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Reliable Drying and Energy Saving

An aged passivation line for medical implants and instruments was replaced by an up-to-date one. A view of the cleaning, passivation, rinsing and drying operations under quality, throughput and energy aspects.

An internationally operating company is a supplier to premium customers in the healthcare, optical and electronics business worldwide. A site in Switzerland produces mainly surgical instruments and implants. Biomaterials for use in the human body and the surgical instruments to insert them must meet high standards. Stainless steel alloys used in medical engineering must be resistant to corrosion by any ambient body fluid or tissue. The purpose of passivation is to restore the natural protective passive layer of stainless steel that is contaminated or deteriorated by machining to produce implants or medical instruments.

Low Temperature Cleaning and Drying to Meet Requirements

Perfect cleaning and complete drying are requisite for passivating or electropolishing these metallic components. Also, the operator wanted to get rid of drying at 120 °C in order to save energy and to have parts ready for immediate further processing. So, they brought in their established technology partners KKS Ultraschall AG and Harter GmbH whose joint solution met all requirements. KKS is specialised in ultrasonic cleaning facilities and in chemical and electrochemical surface treatment of metals. Drying system manufacturer Harter is specialised in heat pump drying and furnishes low energy and low carbon solutions.

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Appropriate cleaning and complete drying are requisite for passivating metallic components for implants and instruments.

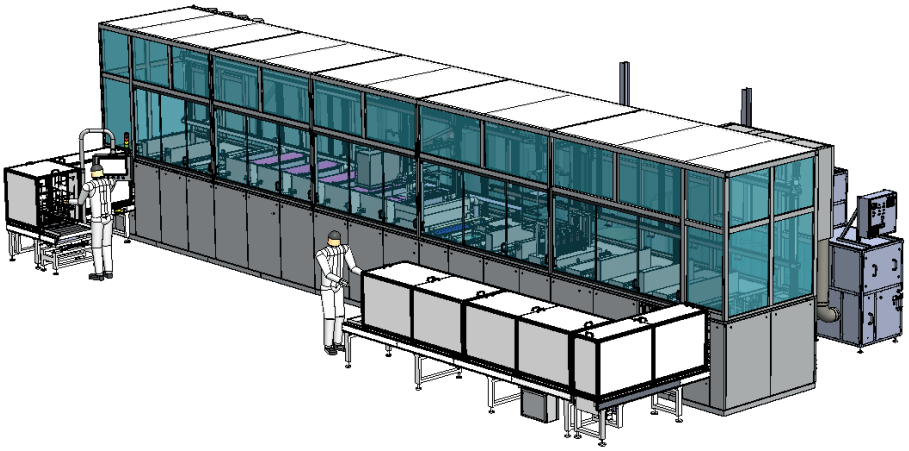
Complex Geometries and Material Combinations

The surgical instruments and implants have largely different sizes and geometries. The same line is used to process individual and bulk parts tending to be made from material combinations of metal, plastic and carbon. The manufacturer of the facility was responsible for meeting all processing challenges to ensure reliable and reproducible cleaning. The final customer knew from experience about the importance of drying, which is up to becoming a bottleneck in the sequence of operations unless addressed by the operator in time. Before, they had a hot air system in operation which required time and space to cool off the parts. This situation entailed a lot of effort and cost. They wanted a low temperature drying system to considerably reduce energy consumption and the processing period, and to save storage space.

Complete Drying at 45 °C

The new automatic cleaning and passivation line consists of a loading and

unloading station, 13 pans and several ancillary components. One processed and dried product rack is unloaded every six to ten minutes. Drying follows after the final cleaning operation. All parts are rendered completely dry at 45 °C within the specified cycle time irrespective of the type of part being dried. The drying station design ensures unagitated drying of any part geometry. The drying system manufacturer does not want to disclose engineering details for knowhow protection. Following drying, the processed parts are automatically discharged from the unloading station. Due to the low temperatures used staff may immediately handle the parts and submit them to the next operation – e.g. quality control and packaging. The facility is used in two and three shift operation.



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The combined use of ultrasonic cleaning technology and heat pump drying provides an efficient and energy-saving solution for cleaning and passivating implants and surgical instruments.

Cost Saved by Drying with a Heat Pump

The drying technique used is capable of dehumidifying items at a defined temperature in a closed air circuit. This has several benefits. The heat pump technology integrated in all dryers is efficient saving energy and carbon emission. This is why it has been eligible for government subsidy in various countries since 2017. Low temperatures are easy on the sensitive parts as well as on the staff, machinery and production areas. Cooling zones are no longer required. A closed air system implies exhaust air-free drying which results in independence from changes in climate or the seasons. The reproducible processes provide maximum reliability. Cost savings by heat pump dryers are high. The rated power of the drying station in this project is only 11.3 kW.//

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