

## **CONCEPT OF BITUMEN TO AGGREGATE ADHESION**

**PROF. A.R. WOODSIDE, DIRECTOR, HIGHWAY ENGINEERING**  
**T.E.I RUSSELL, RESEARCH STUDENT**  
**The Highway Engineering Research Centre**  
**School of the Built Environment, University of Ulster**

### **SUMMARY**

The highway engineer places great significance on the aggregate/bitumen adhesive bond. This paper will attempt to demonstrate the complexity of the adhesive bond using the various interrelated theories available.

The bond is affected by both the properties of the aggregate and the bitumen as well as certain external factors. Three of the most well known theories on adhesion are the mechanical, chemical and interfacial energy concepts. The mechanism of aggregate/bitumen bond failure (stripping) will also be examined.

Various adhesion tests have been evaluated in an attempt to determine the in-service life of any given aggregate/bitumen combination. The majority of these tests, especially those using visual inspection have a limited application. Recent work by the Strategic Highways Research Program (SHRP) produced the Net Adsorption Test which shows the effect of introducing moisture to a given aggregate/bitumen pairing. The effect of aggregate mineralogy on the aggregate/bitumen bond will be demonstrated using aggregates available in Northern Ireland. The effect of adding adhesion agents to 100 pen grade bitumen as well as comparing the results of three basalts using a 200 pen bitumen and a K1-70 emulsion will also be demonstrated.

Finally, this paper provides evidence that the Net Adsorption Test is a quick and relatively simple test method that can detect the best combination of aggregate and bitumen of those available at any given time or location.