

VIRTUAL CLEANING OF MACHINES AND EQUIPMENT IN FOOD INDUSTRY

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Abstract

To ensure hygienic production of food products, machines and equipment used must be cleaned regularly. The cleaning process causes high costs for personnel, cleaning agents, water, and energy. To lower these costs and raise the total availability of the plant, the cleaning process needs to be optimized. Ideally the cleanability can be assessed in a very early stage of construction.

A test stand was developed for cleaning experiments. These are the base of the simulation. In the test stand, easy handling is possible and individual parameters (e.g. pressure and flow rate of the spray jet, angle and distance to the object) can be varied. In addition, a well-defined movement of the object through the spray jet is feasible. The simulation of the cleaning process was realized as an extension of the VisualDecisionPlatform virtual reality software (ESI Software Germany GmbH). The additional source code was entered via the scripting module. By special algorithms the parameters obtained in the cleaning experiments can be integrated into the simulation.

For simulation of the cleaning process the user stands in front of a screen on which the apparatus is being projected. The movements of the spray lance is detected and transferred to the computer system. By use of further input devices the user may "move" during the cleaning process. The result of the simulation will be calculated after completion of the cleaning process and shown visually to the operator. By graduation of color shades the result of the cleaning is displayed. A dark blue color represents a good cleaning result. Hence, a light color indicates where cleaning is not sufficient yet.

The combination of cleaning experiments in a test stand and simulation of cleaning processes in virtual reality allows to assess the cleanability of equipment even before construction.

Key words: Food industry, Cleaning, Virtual reality, Hygienic design.