

## PAID DIPLOMA / MASTER'S THESIS

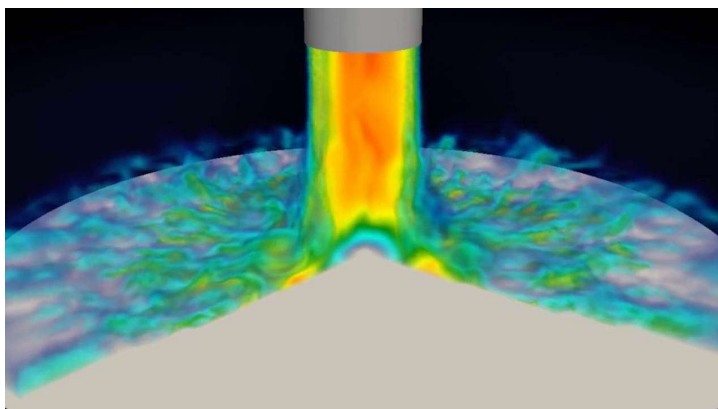
# COMPUTATIONAL CLEANING VALIDATION

Ref. No.DA165

To dedicated students of mathematics, physics, chemical engineering, mechanical engineering and related disciplines we offer an opportunity to write a paid Diploma/Master's thesis.

### Objective

In the pharmaceutical industry, cleaning of equipment is important to avoid contamination of one product with the drug substance from another. For this reason, a great deal of effort is devoted to establishing and validating cleaning procedures. This work is to a large extent carried out in a trial and error fashion, which is time consuming and costly and most likely also results in cleaning procedures that are far from optimal. Suboptimal cleaning procedures are also undesirable from a sustainability perspective since they use excess amount of solvents and detergents.



In order to establish cleaning procedures faster and to design cleaning procedures that consume less energy and solvents, it is of interest to use predictive tools such as computational fluid dynamics (CFD) to design the cleaning procedure. In this work, you will therefore design a simple procedure to clean a model equipment part and analyze it using CFD. Based on this analysis, you will develop a cleaning model that you will later use to predict how the same cleaning procedure would work when applied to another equipment part. Lastly, you will carry out an cleaning experiment on the latter part to determine to what extent the prediction was correct.

### Required skills

- Fluid mechanics and transport phenomena, mathematics (ordinary and partial differential equations), thermodynamics.

### Withing the framework of this diploma / master's thesis we offer the following

- Extensive participation in a top-level and industrially relevant research project in an international environment
- Supervised training in the task
- Assistance of experienced staff with the implementation of innovative ideas
- Access to highly modern infrastructure on campus of Graz University of Technology
- Assistance with the publication of results

### Financing

- Compensation on the basis of a service contract

If you are interested in writing your thesis at the interface between university research and industry/ business and to contribute to the optimization of product and process development in the pharmaceutical industry, please contact us indicating the reference number.

### Contact

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