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1

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Title
A Study On Workability Measurement And Correlation With Performance Of Hot Mix Asphalt

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The difficulty in obtaining the required density and smoothness of constructed pavement, establishing conformity between registered process input parameter and tested output of asphaltic concrete; couple with the effect of small change in aggregate gradation on the workability of asphaltic concrete just as inadequate compaction can result to moisture induced damage are the main factors that triggers this research. The research was therefore undertaken to improve means of measuring workability. The research was divided into three tasks. Task one was consideration of all the materials used in the research. Task two was undertaken to achieve the first objective which is development of an improved workability measuring device. The components were designed, fabricated and a suitable transducer was incorporated. In order to obtain the best paddle suitable for the device out of three types paddle configurations named A, B and C. Seven types of mixes were designed in accordance with (PWD) Malaysia's specifications for road works. Marshall Mix design method was used to obtain the optimum asphalt binder content for the AC14 gradation of three different aggregate fractions used to test the paddles. The first three mixes designed used bitumen of 80/100 penetration, while the other three mixes designed were identical gradation of bitumen 60/70 penetration and the last mix used the Reclaimed Asphalt Pavement (RAP). The RPM was set essentially to 5, and then adjusted to 10,15,20,25 RPM. The device developed was used to blend the mixes at six different temperatures. Dry sieved aggregate, wet sieved aggregate and warm mix asphalt was used to assess the gradation of aggregate and the reliability of device operation. Task three was undertaken to achieve the second, third and fourth objectives. The first three mixes designed were used at different mixing temperatures 140 °C & 150 °C and 5 different compaction temperatures. It was found that Paddle B having speed of 10 RPM is suitable for the device because it provides a wide range of torques. For the second objective, it was found that the value of Torque is influenced by compaction, mixing temperature and gyration; there is however no significant relationship between torque; resilient modulus, Stability and Flow. Also, the research finding suggests that the higher the mixing temperature, the lesser the value of torque. Furthermore, it was found that the increase in gyration will result in the increase in the value of torque. For the third objective, the finding demonstrate that all the three proportions of the same nominal maximum aggregate size AC14 yielded different values of torque. It was also found that the fine aggregate yields more torque (less workable). In addition, the range of torque for AC 14 is 12kNm to 20kNm; and that wet sieved aggregate mix yielded less torque than the dry sieved aggregates. Results for the fourth objective suggest that any increase in TSR at different levels of mixing and compaction will decrease the value of torque any value of torque above 17.2kNm is an indication of moisture-induced damage. It was recommended that the findings in this research be tested on a full-scale, flexible pavement construction.