

## **The Art of Making Layer Cake: Proper Construction of Bituminous Roads**

Dr Norhidayah Abdul Hassan and Dr Mariyana Aida Ab. Kadir  
Faculty of Civil Engineering  
Dr Sarimah Shamsudin  
Language Academy

Universiti Teknologi Malaysia

### **For the teacher**

The aim of this module is to show the students the art of road construction and causes for problematic roads. They need to understand the importance of carrying out road construction in the proper way. The techniques adopted are not complex but based on a simple concept.

The main activity is to insure the students can understand the process of materials selection in road construction which involves the materials' proportion and quality of materials. Generally, the students will be given simple activities that are aimed to insure that the students discover a simple concept of road construction by comparing it to making a layer cake.

In order to continue with the module, the students need to know the basic knowledge of flexible pavement. They will also need to know basic algebra and simultaneous equation in order to compute an expression for the uncertainties.

At the end of the module, the students will be given activities to solve for a better understanding of the concept. The module should not take more than 60 minutes to complete, if the students have the basic knowledge as mentioned.

The first activity asks the students to come up with a few causes for the problems related to the layer cake as shown in the video. This is to answer: "Why is the outcome of the two layer cakes different, although the ingredients used are the same?"

In the second activity, the students are divided into small groups (4 students per group) and are required to find the right aggregate proportion for the given problem. The students will be given question sheets and instructions.

In the third activity, within the small groups, the students have to conduct a few aggregate tests. The students are given aggregate samples. They are required to conduct simple aggregate tests to determine the quality of the aggregate given. Based on the test, the students need to come up with comments (compared to the specification) and recommendations (to be proposed for improvement).

During the fourth activity, in groups, the students will be given a case study where they are required to build a small-scale road model for the given problem. The materials and tools are given. In this task, they need to apply all the aforementioned knowledge to solve the problem.

Finally, this module needs to be summarized in terms of the fact that the materials' selection and its quality, as well as following the correct procedures, are important in road construction. Additionally, the teacher needs to mention the other factors that have to be considered in road construction.