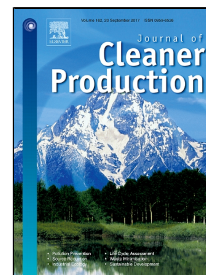


# Accepted Manuscript

A Combined Static-and-Dynamics Mechanics Analysis on the Bridge Deck Pavement

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PII: S0959-6526(17)31750-X  
DOI: 10.1016/j.jclepro.2017.08.034  
Reference: JCLP 10292  
To appear in: *Journal of Cleaner Production*  
  
Received Date: 25 April 2017  
Revised Date: 05 July 2017  
Accepted Date: 05 August 2017

Please cite this article as: Linbing Wang, Yue Hou, Lei Zhang, Guojun Liu, A Combined Static-and-Dynamics Mechanics Analysis on the Bridge Deck Pavement, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.08.034

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10 Beijing, Beijing, China; email: [573909608@qq.com](mailto:573909608@qq.com)11 **Abstract**12 The mechanical performance evaluation on bridge deck pavement has always been a critical issue for pavement  
13 engineers since it directly bears the loadings from vehicles and environment. Due to the complex service conditions  
14 including composite structure design, massive vehicle loadings, serious environmental conditions, large vibration and  
15 large deflection deformation, the service life of bridge pavement structure is usually much shorter than the common  
16 pavement structures. To evaluate the pavement structure stress state comprehensively, a combined static-and-dynamics  
17 analysis is conducted in this paper, combining with the sites tests in the cross-sea bridge pavement deck in Caofeidian  
18 District, China. The finite element software ANSYS is employed to study both the static and dynamics stress of bridge  
19 pavement. Simulation results show that the suggested thickness for the upper layer pavement thickness is 3.5 cm ~4.5  
20 cm and the lower layer is 5 cm ~ 7cm. And the suggested modulus for the pavement upper structure is 1600~1900MPa  
21 and 900~1000MPa for the lower structure. It is found that, along with the approaching of the load, the vertical  
22 displacement of each layer of the bridge deck pavement increases, and the vertical displacement decreases with the  
23 leaving of load. During the loading cycle, with the increase of speed, the maximum vertical displacement of bridge deck  
24 pavement decreases.25 **Keywords:** Bridge deck pavement; static-and-dynamics mechanics; finite element; simulation.26 **INTRODUCTION**27 The mechanical performance evaluation on bridge deck pavement, usually asphalt concrete, has always been a critical  
28 issue for pavement engineers (Hou et al. 2016, 2017a) since it directly bears the loadings from vehicles and environment.  
29 Due to the complex service conditions including composite structure design, massive vehicle loadings, serious  
30 environmental conditions, large vibration and large deflection deformation, the service life of bridge pavement structure  
31 is usually much shorter than the common pavement structures.32 There have been many research in simulation of the bridge deck pavement structure, where most models are based on  
33 finite element method and energy theories. ElSafty et al. (2016) proposed analysis, prediction and case studies of early-  
34 age cracking in bridges. Chen et al. (2016) developed a multiscale numerical modeling of steel bridge deck pavements.  
35 Pouget et al. (2012) evaluated the viscous energy dissipation in asphalt pavement structures and implication for vehicle  
36 fuel consumption. Hou et al. (2017b) proposed an energy-based approach to evaluate the failure in asphalt materials and  
37 pavement structures. Xue et al. (2013) studied the dynamic behavior of asphalt pavement structure under temperature-

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