Quality Control Aspects of Asphalt Concrete Surface Regularity

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Standard Specifications for Construction & Maintenance of Roads and Bridges in Sri Lanka do not specify the allowable limit of road roughness for newly constructed roads or rehabilitated roads. But, the specification outlines the maximum permissible undulations for various types of constructions, that can be measured using straight edge. For asphalt surfacing the maximum permissible undulation is 6 mm longitudinally and 4 mm transversely. Hence, Road Authorities, which use the current Sri Lankan Road Specification, are unable to set an allowable road roughness for newly constructed roads or rehabilitated roads. So, the contractor is entitled to get his full payment, if the straightedge criterion is satisfied.

The main objective of this research is to find out an acceptable road roughness value for newly overlaid asphalt surface roads and to get an acceptable value at the end of the Defects Liability Period. The other requirement is to find an approximate IRI value when the maximum undulation is 6 mm within each and every three meter length of road. This can be obtained using a correlation equation between IRI values and Straight edge readings. Then it is possible to predict an approximate IRI value when the straight edge measurement gives its maximum acceptable value as per SSCM of Roads and bridge published in 1989.

Recently constructed roads in various areas of the country were selected to observe their initial roughness values using vehicle mounted bump integrators. Further, the roughness values of the selected roads were monitored to find out the variation of roughness with time, especially for a shorter period. The idea is to check whether the roughness varies drastically around one year time that is within the Defects Liability Period of the Contract. Though many countries have already adopted initial roughness requirement in their specifications, it is essential to check the practicability of adopting it in Sri Lanka. Setting a target which is impossible or it causes remarkably higher project cost does not give any benefit to the nation.

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The road surfaces with different undulations were measured for IRI and the same locations were measured using straight edge. The road sections were carefully selected such that the road surface does not have sharp undulations such as potholes. Then approximate correlation equation is found.

In this study the maximum undulation for every 3m was taken and it is plotted against the IRI for the corresponding section as shown in figure 1. Using the correlation, IRI value is found for the straight reading of 6mm. This comes to an IRI value of around 5m/km. This is the minimum IRI value for the corresponding straight edge reading as the analysis is carried out for the maximum straight edge readings. That is to say, for average straight edge reading the IRI is greater than 5 m/km.
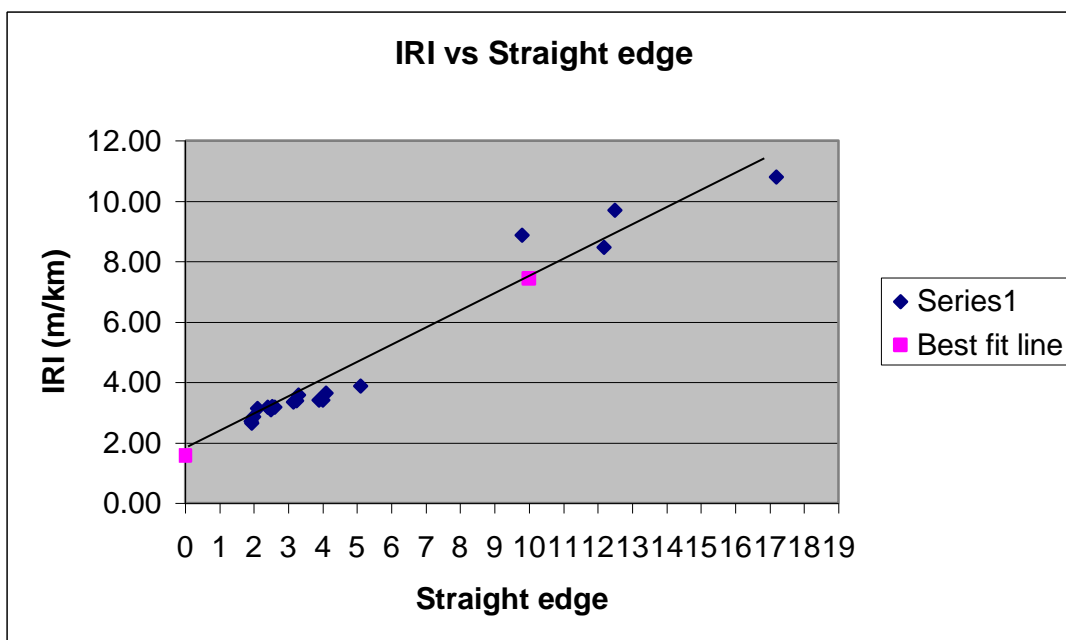
It is found that the implementation of smoothness specification in Sri Lanka, in terms of IRI, is essential. The bonus and penalty system appears to convince the contractors to produce smoother road pavements. This has resulted reduced life cycle costs. It is practicable to set a maximum initial road roughness in terms of IRI, when the measurements are being made using vehicle mounted bump integrators.

The change of IRI with time for a shorter period is not significant. So, it is not essential to set a roughness value at the end of defects liability period. The maximum tolerance of surface regularity given in the standard Specifications for Construction and Maintenance of Roads and Bridges published in 1989 results a higher initial IRI value.