Design and optimisation of cleaning processes

Product: SITA CleanoSpector
Industry: Operators of cleaning processes, chemical and plant manufacturers
Measuring principle: Fluorescence measurement

In cleaning processes there are a multitude of boundary conditions and setting parameters that influence the cleaning result. The aim of the design and optimisation of a cleaning process is to stably achieve the required cleanliness of the cleaned parts with high efficiency. Parameters such as the available cycle time, the use of resources (energy, chemicals etc.) and the achieved cleaning result are often oppositely dependent. According to the process, different criteria are relevant and the aim of the optimisation.

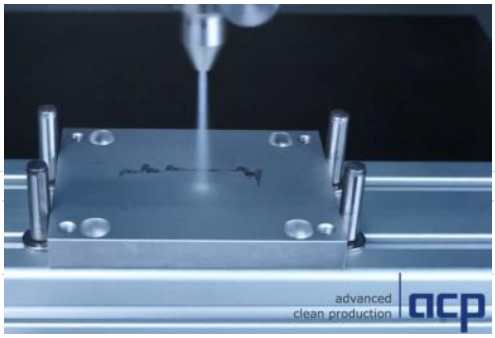
Fluorescence measurement

To investigate the effect of different cleaning parameters on the cleanliness of parts, fluorescence measurement directly on the parts surface is used. The intensity of the fluorescence is largely proportional to the thickness of the coating, so measurement results show the ratio of the residue quantities. Fluorescence measurement is used to benchmark different cleaning processes and procedures, as well as to design and optimise process parameters of one and the same procedure. Consequently, it is used beneficially in the technology and application centres of cleaning chemicals and equipment manufacturers; be it the design and optimisation of aqueous cleaning, solvent cleaning or selective cleaning by laser, plasma or CO_2 snow blasting.

Optimisation of CO_2 snow-jet cleaning

In the following example, fluorescence measurement is used to determine the optimum process parameters for CO_2 snow jet cleaning during process design. The aim is to achieve an optimal cleaning result with minimum cycle time. In order to investigate the influencing factors for the specific cleaning task, different parameters such as distance to the surface, travel speed and pressure of the CO_2 snow jet cleaning were varied and the cleaning result was checked by means of fluorescence measurement.

The use of a smaller capillary or half the pressure did not lead to an improvement compared to the standard parameters. By doubling the speed, the cycle time can be reduced, but only at the expense of the cleaning effect. On the other hand, an increased distance to the surface more than halved the amount of residue as compared to the standard parameters with the same cleaning time. This shows exemplarily the possibilities of fluorescence measurement for process design and optimisation of cleaning processes.



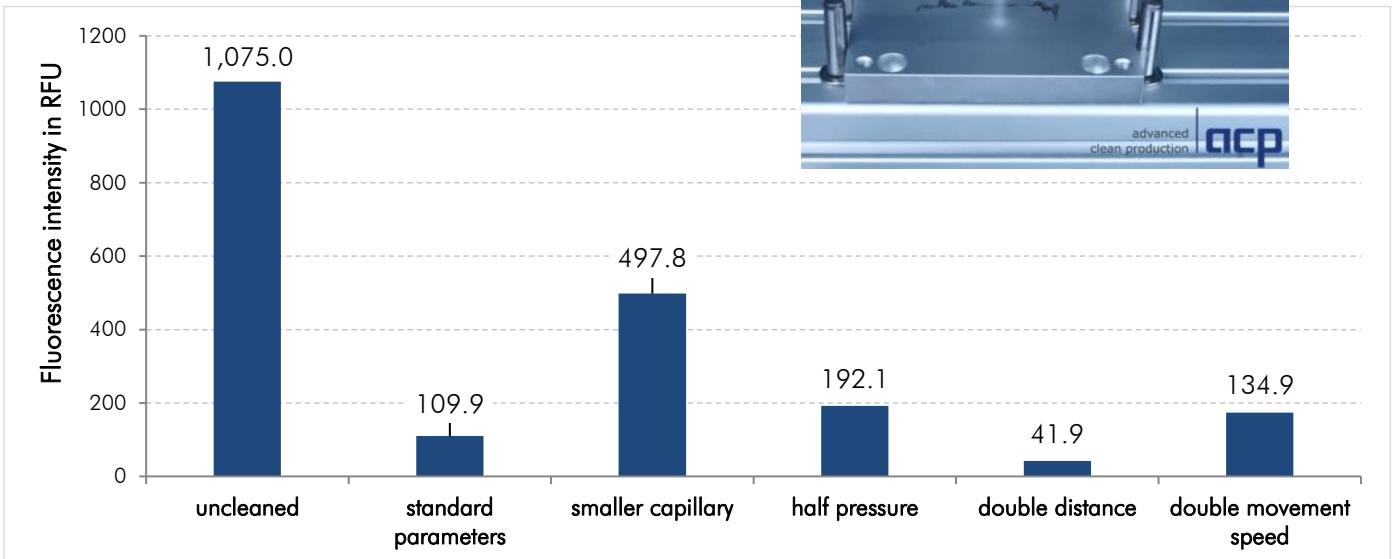


Figure 1: Results of the fluorescence measurement for uncleaned and with different parameters cleaned parts

SITA Messtechnik GmbH . +49 (0) 351 / 288 53-0 . info@sita-messtechnik.de . www.sita-messtechnik.de