

CASE STUDY



DRY VACUUM SYSTEMS: BRINGING RELIABLE HIGH VACUUM ON DEMAND TO POLYLACTIC ACID APPLICATION

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A high-tech company located in south eastern China is engaged in the industrialised production of polylactide (PLA) and high-temperature resistant polylactide.

The company is dedicated to developing plastics derived from annually renewable resources, such as corn, cassava and other plants. After fermentation by microorganisms, lactic acid is extracted, then PLA is produced through a process of refining, dehydration polymerization, high temperature pyrolysis and final polymerization. PLA has excellent biodegradable properties. One year after disposal, microorganisms degrade it into carbon dioxide and water, causing no harm to the environment.

PLA is used in 3D print material, food packaging, shrink wrap, rubbish bags, baby wipes and many other uses.



KEY FACTS

Customer	Major PLA Manufacturer
Region	China
Sector	Industrial Vacuum – Fine Chemical

BENEFIT	Utility Savings of up to \$30,000 / ¥ 200,000 System Annually
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DRY VACUUM SYSTEMS

1. CHALLENGE

Vacuum is used to remove water and traces of the process gas during the esterification step of polylactic acid manufacturing - lactide, if condensed, is highly corrosive. The customer above all else requires steady product quality, for which they need a continuous high level of vacuum of <0.5 mbar. In addition they wished to produce less waste water and consume less power than their existing system, a three stage Roots combined with liquid ring pump system.

2. SOLUTION

Following a careful selection process, Edwards was chosen by the customer to supply a GXS 450/4200 dry vacuum system. They were impressed by Edwards' GXS unique tapered discrete variable pitched screw dry vacuum technology, which provides high reliability even in this harsh distillation application. Edwards' application specialists' thorough knowledge and understanding of the customer processes were key in their selection.

3. OUTCOME

The reliability of the GXS operation results in very stable pumping speed, giving a steady product quality for the customer, their key requirement. GXS also has an innovative automated remote control which enables consistent output and a safe operation.

Lactic acid, if allowed to condense with water, is highly corrosive. Edwards' GXS can run with a high internal temperature to keep the gas in the vapour phase while processing. To minimise the risk of cold seizures, solvent flushing of the system (to avoid any trace of process gas condensing in the pump) is used before shutdown or in standby mode. A cold seizure is when a pump fails to restart after stopping and cooling down because of solids build-up.

The customer, following Edwards' recommendations and instructions, has carried out a solvent flush with alcohol whenever shutting down the system, to dissolve any solids build-up. The system has been running for around one and a half years and no seizing has occurred whilst in operation.

Previously, three stage Roots and liquid ring pumps were used on this application. This resulted in waste water costly to discard and high power consumption.

The GXS vacuum technology is totally dry, meaning there is no oil or water to be contaminated or disposed of. Combined with low power and utilities consumption, the low maintenance requirements of the GXS mean it has a low cost of ownership. Payback is quick, with savings of RMB 200,000 (USD 30,000) on just power alone per year. They are very happy customers and are now converts to dry vacuum systems.

