



Using Monte Carlo Simulation for Pavement Cost Analysis

Industry: Transport
Product(s): @RISK
Application: Pavement Cost Analysis



@RISK

Summary

To better understand the practical aspects of the use of probability and Monte Carlo simulation in life-cycle cost-analysis (LCCA), the US Federal Highway Administration developed a model and made arrangements with multiple agencies to prepare case studies illustrating the application of risk analysis to LCCA in pavement design.

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With limited training in probabilistic principles and in the application of risk-analysis software, state highway agency personnel can apply the probabilistic approach to their current life-cycle cost-analysis procedures, using @RISK.

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Below is an excerpt from a November/December 2000 Public Roads magazine article by Keith D. Herbold.

Life-cycle cost-analysis (LCCA) models that are currently used by state highway agencies treat input variables as discrete, fixed values. In actuality, many input variables are not fixed; they are uncertain. In conducting an LCCA, it is important to recognize the uncertainty of input variables and the uncertainty that this variability creates in the results.

To better understand the practical aspects of the use of probability and Monte Carlo simulation in LCCA, the Federal Highway Administration (FHWA) developed a model and made arrangements with 10 state highway agencies, the American Concrete Pavement Association, and the National Asphalt Pavement Association to prepare case studies illustrating the application of risk analysis to LCCA in pavement design.

Prior to developing a case study, each participant received risk-analysis training using @RISK. @RISK, an add-on to Microsoft Excel, provides an efficient means to incorporate simulation capability into a spreadsheet.

Without the aid of simulation, a spreadsheet model will only reveal a single outcome, generally the most likely or average scenario. Spreadsheet risk analysis uses both a spreadsheet model and simulation to automatically analyze the effect of varying input on the output of the modeled system.

This article summarizes the results of the case studies, which show that with limited training in probabilistic principles and in the application of risk-analysis software, state highway agency personnel can apply the probabilistic approach to their current life-cycle cost-analysis procedures. Then they can answer three basic questions: What can happen? How likely is it to happen? What are the consequences if it happens? By applying this information, the decision-maker can select the best, most cost-effective solutions to provide the greatest long-term benefits.

Read the full article:

<http://www.palisade.com/downloads/UserConf/Using%20Monte%20Carlo%20Simulation%20for%20Pavement%20Cost%20Analysis.doc>