

# Nitrogen Applications

## Metal Fabrication: Laser Cutting



### Laser Cutting with Nitrogen Assist Gas

Laser Cutting or Laser Beam Cutting is used by industrial manufacturing in a process that cuts or severs material with the heat obtained by directing the output of a high-power laser at the material to be cut. The focused laser beam will vaporize and or melt a small area of the material and a pressurized gas, or "assist gas", will be added beneath the lens coaxially with the laser beam to push the molten material out of the cut zone leaving an edge with a high-quality surface finish.

The assist gas is not to be confused with the laser gas mixture which is a gas mixture of high purity Carbon Dioxide (CO<sub>2</sub>), Nitrogen (N<sub>2</sub>) and Helium (He) used as its active media. The largest use of gas during laser cutting is in the assist gas.

Laser cutting is commonly performed at power levels ranging between 1,500 and 2,000 watts. However the use of higher powered lasers in the range of 3,000 to 6,000 watts is becoming more and more common.

Nitrogen is used for cutting of stainless, aluminum and alloy steels and is commonly referred to as a "clean cut" process. Nitrogen has also shown improved cutting speeds with higher-wattage lasers on thinner gauge carbon steels. Because the nitrogen does not aid in the cutting process other than to blow away the molten metal and prevent oxides from forming on the cut edge, higher pressures are required.

### What Nitrogen pressure and purity to Use?

The Pressure and Purity of N<sub>2</sub> are dependant on the type and thickness of material, the speed and quality of the cut, and Laser output-power among other factors.

The greater the thickness the higher pressure required. The Nitrogen assist gas flows through the nozzle orifice and down into the kerf at high speed and strong force in order to blow away the molten material. Assist gas pressures usually range between 100 to 200 psig for thinner stainless steel and between 300 and 500 psig for thicker stainless.

Purity of the assist gas nitrogen affects the quality and cleanliness of the cut.

For applications with purity requirements above 1000 PPM O<sub>2</sub> (nitrogen purities below 99.9%), Nitrogen Membrane Generators are perfectly acceptable.

For applications that require higher purity assist gas < 500 PPM O<sub>2</sub> (nitrogen purities greater than 99.95%) to 10 PPM (99.999%) PSA Nitrogen Generators are recommended.

### Benefits of Using Nitrogen

- High Cutting Speeds
- High Quality Edge Cut ( No Grinding)
- Absence Of An Oxide Layer Or Blackening
- Low Distortion and Dross Formation
- Very Narrow Kerf Width

# Generon IGS Nitrogen Generators

Generon IGS is in the unique position to be able to supply competing air separation processes utilizing either hollow fiber membrane or PSA (Pressure Swing Adsorption) technologies to provide our customers with the best technical solution for their application.



## NITROSWING® Modular PSA Generators

- 8 Models to choose from ranging in size from 84 SCFH (2.2 Nm<sup>3</sup>H) to 4,300 SCFH (112.8 Nm<sup>3</sup>H) depending on desired purity and pressure.
- Nitrogen purities to 99.9995%.
- Product Dew Point to -70°F (-57°C).
- Delivery pressures to 120 psig (8.3 barG).



## NITROSWING® Twin-Tower PSA Generators

- Generon IGS manufactures more than 30 models ranging in size from 324 SCFH to 262,300 SCFH (9.0 Nm<sup>3</sup>H to 7,400 Nm<sup>3</sup>H) depending on desired purity and pressure.
- Nitrogen purities to 99.999%.
- Product Dew Point to -70°F (-57°C).
- Delivery pressures to 130 psig (9 barG).



## Nitrogen Membrane Generators

- Nitrogen purities adjustable from 95% to 99.9%.
- Product Dew Point to -70°F (-57°C).
- Extensive product range from the smallest module producing 25 scfh (.7 Nm<sup>3</sup>/h) to large integrated systems producing 187,000 scfh (4,915 Nm<sup>3</sup>/h).
- Modular design allows for various combinations with the flexibility and customization from a single membrane module to multiple Integrated Systems resulting in easy installation and fast start-up times.
- Product pressures available in two standards: 200 psig (14 barG) and 330 psig (23 barG)

*A full installation is typically comprised of an air compressor, air dryer, filtration package, air receiver tank, nitrogen generator, nitrogen booster compressor and a nitrogen buffer tank.*

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## With a Generon IGS Nitrogen Generator you can:

- Eliminate high cost purchased gases.
- Eliminate delivery & fuel sur-charges.
- Eliminate rental and handling charges.
- Eliminate evaporation losses.
- Eliminate long term contracts.
- Eliminate truck and forklift traffic in your plant.
- Eliminate run outs.
- Lower your operating cost with a **Generon IGS** nitrogen generating system.

