

Automatically Removing the Ergonomic Risk

Based in Muskegon, MI, Johnson Technology, Inc., a subsidiary of GE Aviation, is the leading manufacturer of aircraft engines and engine parts; such as: blades, vanes, turbines and hangers for the aerospace and power generation industries. In the late 90s, Johnson sought SIFCO ASC for their selective plating expertise and solutions for Johnson's selective plating needs.

The SIFCO Process® is a specific, proprietary selective plating process from SIFCO Applied Surface Concepts (ASC), part of Norman Hay plc and an acknowledged global leader in selective electroplating, anodizing, chemical solutions and equipment. The SIFCO Process® is portable, and allows the operator to plate a very specific area of a component, quickly and easily, on site (and often in situ) and to the required thickness. For Johnson Technology, Inc. it is the perfect solution to their difficult problem.

THE CHALLENGE

A uniform application of SIFCO Process® solution AeroNikl® 250 Sulfamate Nickel is needed on the irregular-shaped face of the turbine castings in order to improve the brazing process. Due to the environmental health and safety issues and ergonomic risks, Johnson wanted to remove the chemicals and plating operation from their facility. By outsourcing their plating needs to the experts at SIFCO ASC, this allowed Johnson to focus on their core business objectives, remaining the leading manufacturer in the aerospace and power generation industries.

Once in house, SIFCO ASC dedicated space in their job shop for a custom workstation to effectively plate the turbine castings. Traditionally, the SIFCO Process® involves using the dip method – taking an electrically charged anode, soaking it in a solution and rubbing it on the masked-off area of a component. But due to the unique shape of the turbine casting, SIFCO ASC developed a successful system of taking the part to the solution.

CUSTOMER

Johnson Technology, Inc.

LOCATION

Muskegon, Michigan, USA

CHALLENGE

Remove ergonomic and environmental risk from plating operation.

SOLUTION

Development of a fully-automated robotic workstation

RESULTS

Reduction in plating process time by 50%

US Headquarters

5708 E Schaaf Road
Independence, Ohio 44131, USA

T +1 800 765 4131

+1 216 524 0099

F +1 216 524 6331

E info@sifcoasc.com

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THE CHALLENGE CON'T

As with many selective plating applications, this was a manual process requiring a technician to handle each part individually – creating an ergonomic risk. Each part takes approximate 7.5 minutes to plate from start to finish. With 48 parts to plate per day, a technician could expect to spend 6 working hours at the workstation each day. Due to the constant movement needed for an effective plating application, technicians were exposed to persistent stress on not only their upper extremities, but their neck, upper and lower back, and lower extremities due to the long hours of standing. Beyond the ergonomic factors, the workstation incorporated no mechanical tool handling to hold the turbine castings.

THE SOLUTION

While the solution to Johnson's need was the expertise of SIFCO ASC, SIFCO's solution to the ergonomic risk came in the form of a fully-automated system. Engineers at SIFCO ASC designed a turnkey robotic plating system to perform the functions of the technician.

SIFCO ASC is no stranger to designing customized, automated plating systems. In the first phase of process improvements, systems were developed to automate the plating process through programmable power packs; requiring the technician to monitor and change the tooling, solutions, and other aspects of the SIFCO Process® for each component. As technologies improved, SIFCO ASC has been able to pair the automated plating process with an automated tool handling system. SIFCO is now designing systems that are fully-automated with minimal need for technician intervention. Various pumps, flow systems, cleaning agents, work together to change, catch, and circulate solution; while a robotic arm holds, oscillates, and changes the anodes needed throughout the entire plating operation. But as stated before, due to the unique design of the Johnson turbine casting, the component is plated most effectively by bringing it to the anode; instead of vice versa.

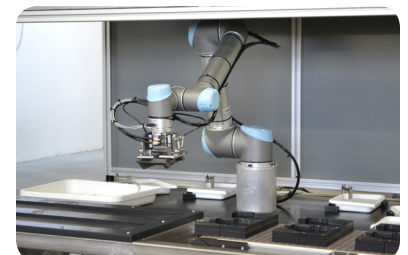
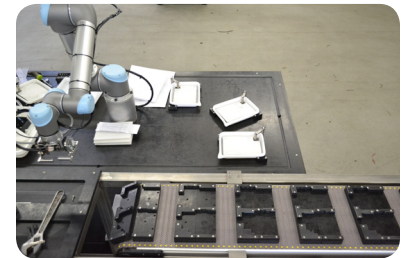
SIFCO ASC designed a system that does just that. A robotic arm holds the turbine casting, carefully bringing it to the solution and anode, oscillating at the optimum anode-to-cathode speed, rinsing and then continuing the SIFCO Process® until the part is complete.

TRACKING THE RESULTS

Automating the plating process for Johnson's turbine castings has proven to be extremely successful. Not only has the ergonomic risk to the technicians been significantly reduced, component plating process time has also been reduced by 50% - increasing the available capacity.

Additionally, by automating the process using a programmable logic controller, technicians can review data captured through the human-machine interface to determine if the operation was completed within tolerance - effectively improving CPK values. If any errors occur, or quality standards are not met, technicians can review the data and trace the error to its source and assign the appropriate corrective action, preventing the errors being repeated.

For more information on the SIFCO Process®, visit: www.sifcoasc.com.



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