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SIMULATION BASED THROUGHPUT ASSESSMENT OF NON-HOMOGENEOUS TRANSFER LINES

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Abstract
This paper proposes a general simulation model to assess the throughput of non-homogeneous transfer lines. The transfer line has no intermediate buffers between adjacent machines. Machines are subject to random operation dependant failures. The transfer line is dedicated to producing only one product type which can be assimilated to an aggregation of various product types. Due to lack in line balancing, the considered transfer line is non-homogeneous so that its machines have different processing times. The purpose of this paper is to evaluate the performance of approximate analytical approaches dealing with non-homogeneous transfer lines. Several production line configurations have been analyzed and statistical tests were carried out to show that approximate approaches generate significant errors and cannot give a good estimate, compared to simulation results, of the throughput of unbuffered, non-homogeneous transfer lines subject to operation dependant failures. 15 refs.
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Key Words: *Automated Transfer Lines, Homogenization Techniques, Throughput Evaluation, Simulation Modelling*

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ANALYTICAL HIERARCHY PROCESS AS A TOOL FOR SELECTING AND EVALUATING PROJECTS

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Abstract
This paper explains the reasons for selecting the right project to conduct business in various organisations. It presents several methods for evaluating and selecting projects. A special focus is on Analytical Hierarchy Process (AHP) method that is becoming increasingly important tool in different decision-making situations. We have used this method in project management and developed a project evaluation and selecting process. We have also developed a simple application in MS Excel that helps with calculating projects' total priority grade. This tool helps us with simulating project importance based on changes in perception of the criteria. 18 refs.
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Key Words: *Project Selection, Project Evaluation, Analytical Hierarchy Process, Criteria Simulation*

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MODEL-BASED TESTING USING REAL-TIME ADAPTIVE SIMULATOR

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Abstract
Using modeling and simulation users can apply realistic interactions with their synthetic environments representing real world. In this study the synthetic environment is a hardware railroad model representing a miniature replica of a full-size railroad system under study. The hardware model is tested by means of real-time adaptive software simulator consisting of two subsystems: the virtual railroad which mimics behavior of the hardware railroad model, and the controller which is used to synchronize and control the hardware and the virtual railroads. The controller has a built-in feature to forecast possible railroad hazard conditions and to avoid them by sending corrective commands to both railroads. Testing the model can be observed on the simulator screen and on the hardware railroad model. The simulator also features test-event history log allowing playing back the tests. 11 refs.
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Key Words: *Event-Driven Software Simulation, Hardware Railroad Model, Railroad Traffic Hazards, Adaptive Traffic Control*

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PRODUCT DEVELOPMENT SIMULATION WITH MULTICRITERIA ANALYSIS

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Abstract
Effective product development rests on a product's design ability to create a positive product experience. This involves complex transformation of product information from customers to engineers to production to sales and back to customers. This work presents the concept of simulating the development of a new product. The multicriteria analysis of product development in a multi-dimensional space is being used. Based on simulation, the model shows in which direction the product will be developed on the basis of existing information. In the set multi-dimensional space, in which each observation parameter has a designated polar dimensional in terms of dependence on time, development on the basis of selected products is simulated. In an innovative way and in the case of sanitary fittings, simulation of the development of a new product in the early stages of design ideas is shown. 14 refs.
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Key Words: *Product Development, Simulation, Multicriteria Analysis, Multidimensional Space*

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CONTROLLERS OPTIMIZATION FOR A FLUID MIXING SYSTEM USING METAMODELLING APPROACH

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Abstract
Offline optimization of controller parameters for complex non-linear processes can be time consuming, even with high performance computers. This paper demonstrates how Metamodelling techniques can be utilized to quickly tune the controller parameters for a non-linear process. The process used in this study is the mixing process which is a multivariable and intrinsically non-linear plant. The Radial Basis Function Neural Network Metamodel founded a good approximation to the optimum controller parameters in this case. This paper proposes an intuitive methodology to use only a small fraction of the design space to create a Radial Basis Function Neural Network Metamodel that is good enough to optimize the system. Comparisons were made between the controllers optimized using the Metamodelling technique and the original large space design. 14 refs.
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Key Words: *Radial Basis Function, Metamodelling, Liquid Mixing Process, Numerical Optimization*