

*Pilkington and Air Products*

# ***A new approach to nitrogen***



**CASE STUDY**





*“Pilkington are constantly driving to achieve the highest glass quality whilst minimising production costs and conserving resources. Air Products has not only delivered a fully developed and low-cost method of nitrogen production, but also supported us throughout the entire investment process. This involved deciding which solution was best from all points of view, through installation, to commissioning and support.”*

*Reiner Regulski, technical services manager, Pilkington Deutschland AG*



## *A new approach to nitrogen*

Increased nitrogen supply capacity, reduced costs and less managerial effort are the main benefits glass manufacturer Pilkington has seen at its plant in Gladbeck, north-west Germany, thanks to a new nitrogen plant supplied and operated by Air Products.

The PRISM® HPN (High Purity Nitrogen) system has allowed Pilkington Deutschland AG to expand production at the Gladbeck float glass plant, while cutting the unit cost of nitrogen by nearly 40%. By replacing an old nitrogen plant operated by Pilkington, it has helped the company concentrate on its core business of making glass. Most importantly, the new plant also meets Pilkington's strict requirements for nitrogen purity and reliability.

Pilkington staff are delighted with the support they have received from Air Products. *"Air Products not only delivers the technology, but also advised us throughout the entire investment phase - from choosing the most favourable concept, through installation, to commissioning and now via continued support."* says Reiner Reguluski, technical services manager at the Gladbeck plant.

Air Products now supplies gases and oxy-fuel burner technology to four of the Pilkington sites in Europe. The Gladbeck project has cemented the already excellent relationship between the two companies and has led to further co-operation, even in a new territory for both companies: Russia.



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## ***Nitrogen: a critical resource for glassmaking***

Making float glass demands large quantities of very pure nitrogen. In the float glass process, flat sheets of glass are cut from a continuous ribbon of glass. This in turn is formed by pouring molten glass onto the surface of a bath of molten tin. Oxidation of the tin spoils the process, so oxygen is kept out by maintaining an atmosphere of nitrogen and hydrogen above the bath.

The process is so sensitive to oxidation that the oxygen content of the nitrogen supply must be less than 5 parts per million (ppm). *“Oxygen concentration is critical to the process, and concentrations of only just a little over 5 ppm are unacceptable,”* says Reiner Reguluski. *“This imposes very stringent technical demands on the whole gas supply system: gas production, purification and mixing.”*

The Gladbeck site has two float lines making two brands of flat glass: Pilkington Optifloat™ flat glass and Pilkington Optiwhite™

flat glass. The latter is an exceptionally clear glass that is sought after by designers and architects, and used in projects such as the new dome of the Reichstag building in Berlin.

Nitrogen for the Gladbeck plant originally came from an on-site air separation plant owned and operated by Pilkington. This plant was able to supply the normal demand of around 90 tonnes/day (t/d) for the two float glass lines, but a problem was looming. A planned increase in production would see the nitrogen requirement increase to around 105 t/d, which would have been beyond the capacity of the existing plant.

Pilkington staff already suspected that their 27-year-old air separation plant might not be the most economical source of nitrogen. In addition, the whole business of operating and maintaining the plant went against the company's current philosophy of concentrating on making glass, while outsourcing non-core activities such as providing nitrogen. Clearly it was time to consider alternative sources of nitrogen.

## Talking to the experts

Reiner Regulski and his team discussed the situation with Air Products. Supplying a wide range of industrial gases and gas manufacturing technology, plus an equally wide range of commercial options, Air Products is well placed to give detailed and unbiased advice to potential customers. *"We like to support our customers with all the detailed information they need to plan their investments,"* says Klaus Gerlach, technical gases project manager at Air Products GmbH, Hattingen. *"For many customers, industrial gases are not their primary expertise - whereas for us, gases are second nature. So we can save customers a lot of effort, and give them a clear idea of the costs and benefits of every potential solution."*

For Pilkington this meant starting with an independent assessment of the existing nitrogen plant. Air Products agreed that the existing plant could not be expanded any further, so road tankers of liquid nitrogen would have to be brought in to make up any growth in nitrogen demand and to cover breakdowns of the ageing in-house plant. The latter case would require up to five tanker deliveries a day. Pilkington began to consider the associated CO<sub>2</sub> emissions, other air pollution, traffic hazards and noise, both on and off the site.

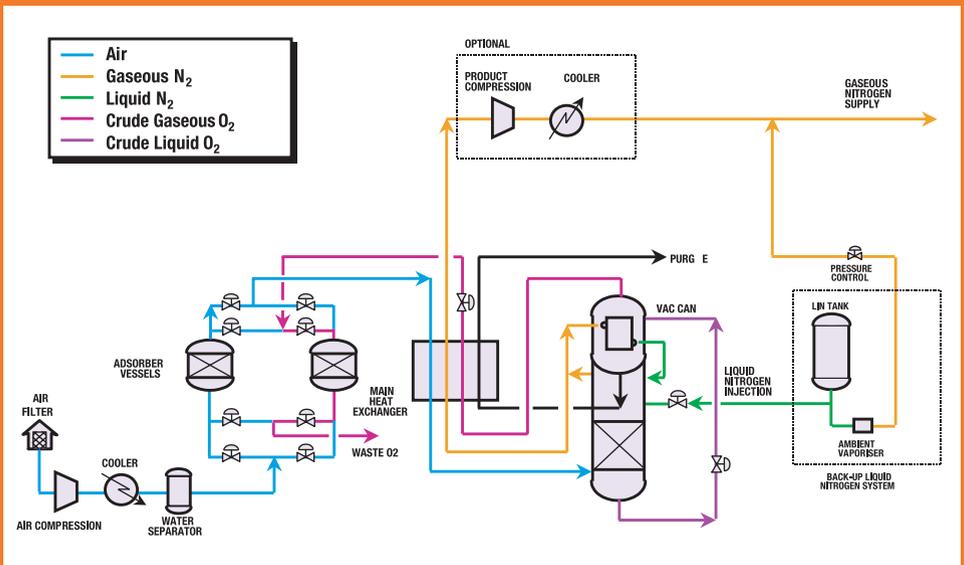
The analysis also showed that the existing nitrogen plant was inefficient, expensive to run, and close to the end of its useful life, with a sharp rise in maintenance costs forecast. *"All these points, together with our constant drive to cut production costs, eventually led us to decide to invest in a new, larger and more modern nitrogen production plant,"* explains Reiner Regulski.

The solution Air Products recommended was an on-site nitrogen generator based on the company's PRISM® HPN technology. Pilkington was looking for a way to outsource nitrogen production, so Air Products was happy to suggest a partnership under which it would own and operate the plant on behalf of Pilkington.

*"When Air Products presented the PRISM® HPN system to us, we were immediately convinced that this was a technically advanced and well proven, and at the same time economical, solution."* says Reiner Regulski.







Cost cutter: glass manufacturer Pilkington used a PRISM® HPN nitrogen generator like this one to supply the two float glass lines at its Gladbeck plant with 105 t/d of high-purity nitrogen containing less than 5 ppm of oxygen. The cost of nitrogen from the new plant is 40% less than the original plant, and Pilkington no longer has the workload of operating and maintaining the facility.

## Efficient nitrogen generation with PRISM® HPN

Air Products has over 40 years' experience in designing, building and operating on-site gas generation plants. The PRISM® HPN system is the company's most up-to-date solution for providing large quantities of high-purity nitrogen on customer sites.

PRISM® HPN is based on the same cryogenic air separation technology that is used by the largest industrial gases plants. Air is first liquefied and then distilled to separate the nitrogen from oxygen and other gases, followed by a series of purification steps.

Thanks to the use of state-of-the-art technology and design techniques, the PRISM® HPN is compact and efficient. Yet although the design is constantly being refined, the PRISM® HPN system has been used for many years, all over the world and in many industrial sectors, and has hundreds of satisfied customers. The technology has low costs for both installation and operation, and is flexible as well as being highly reliable.

Thanks to vacuum insulation and a built-in heat recovery network, the PRISM® HPN is extremely energy-efficient. Nitrogen supply systems based on liquid nitrogen often require extra energy for vaporisation. The PRISM® HPN, on the other hand, supplies gaseous nitrogen at the plant outlet, so the cooling power of the liquid nitrogen is not wasted. This high-energy efficiency makes the PRISM® HPN an environment-friendly choice compared to liquid nitrogen delivered by tanker.

Four plant sizes are available, with nitrogen throughputs in the range 20–3,500 Nm<sup>3</sup>/h respectively. Oxygen content can be as low as 2 ppm if required, easily satisfying Pilkington's requirement for less than 5 ppm oxygen.

PRISM® HPN is a modular technology that can be adapted to meet customers' specific requirements. In the case of the Gladbeck

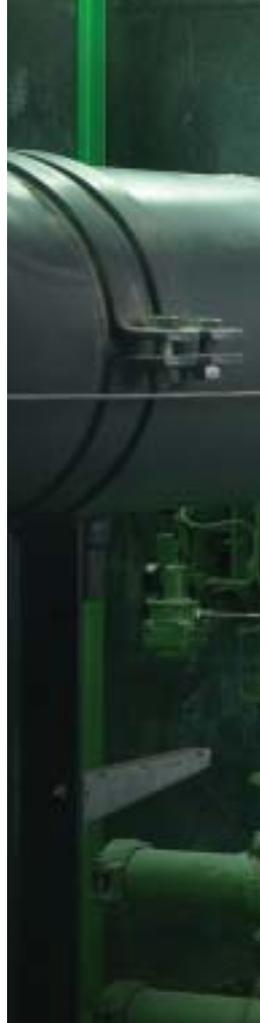
site, one such need was for a backup supply based on liquid nitrogen. In the unlikely event that the PRISM® HPN system cannot supply all the gas requirements for the glass furnaces, liquid nitrogen from storage tanks on site seamlessly covers the shortfall.

Due to Air Products' infrastructure of liquid nitrogen plants in Germany and across Europe they can also ensure that road tankers keep the Gladbeck plant supplied with nitrogen for the duration of any emergency. In more remote locations, Air Products' PRISM® nitrogen plants can also make liquid nitrogen on site, and this can be stored for use as a backup.

## Robust supporting infrastructure

To keep the PRISM® HPN running at peak efficiency and help ensure that the backup system is rarely needed other than for peak-shaving excess demands, Air Products monitors the plant continuously by telemetry. This round-the-clock watch, via a sophisticated local PC-based control system that monitors every operating parameter, ensures maximum reliability.





## *A relationship that's set to last*

Air Products' cost analysis showed that a new *PRISM*<sup>®</sup> HPN system could supply nitrogen at a 40% cost saving compared to the existing plant. In addition, Air Products would assume all the responsibility for operating and maintaining the new plant.

*"Once the Air Products analysis had revealed these advantages to us, it was easy for Pilkington to opt for the *PRISM*<sup>®</sup> HPN system", recalls Reiner Regulski. Adds Klaus Gerlach: "Pilkington pays only the cost of the nitrogen, which is low because the new plant is highly efficient. Pilkington does not have to employ staff, and doesn't bear the risks of operating the plant."*

*"Working together with Air Products, we were able to prepare for the investment very thoroughly. This made the decision-making process much easier for us, and we had the certainty of knowing we were on the right path,"* says Reiner Regulski.

The *PRISM*<sup>®</sup> HPN plant was duly installed and has given trouble-free performance ever since. In fact, the project was so successful that it has paved the way for future long-term co-operation between the two companies.

*"Our co-operation with Air Products in the area of gas supply for production processes has proved very successful. In the future I am sure this co-operation will be continued and extended,"* predicts Reiner Regulski.



## *An innovator in glass*

Pilkington, based in St. Helens, U.K., is a world leader in flat glass products for the Building and Automotive industries. Annual turnover is €4.3 billion, over half of which comes from Europe.

Sales are split roughly equally between the construction and automotive sectors. The group has factories in 24 countries on five continents, and employs around 25,000 people, 17,000 of whom are in Europe.

Each year Pilkington invests around €54 million in developing new products and improving existing processes. The group is building new factories all over the world, and currently has 13 float glass factories in Europe, four of which are in Germany.

Pilkington is convinced that in some areas specialised partners can provide significantly more efficient services, which in turn can benefit Pilkington's own production.

But for outsourcing to work, the partners chosen by Pilkington have to be of the highest quality. *"Air Products has certainly delivered the quality we need,"* says Reiner Regulski, technical services manager at the Gladbeck plant.

## ***An innovator in gases***

Air Products is one of the world's largest suppliers of industrial gases, and the world market leader in hydrogen and helium. It is a leading gas supplier to the European semiconductor industry, and a leader in the development of cryogenic plants.

The standard Air Products gas supply contract includes many features, both commercial and technical, designed to make life easier for customers. In cases where something extra is needed, a programme known as Air Products Service Plus provides a wide variety of other options.

Service Plus options required by Pilkington for the Gladbeck project included a technical and economic evaluation of the existing nitrogen plant, and the telemetry package that allows Air Products staff to keep a round-the-clock watch on the *PRISM*<sup>®</sup> HPN plant at Gladbeck.

Air Products has been serving the glass industry with both gases and combustion technology for more than 40 years. The company has worked on hundreds of glass furnaces worldwide, with a team of in-house melting experts to help customers get the best from their plants.

The Air Products Cleanfire<sup>®</sup> series of burners are designed especially for the glass industry. They use oxy-fuel technology to improve melt rates, product quality and reliability while reducing emissions and operating costs.

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