

Press Release

September 21, 2026 Page 1 | 4

Kick-off meeting for the “CleanGreen” joint research project at Fraunhofer IST in Braunschweig

“CleanGreen” launches: AI-based approaches for more energy-efficient industrial component cleaning

With the kick-off meeting of the “CleanGreen” joint research project in September 2026, partners from industry and research began working together on new approaches for more energy- and resource-efficient industrial component cleaning. The project’s goal is to develop methods that will allow the energy, water, and chemical consumption of aqueous cleaning systems to be better adapted to actual cleaning requirements in the future.

Industrial cleaning processes are a key component of manufacturing in numerous industries. Aqueous cleaning processes, in particular, can consume significant amounts of energy depending on the system and process control. When designing systems and processes, the actual level of contamination on the components is generally not taken into account. Instead, cleaning processes are often designed and operated in such a way that components with varying degrees of contamination reliably achieve the required level of cleanliness. However, information on the actual level of contamination on the components and the current condition of the cleaning baths has often been lacking, preventing the adjustment of cleaning processes to meet actual needs. This is precisely where the “CleanGreen” project comes in. As part of the project, various data sources are to be consolidated and made available for intelligent process control. The plan is to link information from plant control systems, bath monitoring, production planning, and newly developed optical measurement methods.

Research platform at the Fraunhofer IST

For this work, an industrial cleaning system at the Fraunhofer Institute for Surface Engineering and Thin Films IST is being used as a research platform and is being gradually expanded to include additional measurement and sensor technology. On this basis, the necessary data will be collected, and various approaches to process evaluation and optimization will be investigated. As the project progresses, the plan is to test selected developments in prototype form at the industry partners’ facilities. In particular, the goal is to assess the extent to which the developed concepts can be transferred to both existing and new cleaning systems.

Making contaminants visible

September 21, 2026 Page 2 | 4

In order to qualitatively and quantitatively detect organic contaminants on component surfaces in particular, an automated fluorescence measurement system using an F-scanner will be developed and integrated with the expertise of the Fraunhofer Institute for Physical Measurement Techniques IPM. The project participants aim to investigate to what extent this information can be used to assess the degree of contamination prior to cleaning and to evaluate the success of the cleaning process afterward. The data obtained will then be incorporated, together with additional process and sensor data, into AI-supported evaluation methods. The goal is to better understand the relationships between component condition, the cleaning process, and the cleaning result, and to derive recommendations for needs-based process control.

Contribution to energy efficiency and digitalization

The project addresses key challenges in industrial production. Companies are increasingly faced with the task of reducing energy and resource consumption while simultaneously ensuring high quality standards. "CleanGreen" aims to lay the groundwork for this by systematically consolidating data from various sources and making it usable for digital, data-driven decision-making processes. The long-term goal is to create the conditions for automated and demand-driven control of cleaning processes. In the future, integration into existing plants should also be possible. In addition, the information obtained is to be made available for subsequent manufacturing steps such as painting, electroplating, coating, bonding, or soldering processes.

About the project

“CleanGreen” – Energy-Efficient Cleaning Based on Quantified Component Contamination and AI-Optimized Wet-Chemical Cleaning Processes

In the “CleanGreen” joint research project, partners from industry and research are working together to address issues in the fields of industrial cleaning, optical metrology, sensor technology, data analysis, and AI-supported process control:

Project partners:

- B+T Oberflächentechnik GmbH (coordination)
- Fraunhofer Institute for Surface Engineering and Thin Films IST
- Fraunhofer Institute for Physical Measurement Techniques IPM
- Institute for Machine Tools and Manufacturing Technology (IWF) at the Technical University of Braunschweig
- GNS Systems GmbH
- G&M Galvanik UG

Project duration: July 2026 – June 2029

Funding reference:

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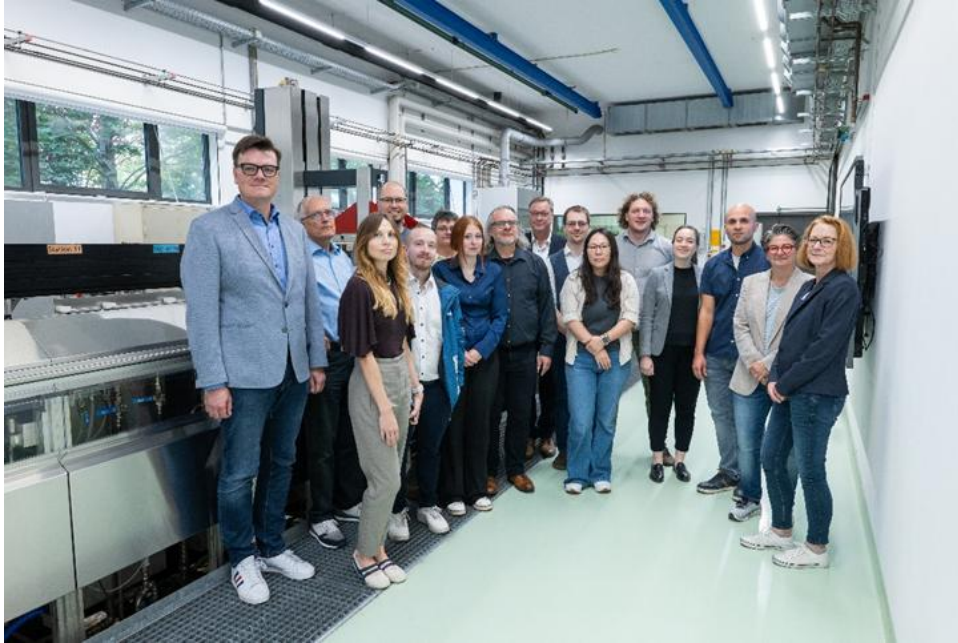


Fig. 1 Group photo taken during the “CleanGreen” kick-off meeting at Fraunhofer IST.
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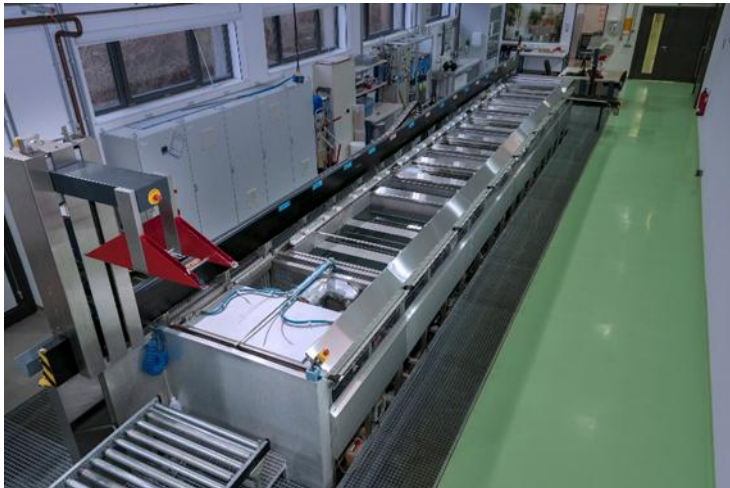


Fig. 2 A multi-chamber system for aqueous cleaning at Fraunhofer IST, offering high reproducibility and flexibility with regard to the materials to be cleaned. © Fraunhofer IST

The Fraunhofer Institute for Surface Engineering and Thin Films IST is an innovative partner for research and development in surface technology, with expertise in the associated product and production systems. The aim is to develop customized and sustainable solutions: from prototypes, through economic production scenarios, to upscaling to industrial magnitudes – and all this whilst maintaining closed material and substance cycles. The Fraunhofer IST is one of the seventy-five institutes of the Fraunhofer Society, one of the world’s leading organizations for applied research.

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