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FRAUNHOFER INSTITUTE FOR MANUFACTURING ENGINEERING AND AUTOMATION IPA

1 *Simulation of a complex cell with more than one robot.*

2 *Cycle time analysis.*

SIMULATION OF ROBOT CELLS

Background

Time and again, unexpected problems arise when a robot cell is put into initial operation or after it has been retooled. Complete simulation of the planned robot cell allows many potential problems to be identified ahead of time.

Technology

The 3D simulation of robot cells and manufacturing systems makes it possible, already in the design phase or when preparing to retool, not only to visualize the layout of the robot cell, but also to simulate what the cell will perform in operation. Robot motions and material flows can be simulated and represented in 3D. In addition, the effects of various simulation parameters can be analyzed and different issues can be examined.

3D visualization

The 3D visualization of the robot cell provides a realistic and illustrative impression of the layout, particularly with regard to space requirements and the overall process.

Cycle time analysis

Simulation of the overall process makes it possible to carry out a cycle time analysis. This can investigate, in particular, the interaction between all the components involved in the process and can analyze the effects of various parameters.

Accessibility check

The simulation of realistic robot motions allows for an easy check of accessibility during each motion. This ensures that the robot is able to reach all the points that are necessary for operation. In addition, it is possible to analyze how different locations will affect the motions of the robot.
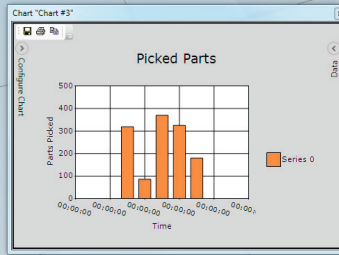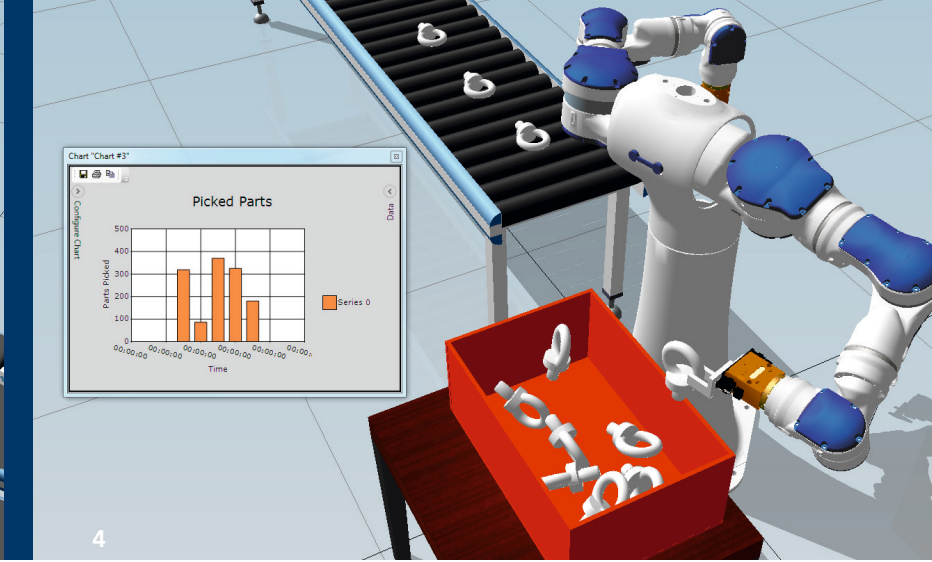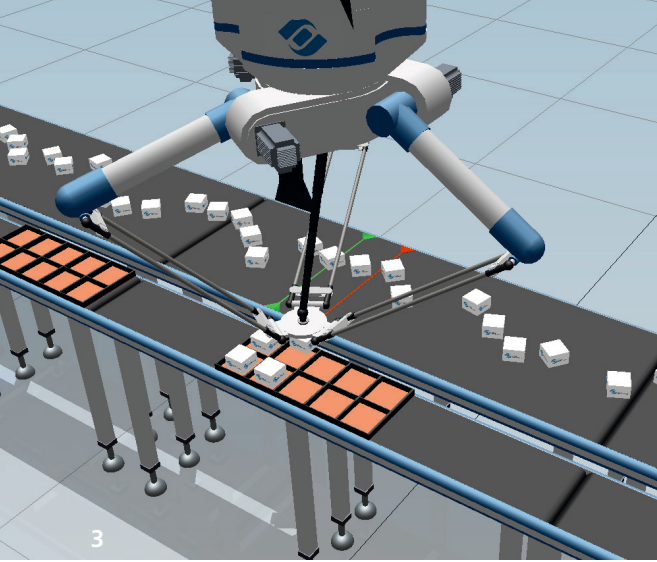
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Control

Simulation can be controlled by the same controller that will be used for the actual robot cell. This allows the controller to be developed and tested in advance (offline).

Virtual study of error conditions

By means of a simulation, a virtual study of how the robot cell will perform under error conditions can be performed. The operability of the controller can thereby be tested on a simulation model without risking damage to the robot cell.

Long-term tests and detail examination

The ability to carry out a simulation at any desired speed makes it possible to perform endurance tests, to identify statistically rare events and to examine individual process steps in detail.

How you benefit

The simulation of your existing or planned robot cell enables you to avoid unexpected problems during implementation and initial start-up, thereby reducing the risks. Also, by determining the optimal process parameters in advance, throughput and availability of your robot cell can be increased significantly.

Fast and cost-effective

The checking of critical points, such as the accessibility of robot positions or compliance with the required cycle times, results in trouble-free initial operation and therefore in faster production start-up and lower costs.

Increased throughput

An analysis of the effects of different set-ups, such as robot motions and component arrangements, enables you to reduce cycle times and increase the throughput of the robot cell.

Solutions to rare problems

A long simulation time will also allow rarely occurring problems to be identified and suitably addressed, thereby increasing the availability of the robot cell.

Reduced lo ss of production

The simulation of error conditions and the implementation of appropriate solution strategies makes it possible to reduce the loss of production when actual errors occur.

What we offer

Fraunhofer IPA will assist you in the following steps:

– analysis of your requirements
– joint definition of relevant simulation parameters
– generation and implementation of simulations
– evaluation and interpretation of the simulation results
– development of measures to optimize your robot cell

Contact us to discuss your own application scenario..

3 *Simulation of a »pick & place« application with a delta picker.*
4 *Various statistics allow a comprehensive analysis of the simulated process.*