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ENHANCING RELIABILITY OF A CONTINUOUS MANUFACTURING SYSTEM USING WIP BUFFERS

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Abstract
Continuous Manufacturing System (CMS), usually employed for mass production, has a serial line arrangement of different machines. These are arranged in sequence of operations to produce a specified product. In such CMS, over long period of usage, the production rate comes down, due to failures of machines in the line. Thus, reliability i.e. probability that such a CMS will give rated production over a year reduces considerably. To compensate for such loss of production, introduction of redundant parallel standby machines approach has been hypothesized and is in use irrespective of cost involved. A new approach of introducing buffers of Work-In-Progress (WIP) at various stages in the line, in place of standby redundant machines, has been proposed and its effect on the reliability of CMS to give rated production is analyzed. The results show that by using the proposed system/approach, the reliability that such a CMS will give rated production, is 100 %. 12 refs.
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Key Words: *Continuous Manufacturing System, Reliability, Standby, Buffer, Work-In-Process, Configuration*

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FRACTAL ANALYSIS OF PATHFINDING AESTHETICS

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Abstract
We study a new, fractal-based model of pathfinding aesthetics for videogames and other virtual worlds. This model fills a gap in previous pathfinding efforts that have studied mostly machine performance issues or relied on anecdotal arguments rather than metrics to hypothesize about and improve aesthetic outcomes. We show firstly that the fractal model consistently discriminates between paths that were generated with beautifying treatments versus control paths. We also report that the model reliably predicts player expectations of relative aesthetic values for pathfinding. These conclusions are supported by statistical analysis of model results and opinion survey responses. 29 refs.
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Key Words: *Fractal Dimension, Pathfinding, Aesthetics, Virtual Worlds, Beautifying Heuristics*

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FIXED/FREE FINAL TIME SIR EPIDEMIC MODELS WITH MULTIPLE CONTROLS

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Abstract
In this paper the possible advantages in introducing multiple controls in the analysis of epidemic models are investigated. Usually, only the susceptible or infected people are controlled by vaccination or by quarantine and/or medicine treatment; in this paper multiple controls, both for the susceptible and infected are considered. The problem is studied both in the case of fixed and free final time. Numerical results are considered for simulated data showing the effects of multiple controls and the rule of each parameters of the model. Also a simulation on real data regarding the course of measles in Africa is presented. 22 refs.
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Key Words: *Optimal Control, Epidemic Control, Nonlinear Programming, Direct Transcription Methods*

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SIMULATION OF CUTTING FORCES FOR COMPLEX SURFACES IN BALL-END MILLING

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Abstract
This article presents a method of a cutting force prediction in the case of a ball-end milling. We have proposed a geometrical description of a generic tool so as to simulate the 3 axis milling operation with a hemispherical ball-end cutter. This tool is decomposed into elementary discs; a mechanical approach of the cut is applied onto each disc to obtain the cutting forces from the machined material behaviour and from the cutting conditions. The model, thus obtained, will be afterward generalised in the case of an inclined or circular surface. This generalisation is carried out by adopting, at each time, an adequate reference change, dependent on the trajectory inclination angle. For application, we will consider the milling of a complex part. In fact, the synthesized cut model will be applied to the different types of surfaces which constitute this workpiece; and this will be executed according to the two machining senses: longitudinal and transversal. 12 refs.
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Key Words: *Ball-End Milling, Cutting Force, Complex Surface*