

# CLEANING EFFICIENCY – WHICH EFFICIENCY? STUDY ON THE INFLUENCES OF NOZZLE DIAMETER, PRESSURE AND JET MOVING SPEED OF MOVING IMPINGING JETS

Hannes Köhler<sup>1\*</sup>, Hannes Stoye<sup>1</sup>, Marc Mauermann<sup>2</sup>, Thomas Weyrauch<sup>2</sup> & Jens-Peter Majschak<sup>1,2</sup>

<sup>1</sup> Technische Universität Dresden, Faculty of Mechanical Engineering, Institute of Processing Machines and Mobile Machines, Bergstr. 120, 01062 Dresden, Germany

<sup>2</sup> Fraunhofer IVV, Branch Lab for Processing Machinery and Packaging Technology, Heidelberger Str. 20, 01189 Dresden, Germany

\*[hannes.koehler@tu-dresden.de](mailto:hannes.koehler@tu-dresden.de)

## ABSTRACT

*The cleaning of process equipment is a necessity in the pharmaceutical and food industry. Recently the efficiency of these cleaning processes comes more into focus due to the increasing economical and ecological demands. Except the ratio between benefit and efforts there is no consensual unique approach to assess the efficiency of cleaning processes so far. In this paper different assessment criteria (time, fluid consumption and energy) to determine different cleaning efficiencies are discussed based on experimental results.*

*Stainless steel sheets soiled with Xanthan gum were cleaned by a moving impinging jet in a laboratory scale test rig. The influence of various operating parameters (nozzle diameter, gauge pressure and jet moving speed) on different kinds of efficiencies was quantified by analyzing the cleaned area. Experiments showed that the complete cleaned area, as a quantitative criteria of the cleaning result, decreased with higher jet moving speed. The influences of the three operating parameters on the different efficiencies were evaluated respectively. The experimental results reveal that there is no overall optimal parameter combination leading to the highest values in all the analyzed efficiencies simultaneously. A differentiated or combined consideration of the efficiencies is therefore required to optimize cleaning processes.*