

Modelling, Simulation and Optimization of Maintenance Strategies under Consideration of Logistic Processes

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- Industry

10) Partner organizations:

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11) Short Summary: Study concerns about optimization of maintenance strategies in manufacturing industries based on contingency risk analysis of the production system. Thereby, the focus is on performance optimization and the interplay of preliminary logistic processes and maintenance strategy.

12) Keywords: Economics, Engineering Sciences, Logistics analysis

13) Project description:

Aim of the study is to enhance the maintenance strategy selection procedure by simulating plant characteristics under different maintenance strategies embedded in the enterprise-internal process chain from goods receiving to goods output.

Nowadays, enterprises are faced with shortened delivery times mostly caused by JiT production of their customer coupled with high penalties for delayed supply. Whereas time for delivery and production decrease clients call for customized goods is raising. Consequently, a production hold-up can immediately effect a delayed delivery unless stock keeping acts as a buffer. However, stock keeping of customized goods is not feasible because of the exploding amount of stored parts.

A high readiness for delivery claims reliable plants, whereas maintenance has a strong impact on plant reliability.

Running a plant requires technical available equipment, labour and raw material in particular. Absent raw material or short of stuff may cause a product interruption as well. Whereby technical availability is influenced by maintenance, preliminary logistic processes provide labour and feedstock. By optimizing all over product availability (readiness for delivery) dependence between maintenance and logistic processes must be taken into account.

Based on process oriented models (using Process Oriented Analysis) of machinery and logistic processes, avoiding events are identified which could provoke delayed supply. These events are top events in fault trees which correspond to the specific plant or logistic process.

With help of these fault trees an agent-based simulation is elaborated and tested to evaluate adequate strategies at distinctive objective functions.

Of main interest are answers to the following questions:

‡ What is the impact of different maintenance strategies on basic events in a fault tree? How can the appearance of the top event be prevented?

‡ How can the (technical) availability of a plant be improved by applying different maintenance strategies? (Optimal cost strategy?)

‡ What is the interplay between logistic processes and maintenance strategies?

‡ What are the needed logistic adaptations to a given maintenance strategy to improve the readiness for delivery degree?

14) Popular description:

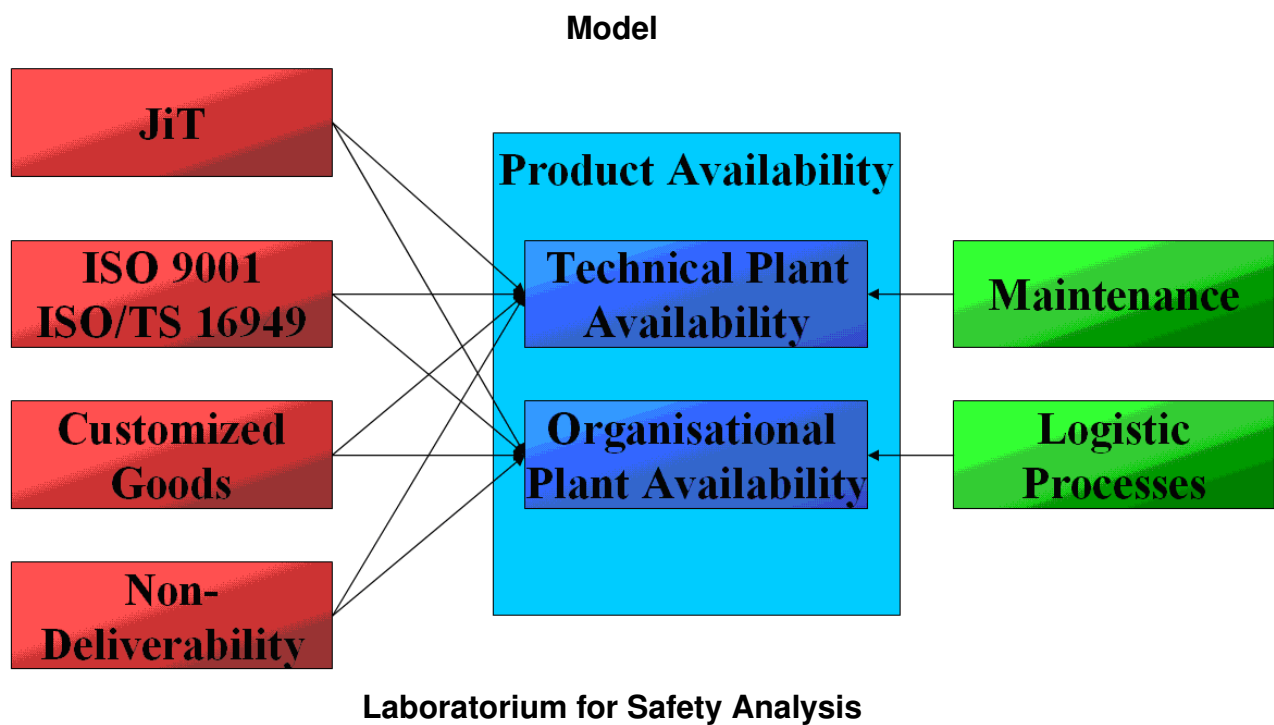
The claim being able to deliver on time and within shorter periods of time have become one of the key success factors in manufacturing and especially in automotive industry. Buffering demand and

production by stock keeping is often impossible because of customized products. By consequence, a production hold-up, in case of short of stuff or plant failure, may delay deliveries and decrease product's availability.

Thereby, maintenance improves plant availability and preliminary logistic processes provide labour and feedstock. A holistic product availability optimization approach must take into consideration technical availability of the plant and availability of preliminary logistic processes as well.

Sophisticated modelling techniques are applied to build up a simulation of plant characteristics, logistic processes and maintenance strategies and to compute, on basis of the model, an optimal combination of these elements.

15) Graphics:



16) Publications: no entry

17) Links to important web pages:

- <http://www.hubacontrol.com>