



June 13, 2016

Busch LLC
516 Viking Drive
Virginia Beach, VA 23452
Visit us at www.buschusa.com

HJS Emission Technology GmbH & Co. KG

Reliable Heat Treatment with the Correct Choice of Vacuum Technology

Vacuum technology is an essential part of heat treatment processes. It is an important factor in achieving quality objectives, and helps heat treatment processes run reliably and economically. HJS Emission Technology decided to use Busch dry-running COBRA screw technology for its sintering process, and after more than six years of operation, is now sure that this was the correct choice.

HJS Emission Technology is based in Menden, Germany. The company develops and produces modular exhaust converter systems to reduce internal combustion engine emissions. This innovative and environmentally-friendly technology reduces exhaust particulates and nitrogen oxides dramatically, and is used for diesel engines in cars, trucks and non-road applications.

HJS emissions control devices are included as standard equipment for new engines and may also be retrofitted to older vehicles and installations. The company has developed a particulate filter made of sintered metal that forms the core of its emissions control devices. The raw material for the filters is an expanded metal mesh with a metal powder coating. Both materials are heat resistant and non-oxidising, and are fused together by sintering to form a thin and porous metal foil. SMF[®] particulate filters are manufactured by stamping, folding and welding this foil. The process starts with a sheet of austenitic stainless steel, which is expanded to form a mesh. The mesh is coated with a mixture of high-alloy steel powder and bonding agent, then sintered in a horizontal oven to fuse the materials together. Before the sintering process, the oven is evacuated by a two-stage Roots/screw combination

vacuum pump to 10^{-2} mbar, then flushed with inert gas. The oven is then heated to 2,012°F and the 12-hour sintering process is carried out.

When SMF[®] particulate filters were first produced, the behavior of the new materials during sintering was largely unknown. The vacuum for the oven was originally generated by a Roots vacuum pump (booster) with an oil-lubricated rotary vane vacuum pump as a backing pump. During production, it was discovered that dust and organic material were accumulating in the vacuum pump oil. These deposits caused accelerated wear of the rotary vanes, and the required vacuum of 10^{-2} mbar could no longer be reached. The contaminants also had an adverse effect on the pump bearings, which were subjected to increased wear. To conduct the sintering process reliably, the vacuum pump oil had to be changed every two weeks. This resulted in increased costs for production downtime and the purchase and disposal of synthetic oil.

After consultation with the oven manufacturers, the HJS research and development manager, Simon Steigert, decided to replace the oil-lubricated rotary vane vacuum pump with dry vacuum technology. Busch vacuum specialists recommended a COBRA screw vacuum pump, which was then installed. As a precaution, a flushing mechanism was fitted to allow the vacuum pump to be cleaned at the end of the sintering process. A detailed examination of the COBRA screw vacuum pump after 2,500 operational hours showed that no deposits had accumulated, even though the flushing mechanism had not been used.

The system has now been in service for 16,000 hours over six years, and Steigert is certain, “The decision to use a Busch COBRA screw vacuum pump was absolutely correct.” During six years of operation, the only maintenance has been a service every 6,000 hours. The flushing mechanism fitted as a precaution was never used. The vacuum pump is flushed by hand as part of the service, an almost negligible task compared to the oil changes every two weeks of the original rotary vane vacuum pump.

For more information, visit: <http://www.buschvacuum.com/us/en/products/cobra+industry>.