

GXS INTELLIGENT DRY VACUUM PUMP AT SANDVIK

edwardsvacuum.com

The high-tech & global engineering group Sandvik Coromant AB increases their production efficiency while minimizing carbon footprint and waste generation by using advanced dry vacuum technology.

Sandvik AB is a Swedish multinational engineering company specializing in metal cutting, digital and additive manufacturing, mining and construction, stainless and special steel alloys, and industrial heating. The company was founded in Sweden in 1862.

Sintering is a heat treatment applied to a powder compact in order to impart strength and integrity. The temperature used for sintering is below the melting point of the major constituent of the powder metallurgy material. Powder metallurgy (PM) techniques offer the possibility of near net-shape production of components with complicated geometries without subsequent machining. Almost 100% usage of the material is achieved, resulting in little or no scrap. As a consequence, the energy required per kg of finished parts is less than for other manufacturing processes. Another advantage of PM techniques is that it is possible to use alloy compositions that are not possible with conventional melting and casting.



KEY FACTS

Customer	Sandvik Coromant AB
Edwards Distributor	Advanced Vacuum Distribution AB
Location	Gimo, Sweden
Sector	Metallurgy & Heat Treatment

DRY VACUUM SOLUTION FOR SINTERING – ENABLING A MORE EFFICIENT AND ECONOMICAL PROCESS

1. Process & Challenges

The pressure requirement during the sintering process varies in the range of few mbar. As a binder PEG (polyethylene glycol) was used. Before the actual sintering process could start, the binder needed to be removed. In this particular process hydrogen (H₂) was used for the debinding process. After debinding, the H₂ was flushed out with argon (Ar). Therefore, the vacuum pumps needed to pump out argon during pump down to achieve a minimum pressure in a short period of time. A full sintering process from start to end, includes debinding, flushing, pump down, sintering and cool down.

In the past, Sandvik used multiple vacuum systems consisting of oil-sealed and screw pumps combined with mechanical boosters on their sintering furnaces. Most of the pumps were part of furnaces which were already around for some time. The costs and time spent on maintenance and oil changes were very high. Therefore, Sandvik was looking at alternative solutions to replace the existing pumps.



2. Solution

The Edwards GXS dry screw pump is an intelligent industrial pump with a unique screw technology and class-leading high efficiency drives. This enables advanced pump temperature control and low running costs with long intervals between services.

The intelligent on-board controller gives various indicators such as running mode and fault status, allowing true “plug & pump” capability. It allows for programming with start/stop routines, reduced speed, “green mode” and self-cleaning options.

Advanced Vacuum, the Edwards distributor and approved service provider in Sweden, has been in close contact with Sandvik for more than 15 years. Therefore, with the launch of the GXS about 10 years ago, Sandvik was offered to evaluate the new technology on site. This very same pump has been on site ever since and has been closely monitored by Advanced Vacuum.

Up till now several GXS pumps and pump/booster combinations have been installed.



3. Main Benefits

The size of the previous pump sets was huge compared to the GXS pump. With the GXS pump/booster combinations having a much smaller footprint and height, the new pumps saved a lot of space and were also of less weight. Another benefit is the low noise of the GXS pumps due to their installed silencer. Over time with more and more pumps being exchanged to GXS, improving the overall noise levels in the manufacturing areas.

The GXS pump/booster combinations are very economical. Therefore the power saving Sandvik achieves today with the GXS compared to the previous pumps is substantial. Instead of pre-pumping the chamber through roughing pipes and using throttling valves, the GXS pumps can be speed controlled via the intelligent interface. This way the pump self-adjusts to a pre-programmed pressure setpoint.

As the process created some sticky by-products, the GXS pumps were configured as “MB+” versions. This means, that along with different options to purge the pump during or after the process, the pump is equipped with a solvent flush device. This allows flushing the pump with water or any other solvent when it is needed to remove any process build-up inside the pump. This is done every hundred pump running hours. After each process run Sandvik use an automated purging sequence to clean and dry the pump before shut-off.



Multiple Edwards GXS450/2600 dry screw pump/booster combination installed at the Sandvik site on a sintering furnace.