NITROSource NEWS 03

SEPTEMBER 2019

Welcome to the third edition of NITROSource News!

In this edition we take a look at applications requiring a high pressure nitrogen supply. In most cases, a permanently sited pack of high pressure cylinders will be constantly recharged from the nitrogen generation system to provide an "everlasting supply". This removes the need to continually replace empty cylinders, or manifolded packs, via a gas company.

This type of high pressure system configuration is useful to supply gas at higher than normally generated pressures, or as a method to provide a large flow of gas over an intermittent peak period. It also often provides a significant cost advantage by facilitating the use of a smaller nitrogen generation package, with vast storage, to cope with highly fluctuating demands.

Once pay back is realised on the initial capital investment for the high pressure nitrogen generation package, gas costs can be reduced to achieve savings of more than 90% in some cases.

There are two main industrial laser cutting technologies – CO_2 and Fibre.

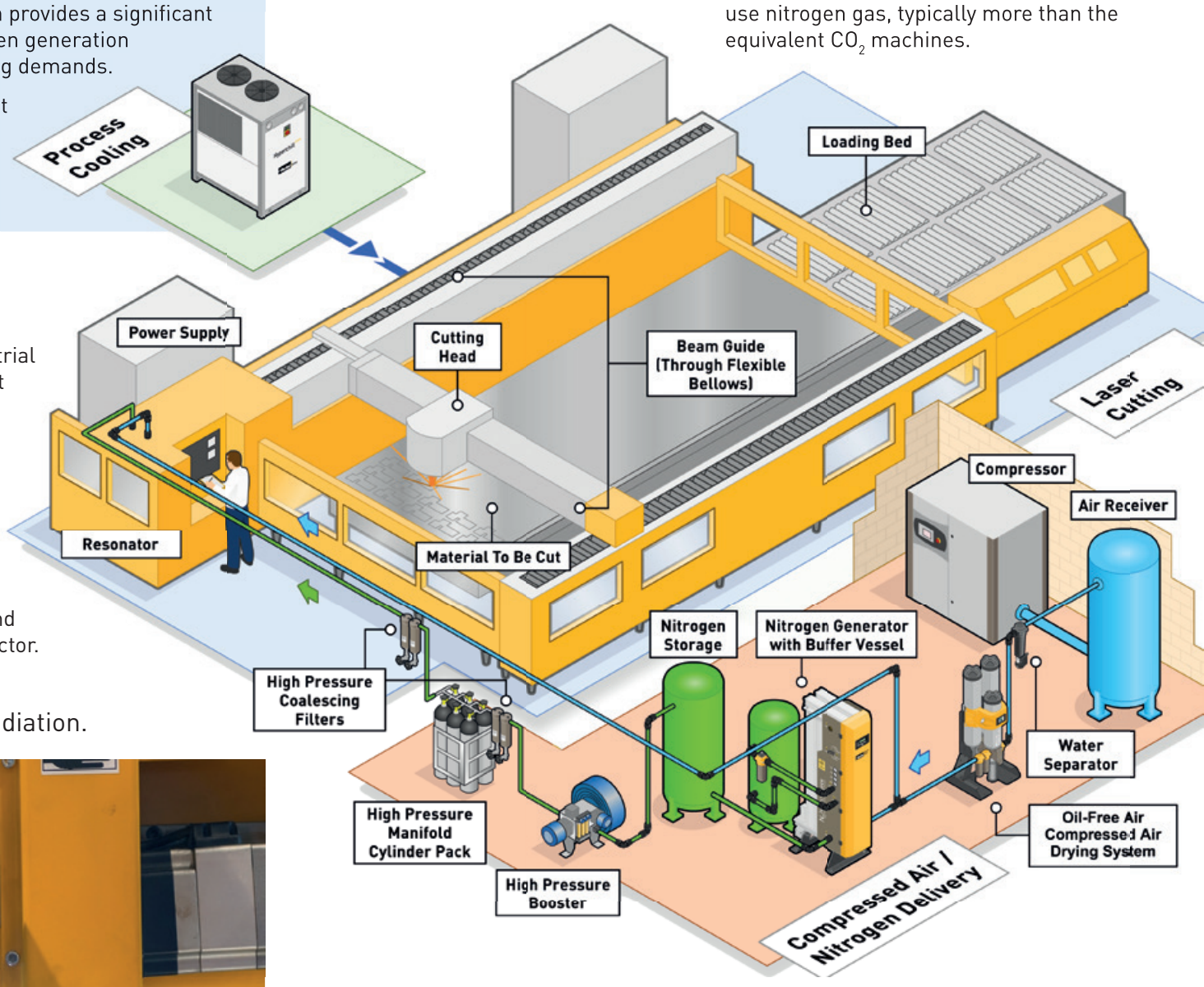
CO_2 lasers use nitrogen, carbon dioxide and helium in the resonator to create the laser beam that is then conveyed along a series of tubes and bellows through mirrors and lenses to the workpiece.

Fibre lasers use an optical cable, coated at one end with lasing material, that carries the beam to the workpiece.

Fibre is the newer technology and regarded as generally more efficient with less beam power transmission losses and faster cutting speeds.

Reports indicate that approximately 85% of new laser sales are now fibre technology.

The good news is that fi bre lasers still use nitrogen gas, typically more than the equivalent CO_2 machines.



Laser cutting

When considering the typical uses for high pressure industrial nitrogen gas, laser cutting is always an application of great interest. This is because the process uses a lot of gas, usually from manifolded cylinder pallets, and users experience all the problems, expense and hassle that this method of supply incurs. Huge cost savings can be realised using a Parker nitrogen generator; however, not only does this process require exactly the correct purity for the material being cut but also pressures generally above the normal output from a typical PSA system. So, a certain degree of knowledge and expertise is required to tackle enquiries for this market sector.

L.A.S.E.R (acronym) -
Light Amplification by Stimulated Emission of Radiation.

The main use for nitrogen in a laser cutting machine is as "assist gas". The purpose of the assist gas is to shield and prevent any oxidisation of the material being cut as well as blowing away the molten material to leave a clean, shiny cut edge.

In some instances, the assist gas usage can account for over 60% of a laser cutting machine's operating costs. The opportunity to significantly reduce this cost for the end user, by utilising on-site generation, raises a lot of interest. However, understanding the exact requirements to produce perfect cut edge quality, economically and reliably, is key to making a successful sale.

Sharing knowledge, experiences, specifications and reference information will help us all grow this nitrogen hungry market sector and give end users confidence in Parker's distribution network's expertise and ability.

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Cutting edge nitrogen generation technology installed in Croatia!

Alen Tomić – Area Sales Manager from Parker's long-standing, authorised distributor Fering Fit, based in Zagreb, Croatia, kindly shares a high pressure application for laser cutting.

SOBOČAN-interijeri d.o.o., is a major European manufacturer of business and store interiors based in Mursko Središće, Croatia. They produce shelving and display equipment for supermarkets, shops, hotels and specialist product promotion.

They operate 3 laser cutting machines - A 3kW Amada CO_2 laser, along with 1kW and 1.5kW Bodor Fiber lasers, manufacturing stainless steel shelving and display components where a high quality of the cut edge is of extreme importance. The material thicknesses cut are typically 1mm, 3mm and 5mm.

Nitrogen is used as assist gas to prevent oxidisation of the cut edge from oxygen in ambient air, and to blow away molten metal as the laser cuts through the sheet material.

On a recent visit to the BIAM exhibition of machine tools in Zagreb, representatives from Sobocan visited Fering Fit's stand with great interest in the nitrogen generation equipment on display. They explained how they were using high pressure manifolded cylinder packs, and the cost, along with handling, storage and stock monitoring issues were becoming a real problem for them.

Fering Fit agreed with Sobocan to use their expertise and embark on a complete survey of the laser assist gas usage, and costs, with the aim of proposing a Parker on-site nitrogen generation system. After several months of research and analysis of Sobocan's operation, a 40 bar(g) system was identified as the ideal solution, with an advised purity level of 100 ppm maximum remaining oxygen content.

Fering Fit designed, engineered and installed a complete "turn-key" high pressure nitrogen system comprising a Parker NITROSource N2-80PALY nitrogen generator, OFAS HL 80 adsorption dryer and IP50 high pressure filters, along with a high pressure gas booster. This allowed for a sufficient stored volume of nitrogen at 40 bar(g) to handle any peak flows, with a regulated usage pressure of up to 25 bar(g) into the laser cutting machines.

The nitrogen package is now in full operation, providing better cut edge results and with much lower operating costs than the previous gas company supply.

Cut edge quality using NITROSource PSA system @ 100ppm

This project is Fering Fit's first high pressure nitrogen system using a Parker NITROSource PSA generator.

The installation has strengthened Fering Fit's position as regional experts in the field of technical gases and compressed air. Many prospective clients are seeing the success and savings realised by this project and are now considering generating their own high-pressure nitrogen from equipment to be supplied by Fering Fit.

Plant room installation at Sobocan

Fantastic work by Alen and the team at Fering Fit.

https://sobocan-interijeri.hr/en/

Vietnam Airlines - upgraded to efficient class!

Back in the early 1990's, Parker were involved in supplying one of the first high pressure nitrogen systems for commercial aviation ground support. High pressure nitrogen gas is used within the aviation industry to fill aircraft tyres and top up landing gear struts.

Since then, the original N2MAX system fitted with a Bauer high-pressure nitrogen booster compressor has operated faultlessly to refill cylinder carts, literally thousands of times, saving Vietnam Airlines over a billion Vietnamese Dong.

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Steve Carss, Sales and Operations Manager for Parker Vietnam, explains further – –

"The idea to replace the existing N2MAX system had been constantly reviewed on and off for the past 8 years, something that is not uncommon here in Vietnam. We stuck with the project though, and with our distributor, Mico Mineral, were ready to act once the final go-ahead was given by Vietnam Airlines to seek suitable proposals.

The key issue we had here in Vietnam was that Vietnam Airlines were very specific about the system component brand and performance required to meet the tender conditions. We lacked in-depth expertise in putting together a complete plug and play 350bar(g) package locally. Having heard that one of Parker's specialist high pressure systems integrators, MSS, based in Rugby UK had designed, assembled and successfully installed hundreds of 350 bar(g) systems, it seemed sensible to explore a way we could benefit from this already available expertise.

In the end we won the order and the sale was a triumph of collaboration, with many parties coming together to provide a single solution, fully meeting Vietnam Airlines stringent criteria."

Parker Vietnam worked directly with MSS, supported by Parker GSFE and Clark Lee locally, to integrate a skid package with Parker, Bauer and Kaiser brand components. MSS designed and assembled the open frame skid, providing a complete, pre-commissioned, plug and play system.

Mico Mineral service and support personnel travelled to the UK for extensive maintenance training at MSS, Parker GSFE, Kaiser and Bauer. This enables Mico Mineral to honour all the warranty conditions of the individual suppliers, whist providing first class support locally to Vietnam Airlines.

The new high-pressure nitrogen package with NITROSource N2-45P, OFASHL070, Bauer GIB12.2-5.5MV nitrogen booster and HPC/Kaiser ASK-40T low pressure screw compressor.
Output 34.7m³/h @ 0.1% maximum remaining oxygen content up to 350bar(g).

The older dh N2MAX system can be seen alongside the new NITROSource package with cylinder carts ready to be filled.

Safe heat treatment with NITROSource and high pressure storage back-up

ADI Treatments Ltd, based in West Bromwich in the UK, provide contract heat treatment services to a wide range of industries, but predominantly automotive and truck.

ADI's expertise is in the Austempering and Annealing of ductile iron castings. Austempering is an isothermal heat treatment applied to ferrous materials.

The precise control of process times and temperatures facilitates the production of a microstructure that is stronger and tougher than the structures resulting from conventional heat treatments.

Part of the process involves "quenching" the components in a bath of molten salt held between 230°C to 400°C.

The quenching process is blanketed with inert gas for safety reasons, and in the event of a power failure, nitrogen is required to purge the system for a predefined period.

ADI had used a liquid nitrogen supply for many years, but continual price increases, along with the need to make sure the system was full enough to accommodate the potential emergency, purge process was a concern.

An ideal solution, devised by Parker's UK N2 Sales Manager, Tony Brown, came in the installation of a Parker NITROSource system with high pressure boosting and storage capability. The generators were specified to produce a continuous blanket of inert gas to the quenching process, with a slight over capacity to boost and fill storage cylinders for backup purposes.

In the event of a power cut, or any other need to rapidly purge the quenching process, an automatic system opens a valve to allow the stored gas in the cylinders through to where required.

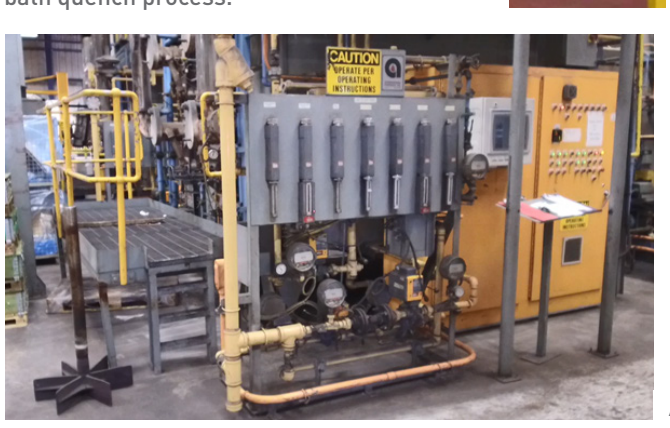
Once the concept had been explained and approved by the projects team at ADI, Harrier Pneumatics of Bristol were commissioned to install the complete system along with Hydrovane compressors.

The main competitor was the incumbent gas company, but they had frustrated ADI with their arrogance and inflexibility so much, that the project was approved in Parker's favour very rapidly.

In addition, the removal of the existing bulk liquid vessel, and associated plinth, freed up valuable real estate on-site that was used for much needed extra office space.

Two N2-45P units @ 3% purity to provide blanketing gas to prevent fire and explosion in salt bath quench process.

Sauer "Tornado" packaged, silenced, 350 bar(g) nitrogen booster compressor.



Austempering batch furnace.

High pressure horizontal, manifolded, cylinder pallet. Permanently located on site with 490 m³ storage capacity.

Empty concrete plinth with the remains of security fencing, where once a gas company liquid nitrogen bulk vessel and evaporators stood! This area was re-designated for extra office space at the front of the building.

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Why using bulk liquid nitrogen vessels for back-up, may not be a good idea?

Liquid nitrogen stored in bulk vessels must be maintained at approximately -196°C. If the temperature increases, the liquid begins to gasify (with a liquid to gas ratio of 1:694) at 1013mbarA), causing the pressure in the vessel to increase. Once the vessel's internal pressure reaches a safe limit, a vent valve opens to allow the gas to escape to atmosphere, thus relieving the pressure.

Although modern bulk vessels are vacuum and super insulated, "heat leak" from ambient air temperature is always causing the liquid to "boil-off". Even if a vessel is installed in a very cold region, with ambient air temperatures of -40°C, or below, this ambient temperature is still a lot higher than the liquid nitrogen.

Parker has experience of installing nitrogen generator systems where end users have kept an existing liquid supply for back-up purposes, while they accustom themselves to the generated supply.

On many occasions we have heard customers exclaim that - "We haven't used any liquid at all. It has been valved off from the generated supply and application, but we have emptied the whole liquid nitrogen bulk tank in just a couple of months. How can that be?"

The answer lies in the boil-off table below, issued by a major gas company, that explains either "you use it, or you lose it!"

Vessel Size Litres (US Gallons)	**Gaseous Boil-Off Use or Vent** m^3/month (scf/month)
1900 Litre (500) super insulated	708m^3 (25,000)
5700 (1500) super insulated	1700m^3 (60,000)
9000 (2400) Perlite	3400m^3 (120,000)
11,400 (3000) Perlite	4248m^3 (150,000)
18,000 (4800) Perlite	5100m^3 (180,000)
22,700 (6000) Perlite	6230m^3 (220,000)
28,400 (7500) Perlite	7646m^3 (270,000)
34,000 (9000) Perlite	8495m^3 (300,000)
41,700 (11,000) Perlite	9345m^3 (330,000)
49,200 (13,000) Perlite	13,310m^3 (470,000)

Using high pressure cylinders as an alternative to liquid nitrogen back-up means, that unless there are leaks in the system, the stored volume is not wasted through boiling off to atmosphere and can remain charged up almost indefinitely, ready to use instantly as required. Topping the cylinders up with nitrogen from a Parker nitrogen generator can cost as little as €10 for a complete refill, compared to a typical MCP cost of over €100.

High pressure cylinder storage banks filled from a Parker NS-PSA.
No boil-off loses as happens with liquid vessels

NITROSource Feature Focus – Economy Override

When NITROSource comes out of economy standby, the default program enables a rapid clean-up cycle to ensure the nitrogen purity is to specification with regards to maximum remaining oxygen content. During this rapid cycle period, the nitrogen outlet valve remains closed, so there is no outlet flow.

Some applications require nitrogen immediately, and therefore a nitrogen storage vessel can provide a good solution to meet the application demand until nitrogen is output from the generator.

If a storage vessel is not feasible, then the NITROSource unit can be configured with Economy Override enabled. This can be accessed from the controller program menu – service level 1 , 4.12.

Economy Override works by "waking" the NITROSource up from economy standby mode at a predefined period, determined by purity and length of time in economy, and operates it for one rapid cycle before reverting to economy standby.

By doing this, the beds are pre-purged of any residual oxygen that may have been desorbed by the reduction in pressure on the CMS during economy standby, negating the need for rapid cycle on start up when the application demands gas. This means the NITROSource instantly produces nitrogen at the correct purity as soon as the application demands.

This feature is contained within the service level menu, as it requires configuring by an authorised, Parker trained engineer to enable it correctly.

The next edition will focus on food applications for NITROSource PSA. This is to coincide with the upcoming release of a new white paper covering the Parker NITROSource PSA range of nitrogen generators to demonstrate their full compliance with European Union food grade gases statute, (covering the majority of regulations in the rest of the World too). This document contains some useful information that clearly defines the specification for the different food gas application descriptions as well as HACCP, (Hazzard And Critical Control Point), considerations and areas of Parker differentiation.

Request for application articles and gas generation material.

I am certain that you all have food-based nitrogen generator applications that would be useful to share between ourselves? Interesting product? Kicking out a gas company? Unusual application? If you send me some basic details, I can work with you to build an article for the next edition.

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Thanks for reading!

Phil

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