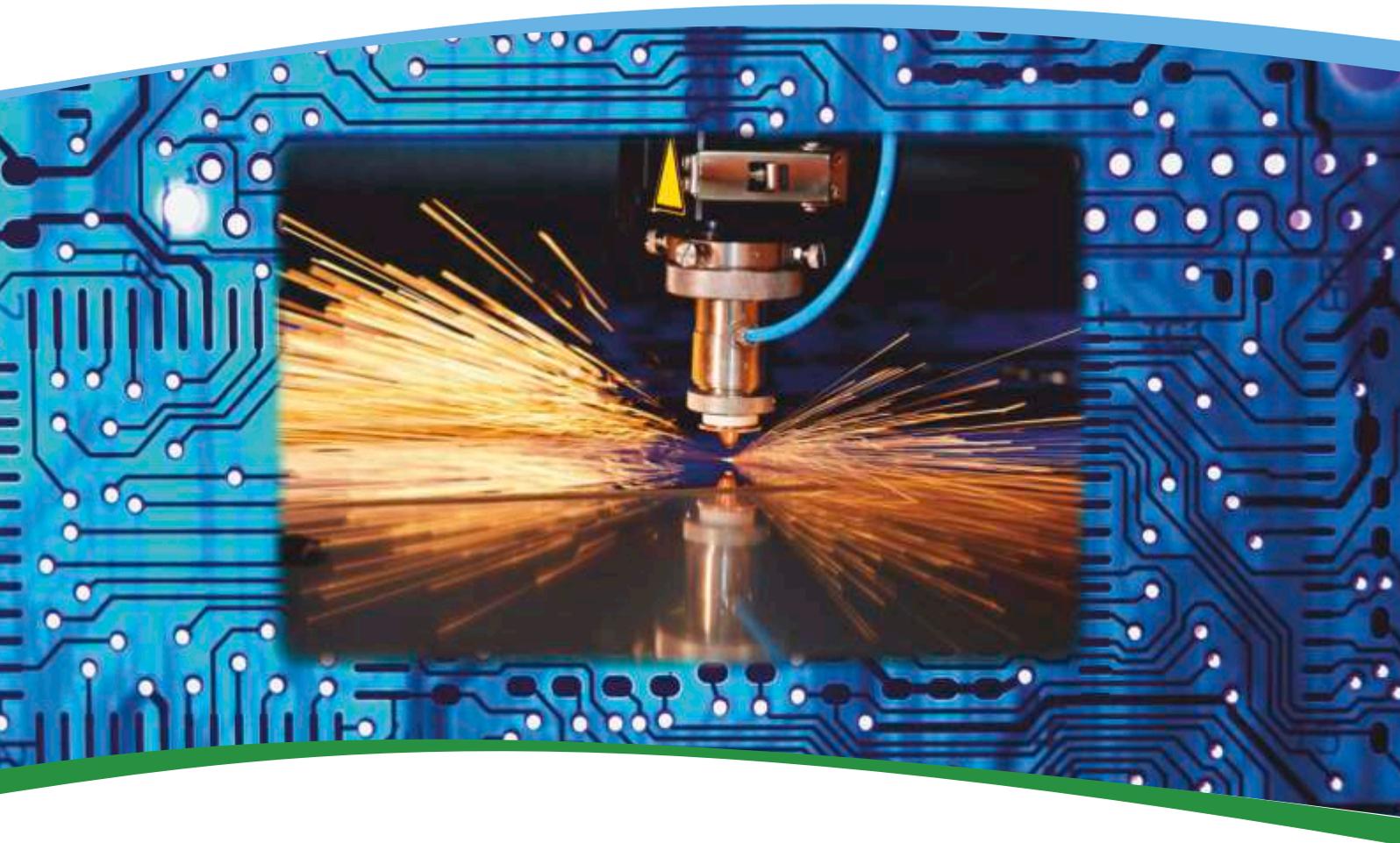




# Electronics & Laser Cutting Industries

## High Purity Nitrogen Systems



# Oxymat at a glance

Oxymat is a Denmark based company and specializes in designing and manufacturing on-site oxygen and nitrogen solutions using Pressure Swing Adsorption (PSA) Technology. We have been designing, engineering and manufacturing oxygen generator systems since 1978 and nitrogen systems since 2001. We possess first hand knowledge of the market, development, demands and possibilities the PSA technology holds. It is our mission to be your preferred innovative, dynamic and environmentally responsible supplier of on-site oxygen and nitrogen solutions worldwide.

Our team of more than 80 skilled and dedicated employees is based in 5 different locations:

- Denmark: Administration, Sales and Service
- Slovakia: Administration, Production, Project management, Sales, R&D, and Service
- China: Administration, Sales and Service
- Colombia: Sales and Service

With more than 20 engineers (project managers, 3D CAD designers, automation engineers and experienced sales engineers) making sure we offer the right solution for any demand.

Through an ever ongoing process we are always focused on developing Oxymat to be cost-effective and ahead of the competition in terms of quality, performance and price. This strategy has made it possible to grow to the size and position Oxymat has in the market today. Our 2014 turnover was 15,2 mil. € and our product range is the most energy efficient in the market and even at a competitive price.

Our team of specialists will always be able to serve any demand. From our extensive standard industrial or marine programme to highly specialized turnkey projects, Oxymat will provide the quality solution. We offer a wide range of standardized control systems, and remote access and can offer to tailor made automation solutions according to your requirement.

It is our priority to always deliver high quality products and services. Oxymat holds all relevant approvals for serving the numerous applications we supply.

- ISO 9001
- ISO 13485
- ISO 14001
- PED 97/23/EC Module B+D
- MDD 93/42/EEC (Medical Device Directive)

MARINE Class societies - we can deliver according to the rules of:

- American Bureau of shipping
- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register
- Nippon Kaiji Kyokai
- RINA

# Bringing Nitrogen to your business

## **Why Oxymat PSA generators are the wise choice?**

At Oxymat, we only see challenges - not problems! No matter your need or application we can provide state-of-the-art design to meet your requirements. Our wide range of standard generator systems supplies:

- Oxygen from 0,6 to 2000 m<sup>3</sup>/h purities up to 95% (60TPD)
- Nitrogen from 0,3 to 10000 m<sup>3</sup>/h with purities up to 99,9999% (300TPD)

## **Unique Oxymat design features include:**

- High performance top quality solutions
- Low energy consumption (from 0,2kW/m<sup>3</sup> Nitrogen and from 1,0 kW/m<sup>3</sup> Oxygen)
- Low CO<sub>2</sub> emission
- Heavy duty construction designed for rough conditions and industrial use
- High quality & durable components
- 3D design
- Optional container or frame-built design
- Design and customization, to meet any specification
- Trouble-free installation
- High quality Touch Screen Control Unit
- Remote Control Access
- Optional delivery as "own brand" OEM solution fully implemented with your system.
- Specialist support from planning, installation and operation of your project
- Oxymat is approved and recognized as a quality supplier by major gas companies

## **The essence of PSA**

The PSA process is an extremely clean operation and the only 'raw material' is air.

On-site generators allow for an uninterrupted supply of gas with a high purity output. This means that you can produce gas where and when you need it, and in the exact quantity and quality you need.

## **Worldwide manufacturer**

More than 2000 Oxymat generator systems are currently in operation around the world.

To provide first class aftermarket service, we have a team of four service technicians, always ready to make sure your equipment stays in good condition. Our service team can be reached 24 hours 7 days a week.

Our products and services are well known around the world, and via our extensive network of more than 100 distributors and agents worldwide, you are never far from qualified feedback, when it comes to onsite gas solutions.

Some of the industries we have served so far...

Medical	Laser cutting	Petrochemical
Food and Beverage	Electronics	Marine & Offshore
Process Industry	Aquaculture & Ozone	Goldmining

...and waiting to serve yours.

# Nitrogen for Electronics

## The usage of nitrogen in the soldering process

High purity nitrogen is used in soldering applications preventing oxidation of the process and leaves a clean, durable solder point. This results in increased product quality.

## Two prominently used machine types are:

**Wave Soldering:** Primarily used for soldering through-hole components on to PCBs (nitrogen purity required 50-100 ppm)

**Reflow soldering:** Used in large-scale electronics applications for soldering SMD components on to PCBs (nitrogen purity required 100-200 ppm)

A standard wave soldering machine consists of three zones; the preheating zone, the fluxing zone, and the soldering zone. An additional fourth zone, cleaning, is used depending on the type of flux applied.

The nitrogen is used in the soldering process where the tank of the molten solder has a pattern of standing waves on its surface.

When the PCB is moved across this tank the solder waves contact the bottom of the board and stick to the solder pads and component leads via surface tension.

Precise control of the wave height is required to ensure solder is applied to all areas but does not splash to the top of the board or other undesired areas.

This process is usually performed in an inert gas ( $N_2$ ) atmosphere to improve the process and final product.

## Benefits of using nitrogen in soldering processes

- Lower dross production
- Reducing oxidation
- Improving wettability
- Increasing quality of joints
- Less cleaning/maintenance
- Flux consumption/acidity
- Reduced defects/improved design
- Cheaper solder
- Less rework



Nitrogen Generator



# Nitrogen for Laser Cutting



## The usage of nitrogen in the laser cutting process

Laser cutting with nitrogen is intended for applications where oxidation is not wanted. Nitrogen is also used where the cut edges could lead to corrosion.

When nitrogen is used as the cutting gas, the laser beam melts the material, and the nitrogen blows away the molten material from the cutting groove.

Inert gases do not produce an exothermic reaction which means the material is cut by laser power alone. For this reason a powerful laser and high-pressure assist gas are required normally at 35 barg.

The part cut using high-pressure nitrogen gas can move directly from the laser system to welding operations without additional processing.

Since nitrogen-cut parts have considerably less taper, welding operations are minimized, less fixturing is required, and parts generally have better a fit. Improved welds also translate to less time spent polishing parts.

## Benefits of using nitrogen in the cutting process

- Increased productivity through higher cutting speed
- Clean cut edges
- No overheating from exothermic reactions
- Improved corrosion resistance
- Oxide-free cuts
- Dross-free finish



Nitrogen Filling Station

# OPAS in Your High Purity Application

## Oxymat Puriier Action System (OPAS)

The OPAS is the true Add-On technology for nitrogen application requiring 1-100 ppm.

OPAS can easily be integrated with already existing nitrogen generation systems resulting in high purity nitrogen at minimum costs.

This process, purifying Nitrogen from 99.5% up to 99.9999% costs as little as 0,39 kW/h produces nitrogen and makes Oxymat OPAS the environment friendly choice for your high purity needs.

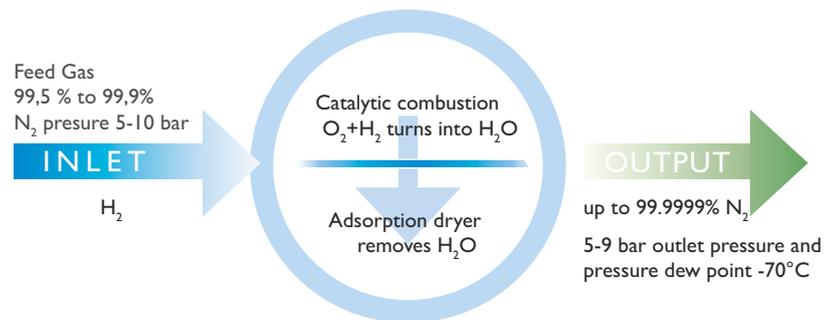
- The OPAS is fed with nitrogen from either a PSA or from external supply.
- A palladium catalyst process removes the oxygen content from the nitrogen fed gas by adding hydrogen and consequently creating water.
- The water is removed, leaving the inal product: nitrogen with required purity up to 99.9999% !



OPAS

## Unique OPAS features include:

- Small footprint - large capacity – high purity
- Top nitrogen quality with minimum space and energy requirement
- Low energy consumption (from 0,39 kW/m<sup>3</sup>)
- Nitrogen purity monitoring system
- Smaller air package
- Best air/nitrogen ration in the market
- Dew point analyzer
- Temperature & pressure transmitters
- Hydrogen analyzer for hydrogen carry-over
- Oxygen analyzer for nitrogen in and out
- Compact integral skid with accessories
- Cost effective maintenance
- Alarm functions
- Less greenhouse gas



## Product Range

OPAS 100	50-100 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 200	101 - 200 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 300	201 - 300 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 400	301 - 400 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 500	401 - 500 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 750	501 - 750 Nm <sup>3</sup> /h	5 - 9 bar
OPAS 1000	751 - 1000 Nm <sup>3</sup> /h	5 - 9 bar

All versions will use 5% feed gas as scrubbing gas for the heated adsorbtion dryer.

Example:

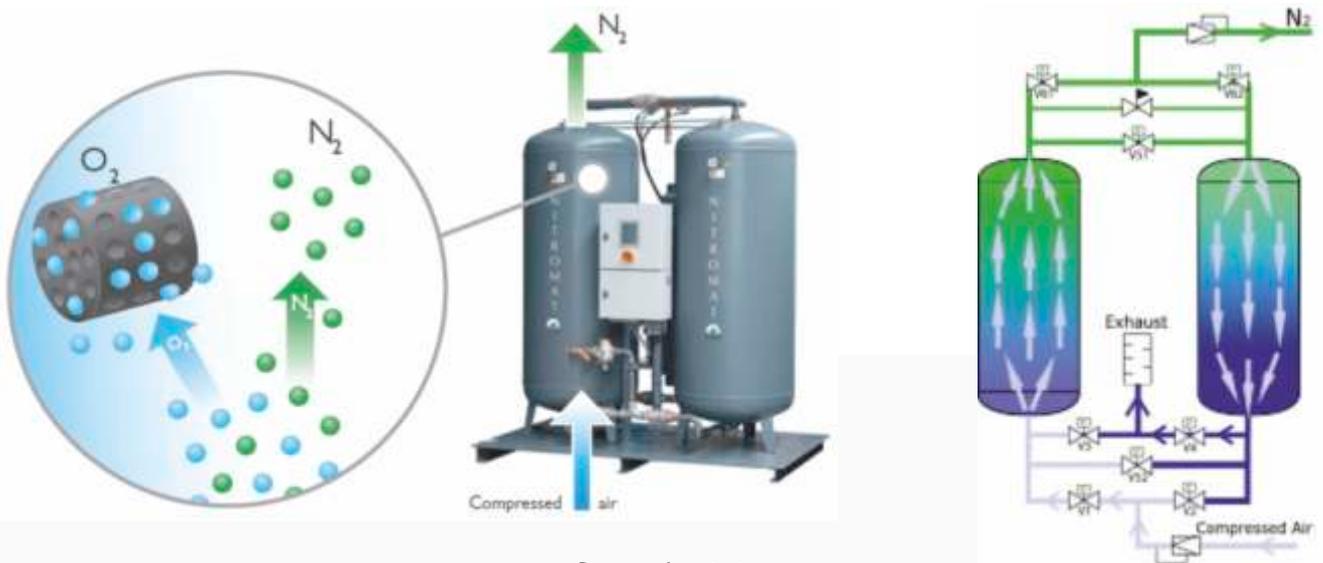
Needed capacity 1000 m<sup>3</sup>/h means that you need feed gas of 1050 Nm<sup>3</sup>/h.

Purity of feed nitrogen 99,5- 99,9%.

# Technical Features

The PSA process is an extremely clean operation and the only 'raw material' is 'air'. On-site generators allow for an uninterrupted supply of gas with a high purity output. This means that you can produce gas where and when you need it, and in the exact quantity and quality you need.

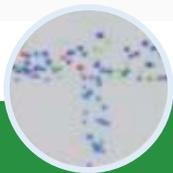
- PSA = Pressure Swing Adsorption and oxygen molecules are adsorbed under pressure.
- OXYMAT uses two columns with molecular sieves to ensure continuous production.
- 7 bar(g) dry compressed air feed one column of the generator where the pressure is built. O<sub>2</sub> is tied to a molecular sieve during pressurization, and the N<sub>2</sub> is allowed to pass through to the Nitrogen receiver tank.
- While pressure is built in on vessel, the second remains standby without pressure.
- A part of the produced gas is used for regeneration of the molecular sieve in the standby column.
- Carbon Molecular Sieve (CMS) is inside the columns of the generator. The molecular sieve is fully regenerative and has a life span of 40.000 operation hours in the OXYMAT generators.



Process description



**Compressor**  
increases air compression to required pressure level



**Dryer**  
removes moisture from air (air humidity) by cooling



**Air tank**  
accumulates necessary volume of air for PSA generator



**CMS**  
filling with its ion-exchange bed traps oxygen molecules and allows nitrogen molecules to stream through



**High Purity Nitrogen**  
flows from PSA generator to product tank and is ready for use

## References

### Laser Cutting

- KGZ / Dobrepolje / Slovenia

Laser cutting will normally require high flow rates combined with relatively high purity and pressure, to ensure a clean and smooth cut. Our tailor-made solutions with nitrogen booster just needs to be connected to power supply and start filling cylinders. The cost of own produced nitrogen reduced more than 50 % in comparison with inconvenient external gas supply.



Oxymat Nitrogen Generator, Model N600. Flow 7,2 Sm<sup>3</sup>/h, purity 10 ppm, 200 bar

### Electronics

- Note / Torsby / Sweden

The customer uses 10ppm Nitrogen in order to protect the soldering processes from oxidation and leaves a clean solder point resulting in increased products quality. After the comparison the end user found the Oxymat Nitrogen PSA solution as the most economical and effective source of Nitrogen (constant delivery, competitive pricing and top performance in air/gas relation).



Oxymat Nitrogen Generator, Model N600. Flow 7,9 Sm<sup>3</sup>/h, purity 10 ppm.

# Features & Benefits of the Oxymat System

#### **Cylinder filling station:**

All systems can be expanded with cylinder filling option. A nitrogen generator combined with cylinder backup gives the highest level of safety.

#### **Custom design:**

Heavy duty construction and design for rough conditions using high quality & durable components, Container installed systems, Frame-built design

#### **Support:**

Very easy to install, operate and require very little maintenance and service. Specialist support from planning, installation and operation of your project.

#### **Safety:**

Low operating pressures, no hazardous storage of cryogenic nitrogen, no safety risks of handling of high pressure gas cylinders.

#### **Touch Screen Control:**

High quality Touch Screen Control Unit (Customized control system). Precision system control for purity level, troubleshooting diagnostics, maintenance schedules and operation diagrams.

#### **Convenience:**

Easy to install and maintain with an unlimited supply of nitrogen. The generator's PLC operates the generator automatically, starting and stopping the production in direct response to demand in the downstream distribution system. Only produce the gas you need, when and where you need in exact quantity and quality needed.

#### **Flexibility:**

Unmatched System Lay-Out Flexibility. No matter your need or application we can provide state-of-the-art design to meet your requirements.

#### **Cost Savings and Fast Payback:**

Quick pay-back 1-2 years. Generators save you handling and storage costs of high pressure gas cylinders and avoids rental charges, transport costs and bulk user evaporation losses. No loss of production time due to running out of gas.

#### **Efficiency:**

The OXYMAT generators have higher separation efficiency than any other PSA system in the market with reduced feed air requirements resulting into lower energy requirement.

#### **Fully Automatic & Remote control:**

Fully automated generator; Unattended Operation; Remote Control Access; Production begins when demand downstream is sensed. The system will go into standby mode when nitrogen is not required.

#### **Reliability:**

High reliability through fewer moving parts and high quality components. You will get controlled low and uninterrupted N<sub>2</sub> gas supply 24/7.

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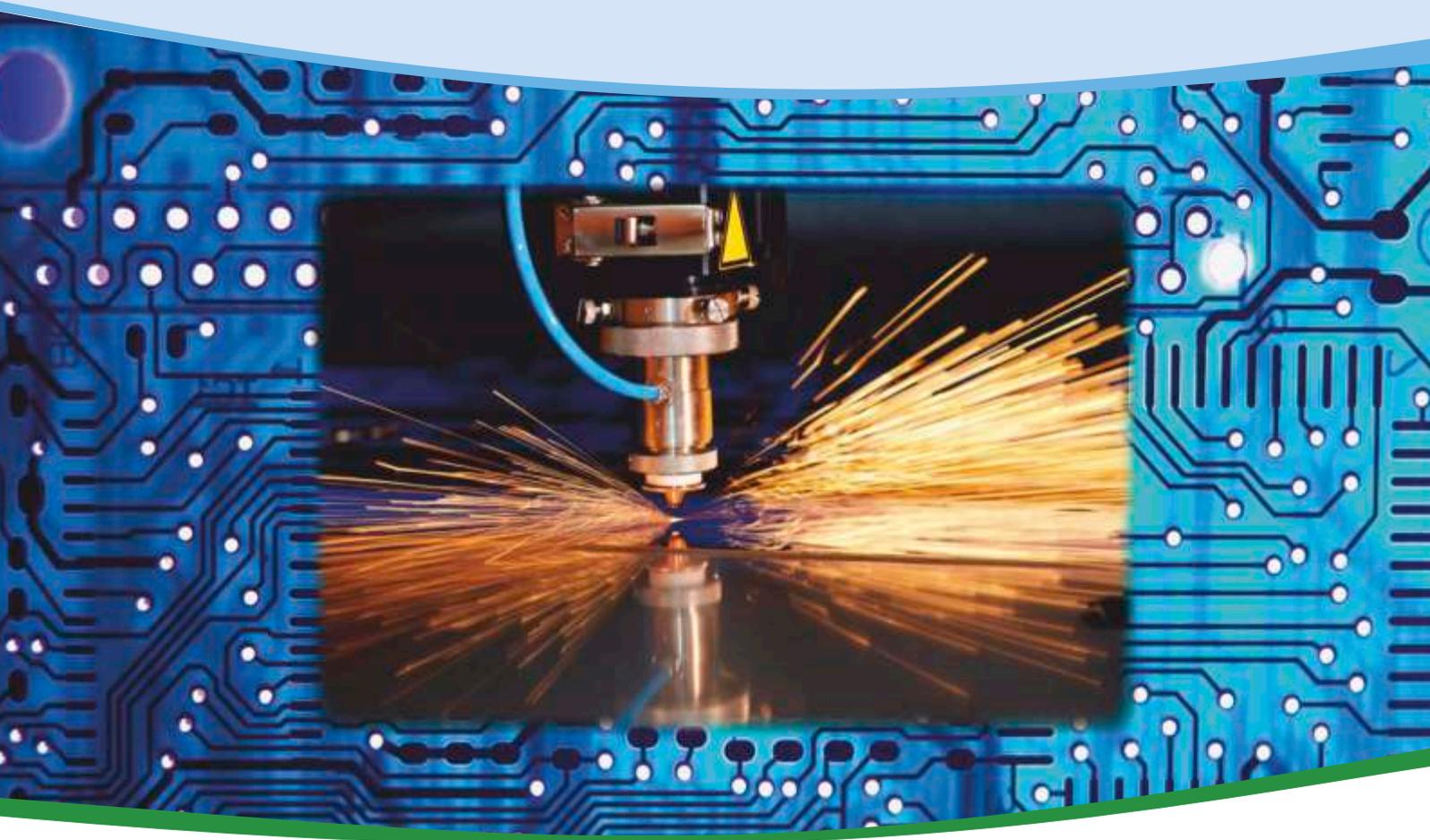
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## Highest level of international approval

Oxymat has vast experience in design, engineering and delivery of thousands of oxygen and nitrogen systems all over the world in accordance with international and national authorities.

Oxymat operates a QA system in accordance with EN ISO 9001:2000 and is certified by Apragaz.

