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Case study – From "hit" to drug

- Support in drug development
- Automated high-throughput screening
- Acoustic dispensing process
- Vacuum technology for uninterrupted operation



Constant and reliable vacuum for high-throughput screening

Constant and reliable vacuum for high-throughput screening



Acoustic dispenser enables sample preparation accurate to nanoliters. (Source: Assay.Works)

It takes years from the discovery of suitable substances to the approval of a drug. The contract research organization Assay.Works provides support in the early phases of drug development – from discovery to preclinical studies. It offers national and international clients from the pharmaceutical and biotech industries unique services such as rapid and automated high-throughput screening. This is used to screen hundreds of thousands of molecules until an identified "hit" can later lead to an approved drug. Vacuum technology from VACUUBRAND makes a significant contribution to uninterrupted operation during this important process.

Assay.Works has been working with VACUUBRAND for many years. Various diaphragm pumps and complete pumping units are used:

- On the vacuum network for aspirating cell cultures
- On the vacuum network for degassing cell cultures
- At the acoustic contactless dispenser

For Assay.Works, in addition to first-class products, holistic support from the manufacturer is also important. That is why the company also uses the wide range of services offered by VACUUBRAND, including maintenance of the vacuum equipment.

Support for drug research

Assay.Works supports drug research as a contract research organization (CRO). Especially for small and medium-sized companies in the pharmaceutical and biotech industry, this can mean an enormous expenditure of time and money for equipment and know-how. That is why Assay.Works, as a professional service provider based in the BioPark Regensburg, takes on the development of custom-fit and scalable test systems (assays) and cell lines as well as procedures for the bioactivity determination of new chemicals and biological agents.

"We offer unique services to our national and international customers from the pharmaceutical and biotech industries. One of our focal points is fast and automated high-throughput screening," says Dr. Ralf Schwandner, founder of Assay.Works. For this purpose, the company provides special equipment, extensive molecule libraries and screening cell lines.

It is a great advantage that Assay.Works developed from an existing HTS center and is thus a specialist in its field. This means that customers benefit from over 20 years of experience. Assay.Works' service significantly accelerates the clients' research programs.

High-throughput screening can be used for numerous indications:

- Inflammatory diseases (e.g. meningitis)
- Oncological diseases (e.g. cancer)
- Neurodegenerative diseases (e.g. Alzheimer's)
- Metabolic diseases (e.g. diabetes)

High-throughput screening

The HTS method (High-Throughput Screening) is an automated mass test. Scientists select various substances from large collections, so-called "libraries". They perform biochemical, genetic or pharmacological tests on thousands of these substances or "compounds". The reaction vessels are microtiter plates with so-called "wells" that hold only a few thousandths of a milliliter of liquid each. A color reaction (fluorescent, luminescent or photometric) indicates when a substance interferes with the "target" protein of a disease, and exerts a desired effect. This substance is therefore referred to as a "hit". If this substance can be further optimized using medicinal chemistry, it becomes the "lead" structure. This has the potential to become a suitable active agent for the disease.

State-of-the-art acoustic dispensing system for sample preparation



Acoustic dispenser enables sample preparation accurate to nanoliters. (Source: Assay.Works)

Assay.Works places great emphasis on advanced equipment and methods, with laboratory automation an important aspect. For this reason, a state-of-the-art device is used for the sample preparation of chemical molecules for a high-throughput screen: the "acoustic" dispenser. Thanks to ultrasound, this enables the transfer of liquids completely contact-free. The molecular solution thus enters the cell solution with high precision, quickly and without contamination. The transfer takes place from a minimum dispensing volume of 2.5 nanoliters – with droplet precision and even against gravity.

In total, Assay.Works' high-throughput screening takes place an impressive 150,000 experiments – which means several million measured values. For one customer, the system is busy searching for "hits" around the clock for several weeks.

How does the process work in concrete terms?

- The Assay.Works compound library includes approximately 150,000 molecules or 500 storage microtiter plates, several copies of which are stored in a walk-in freezer at -20°C .
- From these storage plates (molecular solution), a tiny drop is transferred to the actual target plate (cell solution) for the screening.
- To do this, a transducer focuses ultrasonic acoustic energy onto the storage plate to eject a tiny droplet. This is transferred by the sound wave precisely and against the force of gravity to the target plate hanging above.
- Incidentally, a separate experiment can take place in each of the 384 wells of a target plate. This parallelization of experiments tests the effectiveness of many substances.
- A separate barcode on each individual plate provides a better overview. In this way, a laser scanner can look up at any time via a database server which substance is currently located where.

Vacuum for uninterrupted operation

The acoustic dispensing system at Assay.Works is central to drug discovery. A reliable vacuum supply is essential for its uninterrupted operation: A PC 3012 NT VARIO select vacuum pumping unit from VACUUBRAND is responsible for recirculating the coupling fluid of the transducer and constantly frees the microtiter plate from excess water film. Otherwise, the dispensing system would eventually flood and the automatic process would stop. A shutdown of the equipment would then result in a large loss of sample material and working time. *"With non-contact, acoustic dispensing, the key is to have a vacuum supply 24 hours a day, 7 days a week. We need constant vacuum for weeks and months,"* explains Dr. Schwandner.

For continuous operation, the dispensing system must be in optimal condition. Professional maintenance of the vacuum equipment is also a contributor. *"Service plays a very big role for us. We generally use a lot of "customized", i.e. individually built, equipment. That's why it's important to have a reliable service provider. This service provider must have the necessary know-how and also be on site promptly. We know that our service technicians have an eye for the right vacuum settings and performance. That's why we've been working closely with VACUUBRAND for 20 years,"* says Dr. Schwandner.

VACUUBRAND takes over the entire maintenance of the vacuum technology. This also includes the regular, preventive replacement of wear parts. This ensures that the vacuum equipment, as important process components, retains its performance data. The customized service concept with continuous maintenance thus makes a significant contribution to process reliability. Edgar Englert, Service Manager at VACUUBRAND, explains: *"Customer satisfaction is our top priority. As service technicians, we also need process knowledge about the plant, for example, in order to be able to advise on suitable vacuum technology. We have this knowledge through years of experience. We are pleased to be able to support our customers like Assay.Works in their daily work through first-class products and comprehensive service."*

The clients also benefit from Assay.Works' high-quality standards for vacuum equipment service. They receive a high-throughput screen in a fast and uncomplicated way. This is an important step on the long road to drug development.

[Get to know VACUUBRAND's service](#)



Vacuum pumping unit from VACUUBRAND for uninterrupted operation

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VACUUBRAND®

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With 280 highly motivated and qualified employees, we manufacture the world's most comprehensive product family for vacuum generation, measurement and control for the rough and fine vacuum range in the laboratory.

All with one goal:

Enabling our customers to run reliable, safe and efficient processes. This is why we commit ourselves to continuous innovation, first-class performance, and outstanding quality.

Engineering excellence is central to our ability to deliver products and solutions renowned for their quality, durability, and reliability. Innovative technology, high quality materials and extensive testing deliver unmatched performance - engineered and manufactured in Germany.

Together with you, our experts will find the best solution for your application and provide you with first-class service along the way.



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