National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Conference Return Seminar: Estimation of Carbon footprint using life cycle assessment for flexible pavement: An Emphasis on User stage
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Venue	: CE Seminar Hall
Date and Time	: 06 Jan 2025 (1130 am)
Abstract	: The amount of carbon dioxide released into the atmosphere from pavements during their lifespan measures the sustainability of the structures. The objective of this study is to quantify the greenhouse gas in terms of kg CO2 eq released during the user stage of flexible pavement. The scope of this study includes the synthesis of relevant databases, collection of the International Roughness Index (IRI), computation of the life-cycle of analysis and estimation of kgCO2eq during various stages of pavement service time. To differentiate and identify the impacts of design variables on carbon emission, two pavement sections with different design variables were chosen in this study. Though several research studies had explored the carbon emission potential from different pavement systems, this study offered a first-of-its-kind understanding that emphasized the carbon emission incurred during the user stage in the context of IRI and Average Annual Daily Traffic (AADT). In this study, two models were developed based on LTPP data to understand the variation of IRI and AADT in terms of PCU. Furthermore, the Monte Carlo Simulation technique was used to predict variation of IRI for 20 years. A statistical analysis F-test was carried out and it was found that there is a significant disparity in total emissions despite both pavement sections having identical layer thicknesses. It can be concluded that in flexible pavement, road roughness results in higher fuel consumption of vehicles which consequently leads to higher emissions of greenhouse gases. Overall, it is envisaged that this study would provide important insights into the sustainability features of flexible pavement during the user stage, and thus advancing the state-of-the-art pertaining to the construction and maintenance of flexible pavement.