Fraunhofer FEP

# PRESS RELEASE

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## New cleaning pilot plant for practical education in industrial parts cleaning

**A new multi-chamber system for aqueous ultrasonic cleaning at the Fraunhofer FEP will provide flexible cleaning options for industrial component cleaning in the future. This system complements the LinTR training laboratory, which was developed under the leadership of the Fraunhofer FEP together with the Fraunhofer IPA, IWS and IVV Dresden. The learning laboratory offers a comprehensive, modular training concept for industrial parts cleaning for a wide range of requirements and, for the first time, the possibility of training complex cleaning processes in an extended laboratory environment. The new capabilities will be presented during the exhibition at the 32nd Industrial Component Cleaning Conference, September 11 – 12, 2024, in Dresden, Germany.**

The proverbial sand in the gears can bring entire systems to a standstill. Even the smallest particle impurities or residual dirt in process chains are often enough to cause functional limitations or even complete system damage to assemblies.

The cleanliness of the production environment and any necessary cleaning processes are thus crucial for achieving the quality requirements of a component to be produced. Cleaning processes are hence of quality-determining importance. In addition, there are many dependencies between the process steps, upstream and downstream processes, which can also have complex influences on the cleanliness of the entire process chain.

A lot of theoretical knowledge can currently be learned about cleaning processes and quality assurance and the practical use of cleaning technology as well as measuring and testing devices. However, there is still no way to train the mastery of complex process chains related to parts cleanliness. A new learning laboratory for industrial parts cleaning – LinTR – now fills this gap.

Funded by the Fraunhofer Academy, the Fraunhofer IPA, the Fraunhofer IVV Dresden and the Fraunhofer IWS are working under the leadership of the Fraunhofer FEP on the design and implementation of the extended training options. These should not only include the upgrading of the technical possibilities, but also offer a modular, flexible concept and cooperating learning locations.

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## Modular training approach with lots of hands-on experience and cooperating learning sites

The learning units of the LinTR learning lab will not be offered in a theoretical sequence, e.g. depending on the speaker, learning location or topic. The new methodical-didactic concept subordinates all learning units to the process chain approach and offers corresponding practical training units. In this way, participants can be introduced to technical and logistical interrelationships at the interfaces of the process chain. In addition, the fundamental importance of interdisciplinary communication for ensuring component cleanliness at all points in the process chain is conveyed, which in many cases reveals unrecognized weak points and leads to simple problem solutions.

In order to meet the different demands on the time budgets of future learners, a modular concept has been developed that can be flexibly designed to offer a three-day compact seminar as well as an in-service qualification.

Laboratories at all four project partners are available for training practical skills. These include a laser laboratory at the Fraunhofer Institute for Material and Beam Technology IWS in Dresden. The Fraunhofer Institute for Manufacturing Engineering and Automation IPA in Stuttgart offers special laboratories on the topics of cleanrooms and particle cleanliness. The simulation and practical implementation of spray cleaning are available in the laboratories of Fraunhofer IVV Dresden, among others. Depending on the scope of the project, either live video or direct on-site use is offered.

## Multi-chamber cleaning system for aqueous ultrasonic cleaning

As part of the LinTR project, the existing cleaning technology at the Fraunhofer FEP was expanded to include a multi-chamber cleaning system for aqueous ultrasonic cleaning. The pilot-scale system has a capacity of 100 liters per tank and, in contrast to many conventional ultrasonic cleaning systems, has very flexibly controllable parameter sets.

Project manager Daniel Weile explains the advantages: "The system does not have any fixed ultrasonic systems installed but allows the control of individual ultrasonic generators. This means that the direction, frequency and power of the ultrasound, and thus the cleaning effect, can be varied over a wide range. This allows the cleaning processes to be precisely adjusted to a wide range of contaminants and components. The sequence of the cleaning processes in the six tanks can also be varied using freely adjustable automatic system."

This wide range of variations will be used in the LinTR learning lab in the future. Various cleaning processes and test methods will be used in practice to make effective didactic use of the theoretical content learned in the training courses. For this purpose, a special two-part test component has been developed that contains typical geometries and materials of industrial components, such as different drill holes, edges and screw connections, as well as material combinations of metal, plastic and additively manufactured components.

"One of the practical tasks within LinTR is for the participants to optimize the parameters for cleaning this standard component. Our multi-chamber system is perfect for this. Thanks to the flexibility of the system's individual control variables, the participants can practice and optimize the cleaning processes until the contamination on the test component is removed with the optimum setting," continues Weile.

The cleaning task consists of a defined model contamination on the standard component. Typical production contaminants (lubricating oil, cooling lubricants and grinding pastes) are applied to the component in a standardized manner and then processed using various methods. The participants will have the opportunity to find a satisfactory solution to the cleaning task by varying the process parameters. The standardized initial conditions then allow a comparative analysis of the different processes and show the limits and possibilities of the methods on the basis of practical examples. A final analysis of the components is also an integral part of the practical activity.

The multi-chamber cleaning system is currently being commissioned until the end of the LinTR learning lab project in September 2024 and should be available for the first practical cleaning processes by the end of the year. In addition, from fall 2024, the four project partners in the learning lab will have a complete modular system for training in industrial component cleaning that is precisely tailored to the needs of manufacturing companies and, for the first time, offers practical training units in existing laboratories.

The Fraunhofer FEP will be providing information about all the possibilities of the LinTR learning laboratory, further training to become a "Certified Professional Specialist for Industrial Parts Cleaning" and other topics related to industrial parts cleaning during the 32nd Conference on Industrial Parts Cleaning from September 11–12, 2024, in Dresden in the accompanying exhibition to the conference.

**32nd Conference on Industrial Component Cleaning**

September 11–12, 2024
Dorint Hotel Dresden
You'll find the Fraunhofer FEP stand in the accompanying trade exhibition:
https://s.fhg.de/758

## About the LinTR Project - The New Learning Laboratory for the Cleaning of Industrial Parts

Funding Organization:

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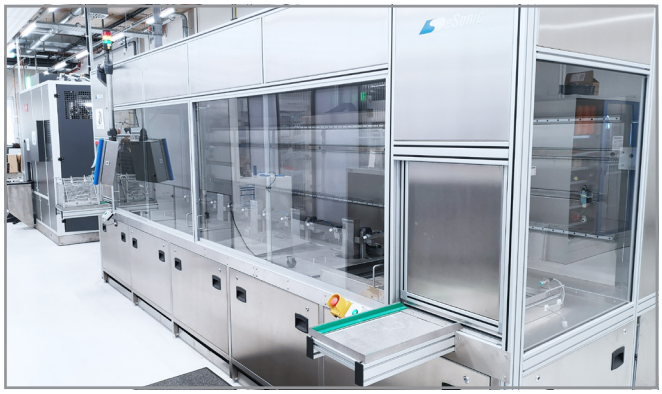
Fraunhofer ACADEMY

Project Partners:

- Fraunhofer Institute for Material and Beam Technology IWS
- Fraunhofer Institute for Manufacturing Engineering and Automation IPA
- Fraunhofer Institute for Process Engineering and Packaging IVV, Processing Machinery Division, Dresden
- Fraunhofer Institute for Electron Beam and Plasma Technology FEP (Project Coordination)



**6-chamber aqueous ultrasonic cleaning system at Fraunhofer FEP**
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**Cleaning processes in practical application during the training course on industrial parts cleaning**
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