

Labs take the lead

ARC's anticipation of the arrival of performance specifications means that the company is at the forefront of materials testing and asphalt technology.



The way the wind was beginning to blow was becoming apparent as long ago as the early 1990s, according to ARC's technical director Chris Curtis. There were indications then of a move from recipe to performance specifications in road construction, with major implications.

ARC had long been a construction materials specialist well able to supply the best of coated road-stone to order, with a technical department highly capable of controlling quality and quantity within proscribed limits.

But performance specifica-

tions would mean the eventual end of proscription, it was clear. Material suppliers would have to know their materials much more intimately, Curtis forecast, when the simple need to keep to a recipe gave way to producing asphalts that had to meet complex requirements for stiffness and resistance to deformation.

They would have to know how their products performed, how this performance could be measured, how the materials could be best used for maximum efficiency and how customers could be assured of durability.

"If I was right, then there was a pressing need to invest in testing equipment and acquiring knowledge, in order to be able to provide our trading people in the future with the right materials to meet any given performance requirement," Curtis says.

Part of Curtis' remit is to keep the company aware at group and regional level of where he thinks his sector is going and to make recommendations about future activity. He was listened to sympathetically about the likely move to performance specifications and the technical department subsequently voted sufficient funds to upgrade the company's testing capability, and its knowledge.

"It was a combination of factors that pointed to fundamental change in the way the sector's materials were specified," Curtis remembers today. Harmonisation of standards under European law was one of the factors.

The other principal ones were growing recognition by the Highways Agency and others of the advantages of specifying to performance targets rather than to a recipe; and the development of testing equipment that was relatively inexpensive, comparatively simple to use and which allowed standardisation.



Taking proper cores is a vital part of laboratory analysis of material performance

"Recipe specification where the quality of materials is laid down along with their proportions in the mix is easy for the industry to cope with, it's well understood and comfortable," Curtis says. But it is an inflexible method which does not encourage innovation.

"For instance, it assumes all materials of one type perform the same irrespective of source. This is not the case in fact, and the method does not allow the supplier to design a mix to suit local aggregates and conditions. Nor does it permit making the best use of materials to maximise their performance."

The main item of testing equipment to which Curtis alludes is the NAT, or Nottingham Asphalt Tester. This can be used to test road base and base course for stiffness (ie strength and load spreading ability) and also resistance to deformation, two main structural properties of asphalt.

"A NAT is an extremely useful device and at around £25,000, comparatively inexpensive. Equally important, it carries out tests on cores and does not require complex and costly test specimens."

For wearing course evaluation, wheel track testing equipment – around for many years but relatively little used – gained a new pertinence in the context of performance evaluation. Wheel track testing kit is also relatively cheap to buy and simple to use.

The Department of Transport began to show real signs of a change in attitude in 1993. A materials specification was introduced for dense road base material based on a design mix but where surrogate properties would be used in terms of voids and binder volume.

In addition, trials were carried out on the M53/M56 in which half the material put down for the job was to a standard design; and where the second half was designed to achieve or better the

stiffness and resistance to deformation found in the first half. In both cases, the asphalt's structural properties were measured using NAT equipment. The principal purpose of the exercise was to gain familiarity of the equipment in a contractual situation.

"It gave the Department, the Transport Research Laboratory and the successful tenderer useful guidance on how performance specifications could be brought in, and how they could be worked," Curtis says. The pace of change began to increase, driven by the DoT's Highways Agency but also by Government's move to Design, Build, Finance & Operate.

"The asphalt sector was anxious, quite literally, not to lose ground to the concrete sector," Curtis says. "We wanted systems in place that would allow us to exploit the developments we were making." Performance specifications were seen as one such system.

Curtis' recommendations to his company on investment in testing equipment and training were based on ARC taking a regional approach to performance specification, with equipment installed at Criggon in the north, Whitwick, Frome and Aberdare in South Wales.

The equipment was bought and laboratories modified to suit: testing regimes were established and people trained. Existing recipe mixes were tested with NATs to give ARC's technicians experience of the testing process including the vital aspect of sampling, and also to build up a data base, for road base and base course materials.

But circumstances conspired to oblige the company to look hard at wearing courses too. The Highways Agency found it had problems with a competitor's hot rolled asphalt laid on the M25: the mix of material as specified rutted quickly and badly. A draft performance specification was produced and a new surfacing



ARC has invested heavily in testing equipment and expertise

which met the requirements of the draft was laid with success.

"The HA let it be known that other contracts would have the same draft performance clause in the future," Curtis says. ARC's testing programme was rapidly enhanced to include wheel track testing and wearing course evaluation. The four regions worked closely together, swapping data, experiences and knowledge.

"We got to know how to evaluate materials very well indeed, how to design the most efficient mix making the best of locally available materials," Curtis says.

By dint of possessing the right equipment and hard work, Curtis' technical department could now tell the company's operations staff what the options were, for a given project; and help them convince DBFO clients, for instance, that the materials being proposed for a particular job were the most appropriate in terms of price and durability.