how best to optimise the performance of Nynas bitumen with aggregates supplied by the asphalt producers we work with," says Hunter.

"The asphalt engineering service is allowing us to develop this knowledge and work with our customers to provide and validate optimum solutions in terms of value and end performance."

Another major development in asphalt design has been the move away from traditional empirical methods to the analytical approach introduced in 1994 by the Highways Agency's Design Manual for Roads & Bridges volume 7 – flexible pavements (DMRb).

NOAH, the Nynas developed computer software pavement design tool, is closely linked with the shift to analytical design methods and forms an integral part of the asphalt engineering service. The NOAH software has been used to evaluate customers' alternative pavement solutions by producing analytical results based on data specific to the real environmental conditions that the design will experience.

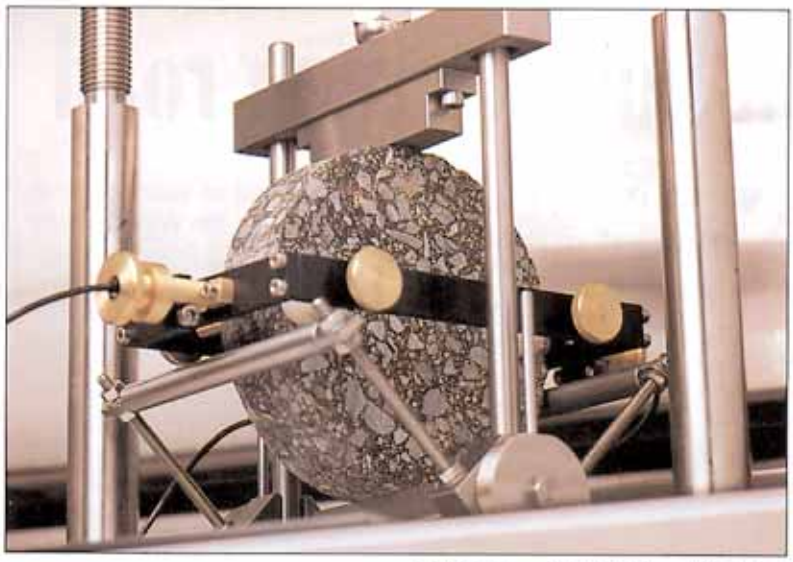
Bardon is one company which has recently benefited from Nynas' asphalt engineering support. An alternative pavement design, using a thin high performance wearing course in conjunction with a stiffer road base, was evaluated and subsequently used to produce a more cost

Nynas is working with asphalt producers to develop and validate optimum pavement solutions

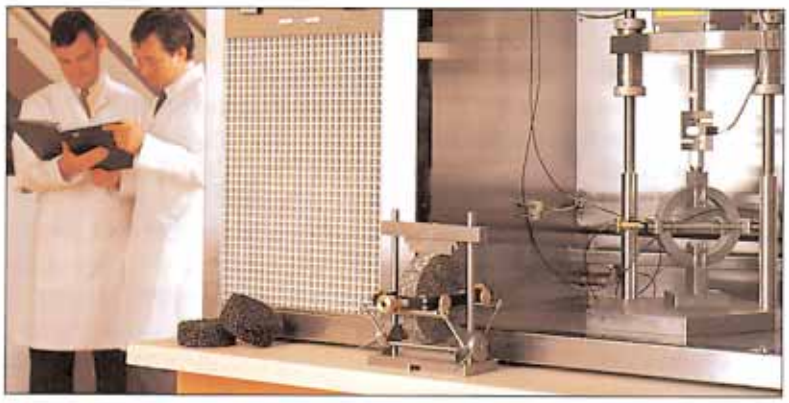
effective solution for the A19 DBFO contract in Middlesbrough.

"Material performance properties, such as stiffness, which are needed to carry out analytical pavement design can now be quantified in real terms by the equipment in the Asphalt Engineering Facility," adds Harris.

"The design manual DMRb is based upon standard values of material properties which are the same regardless of geographical location, site conditions such as temperature, and particular characteristics specific to the aggregate being used," says Harris.



left: Strain and fatigue performance values are quantified using a CRT-NU-5 asphalt tester.
below left: Research and material evaluation is being carried out from Nynas' Asphalt Engineering facility.



"This is where the Asphalt Engineering Facility comes into its own. It enables us to provide more exact and therefore less conservative property values. The equipment in the lab allows us to determine properties and evaluate the performance of materials under controlled conditions."

The versatility of the Asphalt Engineering Facility enables Nynas and its customers to validate a design to required standards laid out in the Highways Agency's Specification for Highways Works – or any other adopted standard. Wearing courses, for example, can be modelled in the Nynas facility and tested for susceptibility to rutting at 45 or 60 degrees Celsius as specified in Clause 943 of the Highways Agency specification.

"On a number of occasions we have used our knowledge and resources to design the optimum mixture for a specific application based on locally available materials and plant production tolerances," says Harris.

"The emphasis is on producing an economic and environmentally friendly material which has maximised engineering properties for a particular application. In other words, the optimum solution every time."

Materials Engineer Steve Harris says Nynas' Asphalt Engineering Facility is unlike a traditional asphalt laboratory because it is has been designed to evaluate end performance rather than how an asphalt mix meets recipe specifications.

The equipment in the laboratory has traditionally been exclusively used by research organisations, says Harris. However, recent technological developments have rationalised the cost of the major items of testing equipment and made them more accessible.

A significant item in the Nynas facility is the CRT-NU-5 (successor to the Nottingham Asphalt Tester), which quantifies strain and fatigue performance values. The NU5 gives greater control over measurements than its predecessor, says Harris, by allowing greater loads to be applied at varying frequencies.

The NU5 is complemented by a Gyratory Compactor for making specimens to represent both cold mix emulsion materials and hot mix asphalt laid and compacted in the road; a Wheel Tracking Machine, which is used to test wearing courses for susceptibility to rutting and therefore compliance to Clause 943 of the Highways Agency Specification for Highway Works; and a Slab Compactor which produces uniformly compacted slab specimens for wheel track testing or for the asphalt tester.

The range of equipment in the laboratory is comprehensive, allowing the determination of end product characteristics including degree of compaction, binder drainage, cohesion performance (slurry surfacing) and water susceptibility.