

Development of an inline cleaning system

Graduate



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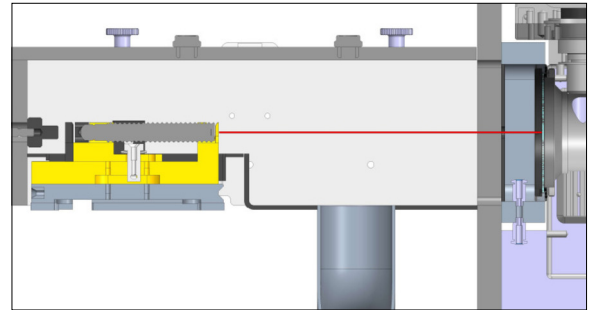
Initial Situation: SFS Group Schweiz AG manufactures ball screw drives (BSC) for the automotive industry. The nut and spindle of the BSC are required in large quantities and are manufactured automatically on rotary transfer machines. Every six seconds, the components are removed from the rotary transfer machines, cleaned and labeled with a Data Matrix Code (DMC). Inside a closed chamber, a laser inserts the DMC into the components. Over time, cutting oil from the rotary transfer machine is deposited in the discharge and laser station. An integrated exhaust system in the chamber extracts sparks and contaminants, but at the same time nebulizes the entrained cutting oil. Fine oil droplets are deposited on the laser lens, forming runners and reducing the quality of the lasered DMC. This leads to massive rejects, as the DMC no longer meets the required quality standards. The laser lens must therefore be cleaned very thoroughly every day, by hand, by the personnel. Incorrect cleaning leads to further rejects.

Objective: By analyzing and optimizing the laser stations and their peripherals, the problem of DMC quality degradation is to be solved. The aim of the work is to optimize the laser chambers and the flows within them in such a way that the cutting oil no longer has any influence on the quality of the DMC. The contamination of the laser lens and the associated reduction in the quality of the DMC must be greatly reduced. The cleaning interval is to be maximized. These goals are to be achieved by a combination of test setups and a flow simulation.

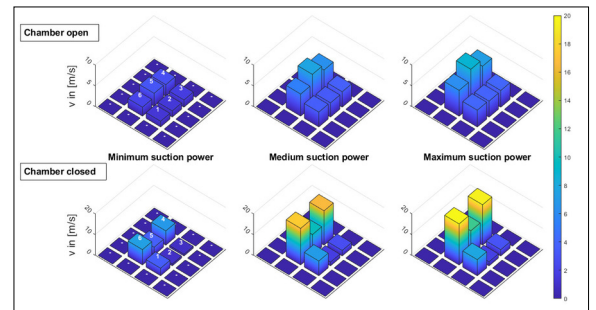
Result: Two optimized laser chambers were developed in which the flow in the chamber no longer fogs the cutting oil and the laser lens remains free of contamination. One of the two test setups could be

modified and the concept successfully verified. The concept has already been adapted for the second test setup.

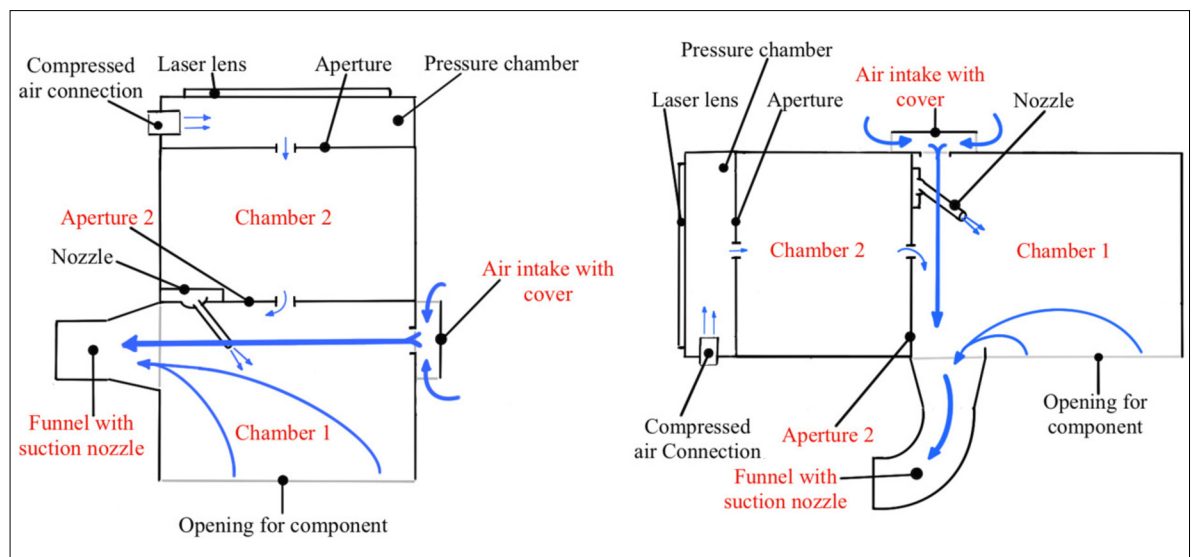
Initial situation: Cross-section through laser chamber for component spindle. (Laser beam: marked red)
Own presentation



Initial situation: Flow velocities in the laser station spindle
Own presentation



Schematic illustration of the optimized laser chambers for the component nut on the left and spindle on the right
Own presentation



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Subject Area
Mechanical
Engineering

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