



Korean Container Glass Manufacturer Cuts Emissions and Reaps Production Benefits with Air Products' Oxy-fuel Integrated Solution

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Lee KeunHaeng, Project Manager, Techpack Solutions



New environmental regulations enforced in 2010 meant Techpack Solutions (Techpack), one of the largest container and tableware glass manufacturers in South Korea, needed to find a fast, efficient and reliable means to dramatically cut its nitrogen oxide (NOx) emissions. Converting from air-fuel combustion system to Air Products' oxy-fuel integrated solution successfully reduced its NOx emissions by 90%, easily complying with the South Korean government's new regulations while also yielding gains in the production pull rate and melting efficiency, as well as cutting energy consumption and CO₂ emissions to provide an altogether greener combustion system.

New Rules calling for fast and effective action

On 14 April 2010, South Korea's Low Carbon Green Growth Law came into force. As part of the government's comprehensive climate change and energy policy, it addressed a range of environmental issues including mid and long-term emissions targets. Within the new law, a mid-term target of reducing emissions by 30% against BAU (Business As Usual) levels¹ has been outlined.

As a consequence of this, the highest pollutants emitting companies in South Korea were required to start limiting their emissions in 2012.

South Korean glass manufacturers in particular have been under pressure to implement measures to meet the new emissions targets while improving their productivity and operational performance.

The challenges presented by the new Green Law coupled with increased market demand meant South Korean glass manufacturers needed to find economic and effective solution to allow them to dramatically and quickly reduce the pollutants while enhancing productivity and melting efficiency.

A new strategic direction at Techpack

Founded in the mid-1950s, Techpack is South Korea's leading packaging solution provider and the country's largest manufacturer of glass bottles with 40% share of the local market currently. The company makes a wide variety of

Adjustable oxygen flow control skid is part of the oxy-fuel integrated solution offered to Techpack





Richard Huang, Air Products Asia Industry Manager for Glass, led the Air Products team in implementing oxy-fuel integrated solution for the customer

glass containers used in the food, drink and medical industries. As with many other glass manufacturers, Techpack had been using air-fuel combustion process for its glass melting.

With the advent of the new regulations, Techpack decided to pursue a new strategic approach, making use of an alternative combustion technology that would deliver the emissions cuts.

Partnering for Success

Techpack had been acquainted with Air Products for many years and was aware of the company's leadership and expertise in oxy-fuel combustion technology.

According to Mr. Lee KeunHaeng, Project Manager at Techpack, "Our relationship with Air Products dated back to 2004 when we were first introduced to their oxy-fuel technology. The Air Products team made a strong impression with us in terms of their technical savvy and professional approach, even though we decided not to go for oxy-fuel technology at that time. Therefore, when the need arose we asked them back to tell us more and see if they could help us with our new challenge."

Air Products immediately conducted a detailed site evaluation of the Techpack facility and concluded it was highly suited to a full-scale conversion to oxy-fuel combustion. "And this is where Air Products really impressed us," continues KeunHaeng of Techpack. "Their team understood what we needed, and recognized we had reservations with regards to the benefits of oxy-fuel technology. This was a big decision for Techpack and we wanted to make the right choice from the beginning."

Air Products recommended a phased conversion process. "We understood Techpack's needs and considerations so opted for a step-by-step approach to best suit their situation," says Richard Huang, Asia industry manager for Glass, Air Products. The first step was to install

an oxy-boost system. “This is one application of oxy-fuel combustion technology that improves furnace performance by adding oxy-fuel burners to the existing air-fuel furnaces,” explains Richard of Air Products.

Techpack started operating with the new oxy-boosting application in April 2010 and quickly noted immediate improvements in emission reductions and productivity. “The tailored step-approach worked extremely well. It allowed us to get more familiar with oxygen combustion. The immediate results convinced us of the benefits, and reliability of oxy-fuel technology,” says KeunHaeng of Techpack.

Buoyed by the success of the oxy-boost trial, in February 2011 Techpack committed to the full-scale conversion to Air Products’ oxy-fuel integrated solution which included the company’s renowned Cleanfire® HRi™ burners, flow control skids and a PRISM® VSA (Vacuum Swing Adsorption) generator for on-site oxygen supply.

Throughout the entire process, Air Products provided turnkey support and project management to ensure successful installation and start-up. The company’s extensive industry know-how and flexibility provided further insight into Techpack’s specific needs during the installation process. Flexible procurement options also featured as part of the package, for example in order to reduce the initial cost of investment, Air Products proposed the option of renting the oxy-fuel burners to Techpack.

Air Products’ VSA systems provide reliable and cost-effective on-site oxygen supply, for Techpack Solutions and many other customers





Cleanfire® burners make possible oxy-fuel combustion in the furnace

A cut above – emissions expectations exceeded

Air Products' oxy-fuel integrated solution started to prove itself right from the onset. NOx emissions dropped sharply by over 90% - from 300ppm to 25-30ppm, and CO2 emissions were also reduced.

"We were delighted. The success of the full-scale conversion was immediately evident, and exceeded our expectations. We had only targeted a reduction of 50% to begin with, so to hit 90% from the beginning was incredible," says KeunHaeng of Techpack.

Other benefits included an increase in the production pull rate, energy savings and an increase in melting efficiency.

Furthermore, very few operational changes were required for the implementation, for example, no additional manpower was needed.

"Meeting the new environmental targets was important for Techpack. Time frame was short. Therefore they were looking for a reliable and trustworthy partner to help them significantly cut NOx emissions with effective and economically efficient solution," says Richard of Air Products.

Energized and expert team ensured success

Pivotal to the success of the project was Air Products' local project team in South Korea who led the conversion process and established a strong rapport with the Techpack engineering and management teams.

"It was clear from day one that Air Products was deploying a team of genuine combustion engineering experts who knew the glass industry intimately," remarked KeunHaeng of Techpack. "They were fully committed and focused on our project, and were constantly on hand to respond to unforeseen challenges and problems that arose."

Some implementation problems that occurred along the way included for example a deviation in the oxygen flow rate between the VSA and flow control skids and oil lance cleaning when operation was on-stream in February 2011.

“Air Product’s proactive attitude and fast response in addressing the problems helped us resolve problems quickly and ensured the conversion was successful,” added Lee KeunHaeng.

On Techpack side, they shared their production efficiency program enhancement roadmap with Air Products in order to help make future improvements and optimize their operations.

Seamless cooperation and communication between both teams ensured success.



Fuel for a greener glass industry

Air Products is one of the few firms with the technology, expertise and dedication needed to make the centuries-old glass production process more environmentally friendly. It has a proven track record of delivering oxy-fuel solution across Asia and worldwide that cut emissions quickly to meet international and country specific environmental regulations.

Its local teams, backed by its global resources bring a wealth of knowledge and experience to each conversion project.

Air Products’ oxy-fuel integrated solution is helping firms not only meet new environmental regulations, but also realize gains to their bottom line through improved productivity and energy savings. By converting their furnaces to oxy-fuel combustion, Techpack and other glass manufacturers can leverage the best-available technology to better meet the challenges and needs of the 21st century, making them stronger and greener enterprises.

¹ BAU levels refer to the average or normal emission levels of daily operation of a company exclusive of any extremely high or low emission situation.

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