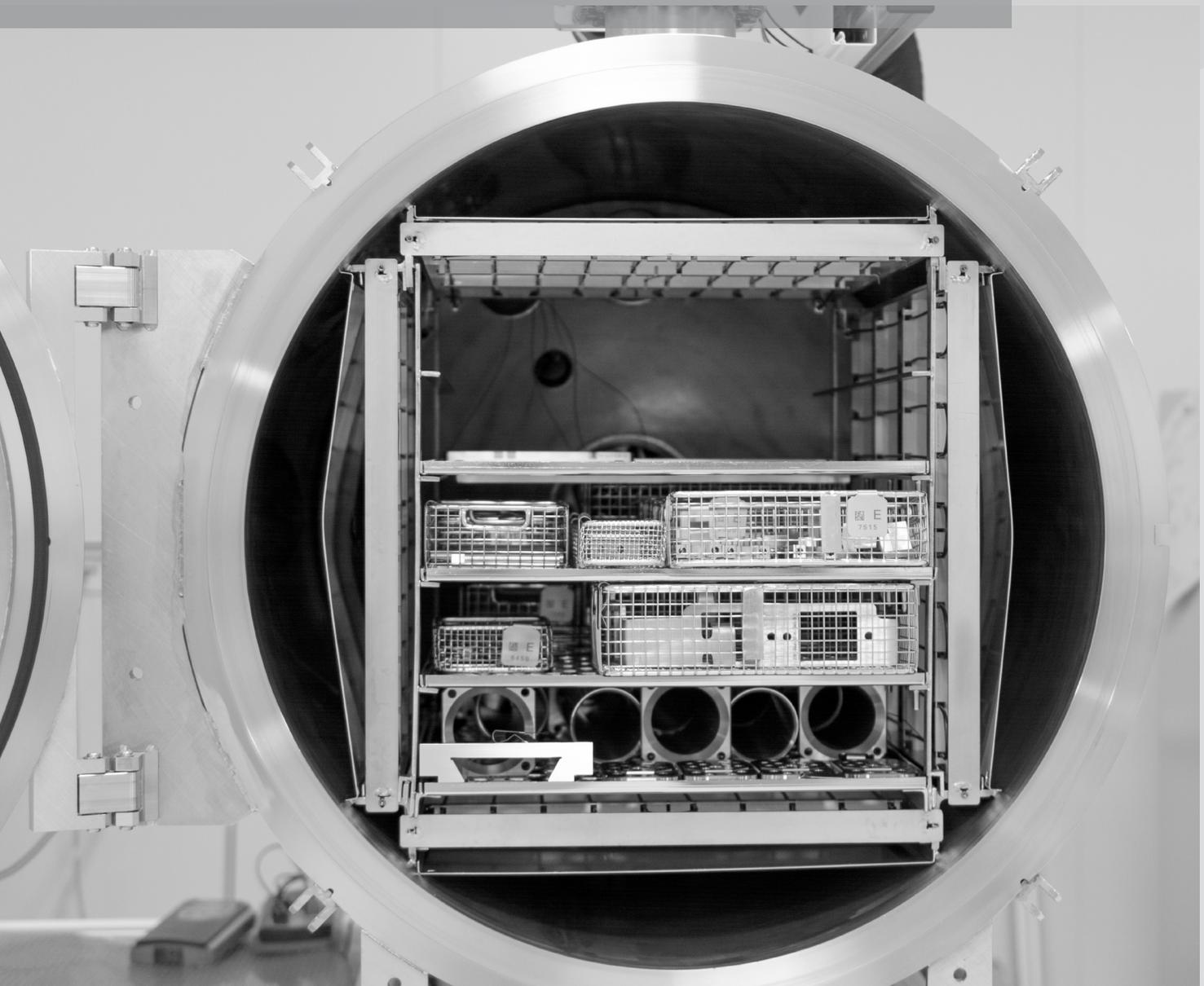
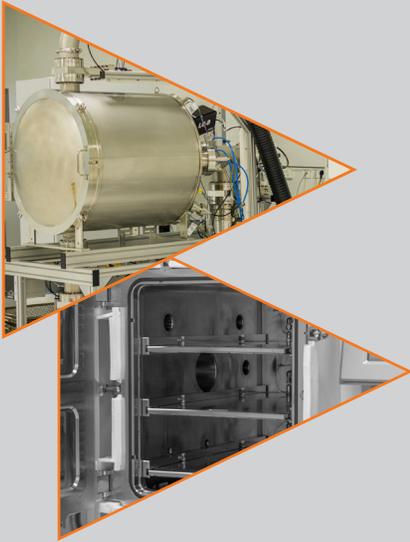




Vacuum Systems For Aerospace



We work under pressure.



- ▶ Who we are!
- ▶ What are molecular contaminants?
- ▶ Automatic Residual Gas Analysis Tool ARGAT®
- ▶ Vacuum Bake Out Oven for Dry Cleaning VOBOS
- ▶ Thermal Vacuum Chamber HeVACool
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TREAMS is a young and innovative high-tech company specialized in vacuum system construction. TREAMS literally means TREATMENT AND MEASUREMENT SYSTEMS and, in particular, the development and manufacturing of gas measuring devices, vacuum bake out ovens and thermal vacuum chambers. The employees of our company, which was founded in 2017, enrich their daily work with their many years of experiences in the areas of out-gassing measurement, parts cleanliness and vacuum technology.

TREAMS for Aerospace

In contrast to many other industries, molecular contamination and bake out of components for dry cleaning and component testing have long played an important role in aerospace:

- ▶ The ECSS standards recommend residual gas analyzes and/or TQCM measurements to detect such molecular contaminant.
- ▶ Baking under vacuum is required to optimize the fine and ultra-fine cleaning of components and to release the last traces of the organics under the simultaneous influence of vacuum and temperature from the surfaces.
- ▶ Thermal vacuum chambers are used to expose components to ambient conditions in space for the parameters pressure and temperature to test and qualify them.

With the help of the TREAMS systems, you carry out the above-described analyzes and processing procedures close to the process. In addition, our systems can be integrated into MES systems and are operated fully automatically and very intuitively.

What are molecular contaminants?

Molecular contamination

Proper parts cleaning is becoming more and more relevant for many fields of industry. The verification of the cleaning result as well as the efficiency of cleaning are increasingly relevant. Whereas generally applicable methods for the detection of particular contamination have been established for some time, no adequate methods have existed for film - type contaminants so far.

What are molecular contaminants?

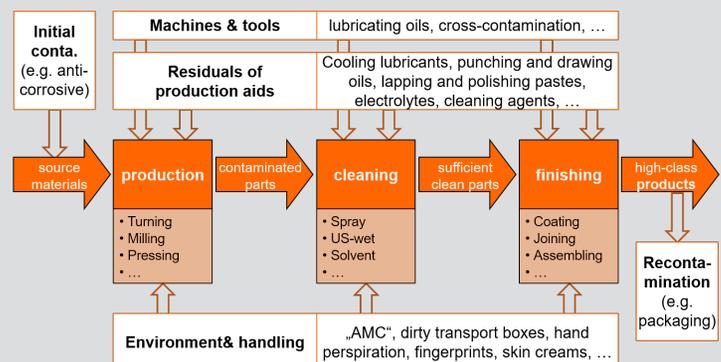
Molecular contaminants are thin, continuous (non-particular) films of undesirable, external substances partially or completely covering parts surfaces.

Origin and examples of molecular contaminants:

By means of a standardised process chain, we have listed possible sources of contamination, which should not be underestimated. Parts can get contaminated all along the process chain, starting from the goods receipt to production, cleaning and finishing to the shipping of goods and the selection of packaging.

What are the consequences of film-type contaminants?:

- ▶ Coating defects: functional and optical defects
- ▶ Contamination carried over into sensitive areas
- ▶ Faulty joining processes
- ▶ Influences due to outgassing in vacuum environments
- ▶ Deposits on optics: scattering and undesirable chemical reactions
- ▶ Electrical discharges or arcing in high voltage equipment
- ▶ Noise on electrical contacts
- ▶ Influencing the results when measuring temperatures on surfaces
- ▶ deterioration of the thermal conductivity



ARGAT® – Automatic Residual Gas Analysis Tool



ARGAT® is a measuring device for residual gas analysis under vacuum. It fully-automatically determines outgassing rates of individual components and complete assemblies. As a result of the automatic spectral measurement, residual gas compositions can be determined directly and gas contributions can be clearly assigned to their sources. Furthermore, ARGAT® provides absolute and comparable measured values of the outgassing rates in $\text{mbar} \cdot \text{l/s/cm}^2$, which enables the determination of appropriate test values.

- ▶ ARGAT® provides quantitative results ($\text{mbar} \cdot \text{l/s/cm}^2$)
- ▶ ARGAT® is easy to operate and works fully automatically after loading
- ▶ ARGAT® directly prepares a detailed test report for you
- ▶ ARGAT® offers the possibility to determine limit values and to use these as basis for comparison
- ▶ ARGAT® has a database option, which enables an automatic material detection

VOBOS – Vacuum Bake Out Oven for Dry Cleaning

VOBOS is the vacuum oven range for baking out parts and assemblies developed by TREAMS. Because of temperature dependence of the desorption and diffusion rates of all materials, cleanliness and outgassing rates are improved by heating parts. Therefore VOBOS systems are suitable to complete precision and ultra fine cleaning systems.

Custom configuration

The modular design of the vacuum furnaces is the basis for efficient and intelligent solutions and guarantors of economic efficiency. Depending on the configuration acc. to the options listed below, temperatures up to 450° C and a vacuum range down to deep high vacuum is feasible. Together with the various control packages we are able to offer a wide range of VOBOS systems starting from simple and fast processing to complex heating tasks with different types of process sequences. The TREAMS company is pleased to assist with the optimal design of heating processes. The systems can also be equipped with a TQCM sensor.

- ▶ VOBOS has a modular design and can be designed according to customer requirements
- ▶ VOBOS provides intelligent solutions for an efficient design of the entire temperature control cycle
- ▶ VOBOS is equipped with flexibly insertable heating plates depending on the component size, therefore, the usable space can be modified
- ▶ VOBOS allows the establishment of product-specific heating programmes
- ▶ VOBOS can optionally be equipped with an integrated mass spectrometer and/or a TQCM sensor for the testing of the component outgassing rates

HeVACool – Thermal vacuum chamber

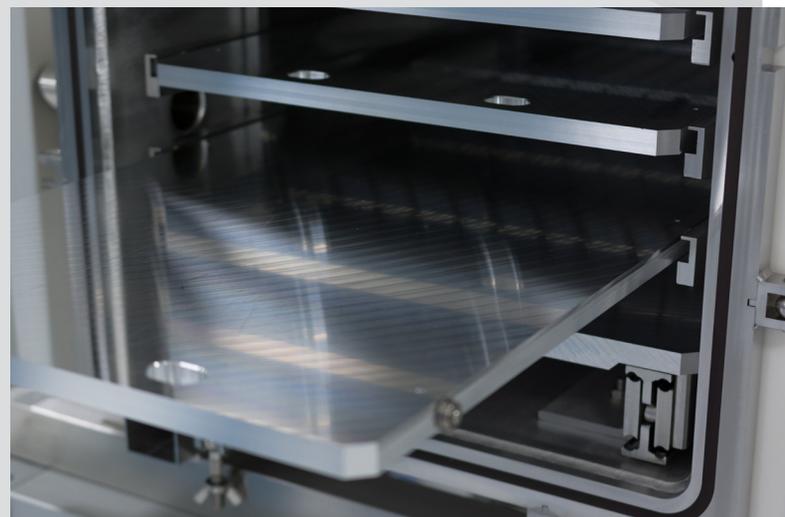


HeVACool systems are mainly used in the aerospace industry and simulate controlled the environmental parameters pressure and temperature of space. Materials, components and assemblies can be qualified and tested for their suitability.

The HeVACool systems by TREAMS, with their modular configuration, are oriented towards the process specifications and the given component characteristics of the customer. In addition to temperature ranges from -120°C to 400°C , the heating and cooling system guarantees efficient ramps and hold times, while the intuitive control ensures simple and automated operation. As with the VOBOS series, the HeVACool systems can be equipped with a residual gas analysis unit and a TQCM sensor in order to evaluate the effect of temperature and negative pressure on the components outgassing rates.

Application-related configuration

- ▶ HeVACool guarantees optimal product temperature control through the integrated heating system
- ▶ HeVACool convinces with fully automatic process control
- ▶ HeVACool can be easily integrated into MES systems
- ▶ HeVACool has a modular structure for optimum performance tailored to the customer process
- ▶ HeVACool can optionally be equipped with a mass spectrometer or TQCM



VIDAM® – Cleanliness Measurement Device for Molecular Contaminants



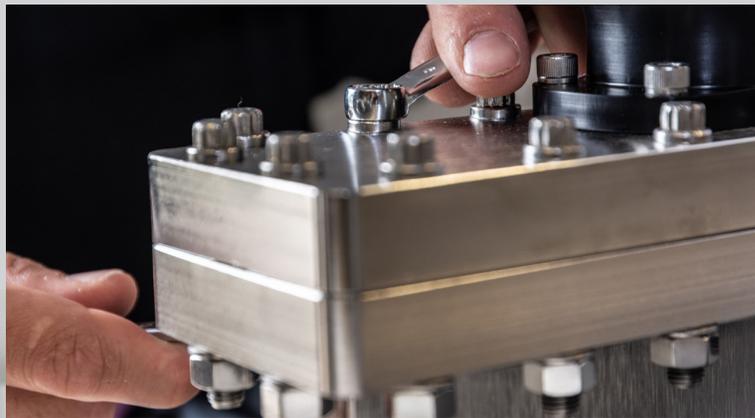
VIDAM® is a cleanliness measuring device which determines chemical-film-type contaminants of the entire product surface by vacuum induced desorption. Single components as well as assemblies can be analyzed – non-destructively and fully automated. As a result of spectral measurement, contaminants can be clearly identified and assigned to their causes. Furthermore, VIDAM® provides absolute and quantitative values in gram per surface or component, which enables the establishing of appropriate evaluation limits.

- ▶ VIDAM® provides quantitative results in g/cm^2 using a patented process
- ▶ VIDAM® allows direct further processing of your components thanks to non-destructive testing
- ▶ VIDAM® is very easy to operate and works fully automatically
- ▶ VIDAM® offers the possibility to determine limit values and to use these as basis for comparison
- ▶ VIDAM® provides qualitative results. The cause of contaminations can be identified via a database option



Service, Maintenance and Repair

Due to the many years of experience in the assembly and maintenance of vacuum systems and attached components, we are also able to perform service and maintenance works for your systems. In addition, we also offer repairs for vacuum pumps and quadrupole mass spectrometers:



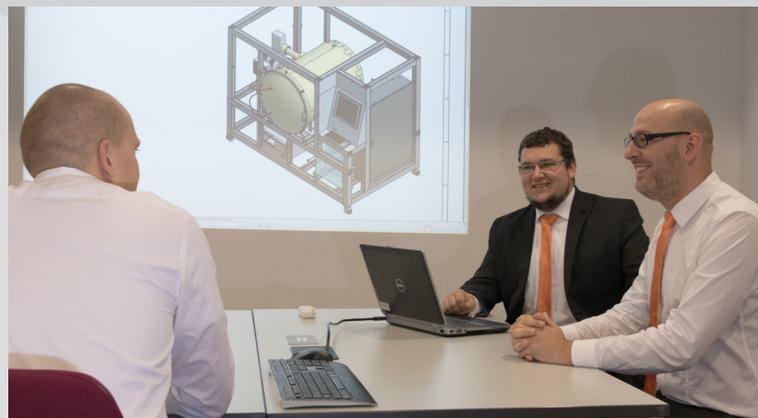
Service, Maintenance and Repair for:

- ▶ Vacuum pumps (e.g. rotary vane pumps, turbo molecular pumps or scroll pumps) independent of size, model and manufacturer
- ▶ Vacuum system for the areas HV, UHV, XHV and UCV
- ▶ Quadrupole mass spectrometers independent of the manufacturer



Use our experience if you need a reliable service provider for the maintenance of your pumps, systems and QMS devices and feel free to contact us. We will be happy to ensure a reliable operation of your systems.

If your system or pump causes problems, you are welcome to use our phone support. In case of vacuum system developed by TREAMS, it is also possible to solve problems easily and efficiently via remote access.



For the quality, the growth and the reputation of a company, it is very important that the employees work at an optimal level of knowledge in their respective divisions. This is the basic prerequisite for mastering challenges and for ensuring motivation, process reliability and high quality of work. In the area of vacuum technology, component cleanliness and cleaning, we are the right partner for you, in order to bring your personnel to this level.

Our experts will gladly perform trainings from our sound and tested portfolio at your company or also at our company. The contents can be specified from the fundamental knowledge area or from the expert level according to the selection of participants.

- ▶ Fundamental knowledge of vacuum technology
- ▶ Cleaning processes
- ▶ Handling of parts in clean room area
- ▶ Cleaning friendly design
- ▶ Vacuum hygiene

TREAMS

