Original Paper

A Review of Software in Flexible Pavement Design

Laila Al Maqbali[1*] & Osama Ragab[2]

[1] Sohar University, Faculty of Engineering, Civil Engineering, MAHMOOD AL SHAQSI, Oman

[*] Laila Al Maqbali, Sohar University, Faculty of Engineering, Civil Engineering, MAHMOOD AL SHAQSI, Oman

Abstract

This review gives an overview of some free and commercial software which used in road design such as AASHTOW Software, PAVERS Software, CIRCLY Software, PAKPAVE software, IITPAVE Software, KENPAVE software, PaveXpress software Win PAS 12 software, Street Pave, MXROAD Suite, and Infra works software. Using a software system in design will solves the problems of design and analyzing on-road and also eliminate road failure.

Keywords

flexible pavement, commercial software, free software

1. Introduction

The design of flexible pavement depends on different factors that affect the strength and CBR value of the subgrade soil such as load, properties of soil, environmental and climatic factors. Using flexible pavement is necessary to ensure road safety in a large city and will help to save time and avoid difficulties and errors which might happen during the design. Therefore, the objective of this study is to evaluate different software used in flexible pavements design. Software is helping to design the various pavement layers thickness.

2. Literature Review

The design of the flexible pavement needs to make different experimental tests and calculations which might occur a lot of errors during the design phase and that a result of road failures. Therefore, flexible pavement software needs to be used to avoid the failure of the road design.

2.1 Free Software

2.1.1 PAKPAVE Software

PAKPAVE software is used for flexible pavement design which provides a high level of pavement

structure for heavy traffic loads under any climatic conditions. It helps to evaluate the thickness of layers, the design life of the road and the relative damage factor for various environmental conditions like swelling, frosting, or both, on the road serviceability (Rafi Ullah Khan et al., 2012).

Rafi Ullah Khan et al. 2012, was analyzed PAKPAVE Software for flexible pavement design and compared the obtained data with the theoretical design. The results found that flexible Pavement software can save precious time and avoid the errors and difficulties occurring during the conventional methods of design.

2.1.2 IITPAVE Software

IITPAVE Software is a mechanistic-empirical software used for the design, analysis of the flexible or bitumen pavement. The input data used in this program to obtain stresses and strains at different layers are the elastic modulus, Poisson's ratio, the thickness of different layers, wheel load and tyre pressure of a vehicle.The result of strains obtained from IITPAVE software will be compared with the allowable strains and if the strains obtained are less than the allowable standard strains then the pavement thickness is called satisfied. (AN, M. K. et al., 2020).

Harish G R 2017, using IIT PAVE software to design the flexible pavement by using cementations materials for the base and sub-base layers for crack relief and cementitious base and sub-base with Stress Absorbing Membrane Interface. The result shows that the pavement which is designed by using the cementitious base and sub-base with Stress Absorbing Membrane Interface gives better serviceability due to substantial reduction in strains and thickness.

2.1.3 KENPAVE

KENLYER software is an Empirical Mechanistic design method used to study a flexible pavement with calculated stresses and strains in asphaltic pavement by calculating the allowance for rutting and fatigue failure (Rind, T. A et al., 2019).

Srikanth 2015, using KENPAVE software to examine the effect of modulus of elasticity and surface layer thickness on the performance of the pavement. The results showed that compressive and tensile strains decreased as surface thickness increasing.

2.1.4 Pave Xpress

PaveXpress is a useful program which used to determine the necessary pavement thickness for any section of roadway or project. It created with support from the National Asphalt Pavement Association and the State Asphalt Pavement Associations. The software needs basic inputs to provide designs for flexible and rigid pavements such as layer thickness, sub grade soil type (Chris, 2015).

2.2 Commercial Software

2.2.1 AASHTOW

AASHTOW is a good software which is designed by transportation professionals for transportation professionals. It can calculate stresses, strains, and deflections based on traffic, climate, and materials parameters to predict the problems of pavement distresses. The pavement engineer can use detailed traffic, materials and environmental information to assess performance of a pavement design instead of

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entering project information into an equation. (User, P. M., 2017).

2.2.2 PAVERS

Pavers software is used for pavement design, construction evaluation and maintenance. Pavers software is a good analytical pavement design which provides evaluation and design of road. The software can provide different information such as develops and organizes the pavement inventory, assess the current condition of pavements, develop models to predict future conditions, and also report on past and future pavement performance (Almuhanna et al., 2018).

Win PAS 12

WinPAS 12 is a program that is based on the AASHTO 1993 method of performs concrete and asphalt pavement designs. Different parameters affect the design of pavement by using this software which is the traffic load that has the highest impact on pavement thicknesses, followed by the subgrade strength, reliability and design life (Moon et al., 2020).

CIRCLY

CIRCLY is the main flexible pavement design software for roads and highways. It provides an accuracy of results of pavement design. The software can calculate the cumulative damage by the total traffic including any combination of vehicle types and loads. It can show the thickness for pavements at any traffic loads designed (Wardle, 2010).

Street Pave

StreetPave software based on the American Concrete Pavement Association (ACPA) thickness design for concrete highway and street pavements, and the Portland Cement Association (PCA) method. (Moon et al., 2020).

MXROAD Suite

MXROAD Suite is a good software that can give an accurate design of all types of roads. Itcan be used on a wide variety of highway projects which provides modeling integrated with CAD, mapping, and GIS. (DASS, S., 2010).

Infra works software

Infra works are civil infrastructure software which is considered as one of the important software used to design the roads, planning and design infrastructure projects (Eliseev et al., 2017).

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