# Case Study

## Final cleaning process for lens systems for medical endoscopes

**Quality assurance by monitoring ultrasound frequency and power**

**The requirements for product safety and quality management are stricter in the medical industry than in almost any other. A leading manufacturer of medical endoscopy solutions ensures that the requirements for the final cleaning of coated precision optics are met using the modular UCMSmartLine ultrasonic multi-stage immersion system combined with a customized service concept. This includes regular monitoring of the ultrasound power and frequency with the innovative Acoustic Performance Measurement (APM) system from Ecoclean, which enables contact-free and reproducible measurements.**

Olympus Surgical Technologies Europe in Hamburg is the Olympus Group's European development and manufacturing center for medical technology. The company stands for top performance in diagnostics, therapy, processing and system integration and covers the entire range of state-of-the-art endoscopic applications, from products to procedure-oriented system solutions. In the manufacture of around 3,500 different medical products, great importance is attached to vertical integration, beginning with the machining of the blanks and ending with the packaging of the finished products. This calls for precision in the micrometer range and demands a wide variety of production systems that must be individually tailored to the respective products. One of these is a system for the final cleaning of coated precision optics with a diameter of under two to ten millimeters and a length of between 1.5 and 40 millimeters. The optics are used in endoscopes and must meet the highest cleanliness requirements.

### Modular ultrasonic multi-stage immersion system ensures cleanliness

For this challenging task, Olympus Surgical Technologies Europe opted for an ultrasonic multi-stage immersion system from the UCMSmartLine series manufactured by Swiss company UCM AG, the division of the SBS Ecoclean Group that specializes in ultra-fine and precision cleaning. The cost-efficient system is based on standardized modules for cleaning, rinsing, and drying as

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well as loading and unloading. The goods are transported by an integrated automated system, complete with servo drive, which comes as standard. The electrical and control technology is integrated into each unit, dispensing with the need for extra space for a control cabinet. Thanks to the flexible modular principle, systems for pre-cleaning and intermediate cleaning as well as for final cleaning applications with the highest cleanliness standards can be easily configured to suit requirements.

The system supplied to Olympus Surgical Technologies Europe has a total of six wet stations with tanks sized 370 x 420 x 390 mm (L x W x H), with four of these being equipped with ultrasound. Two additional stations are integrated for drying with hot air. The standard automated transport system for advancing parts inside the fully enclosed cleaning system is fitted with a servo drive. An additional roll-over unit allows the product carriers to oscillate vertically. Depending on the process station - cleaning, rinsing, drying - speeds range from 200 to 1,500 rpm. HEPA filters and two laminar flow boxes above the drying station and the unloading station, which is designed to hold four product carriers, guarantee cleanroom-compliant environmental conditions. After final cleaning, the parts are discharged into a cleanroom.

Integrated modern sensor technology, including sensors for monitoring temperature and pressure as well as other measured variables such as conductivity, ensure that all relevant process parameters are seamlessly recorded, monitored and documented, thus meeting the stringent requirements governing quality management in the medical industry.

**Regular monitoring of ultrasonic power and frequency with APM**

As ultrasonic power and frequency have a significant impact on the cleaning effect, the company decided to have Ecoclean check these key process parameters for correct functioning once a year as part of a service agreement. The check is carried out by trained and competent field service personnel from the machine manufacturer with a portable version of the Acoustic Performance Measurement (APM) system developed by Ecoclean. The APM system offers various advantages over the test foils and hydrophones normally used for these measurements. For example, deviations cannot be detected with sufficient accuracy using test foils. With hydrophones, the sensor must be immersed in the media of each bath. As the immersion depth can vary, measurement results are not reproducible. There is also a risk of contamination being introduced into the baths. In contrast, the APM system works contact-free and without movement, thus



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enabling reproducible measurements. The values determined for the practically new ultrasonic units during the Site Acceptance Test (SAT) - using the directional microphone specially modified for this application - will serve as the benchmark for these measurements. The values are measured individually in each ultrasonic tank, thus providing a detailed, meaningful data basis. For the control measurement, the directional microphone is aligned with the respective ultrasonic tank using a mount and records the frequency and pressure level. During analysis and evaluation by the software, the measured values are compared with the target parameters defined as reference values for the respective treatment station. All measurements are documented in reports in PDF file format for seamless verification, and a certificate is issued to confirm the perfect functioning of the ultrasonic system. This also applies to other system components such as sensors for recording the temperature, detergent concentration and pressures, the proper functioning of which is also checked during the annual service visit.

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Pictures:


Ultrasonic power and frequency have a decisive impact on the cleaning effect. These process parameters are therefore checked for correct functioning once a year as part of a service agreement with a portable version of the APM system.



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In contrast to hydrophones, the APM system is contact-free and involves no movement, thus enabling reproducible measurements. For the check measurement, the directional microphone is aimed at the respective ultrasonic tank using a mount to record the frequency and pressure level.

The values of the practically new ultrasonic units as determined for each individual ultrasonic tank during the Site Acceptance Test (SAT), serve as a benchmark for the recurring checks.

During analysis and evaluation by the software, the measured values are compared with the target parameters defined as reference values for the respective treatment station, in this case the bottom-mounted ultrasonic transducer.

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*The SBS Ecoclean Group develops, produces, and markets forward-looking machinery, systems and services for industrial parts cleaning and surface processing, as well as customized automation solutions. Another area of activity is the development and series production of efficient alkaline electrolysis systems for the decentralized production of green hydrogen. Innovation is driven by the two competence centers in Germany, which support the global Group companies with technical expertise, research, and pioneering developments. The world's leading parts cleaning solutions help companies around the globe in a wide range of industries, such as mechanical engineering, the semiconductor supply industry, precision optics, medical technology, the automotive industry, and its suppliers, microtechnology and precision engineering, aerospace, cutting tools, and fasteners, to produce efficiently and sustainably at high quality levels. Ecoclean's success is based on innovation, cutting-edge technology, sustainability, being close to our customers, diversity, and respect. The Group of companies unites the Ecoclean, UCM and Mhitraa brands. It has eleven locations in Germany and eight other countries worldwide and employs a workforce of around 900.*

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