Membrane
Nitrogen Gas Generation Systems

Presented by:
South-tek Systems
“Manufacturers / Designers of Nitrogen Generating Equipment”
Non-cryogenic Nitrogen Production Technologies

Two distinct Air Separation Technologies

• Pressure Swing Adsorption (PSA)
  • Membrane

Both technologies mechanically separate Nitrogen Molecules from the air.
Why can you separate Nitrogen from the air?

Molecule Size Relationship:

Nitrogen \((N_2)\) molecules are the size of beach balls

Oxygen \((O_2)\) molecules are the size of pin heads
Why can you separate Nitrogen from the air?

- 78% N2
- 20.9% O2
- 1% Ar
- Balance CO2, CO, rare gases
How can you separate N2 from the other molecules?

Two ways of mechanically separating N₂ and O₂ molecules:

1. **Membrane** – the act of separation utilizing a sieve.

2. **Adsorption** (PSA) – the act of attracting or isolating one of the molecules from the others using a material.
What Is Membrane Air Separation Technology?

• A technology used to generate Non-cryogenic (gaseous) Nitrogen on-site

• A polymeric hollow fiber selectively permeates oxygen, water vapor, and other impurities out of its side walls while allowing Nitrogen to flow through its center and emerge as product.

• Thousands of hollow fibers are bundled and encased to form a high performance gas separation module

• One or more modules are skid-mounted and operated in parallel to supply up to 100,000 SCFH of continuous Nitrogen product
The Basics of MEMBRANE Technology
The Basics of MEMBRANE Technology

- End Plate
- Epoxy Tube Sheet
- Support Core
- Hollow Fibers
- O Rings
- Feed Air
- Epoxy Tube Sheet
- Oxygen-Enriched Air
- Enriched Nitrogen Product Gas

South-Tek Systems
N₂ Membrane Gas Generator Technology

Compressed Air In

N₂ Out

O₂ Out (and other residual gases)

O₂ Out (and other residual gases)
A Membrane “mechanically” separates $N_2$ from $O_2$ and other molecules.
It is not a chemical process!!!
It is a safe process!!!

**N$_2$ Membrane**

Gas Generator Technology
N₂ Membrane
Gas Generator Technology

Features:

• Least expensive N₂ production method.

• High N₂ purities, or high N₂ volumes at lower purity levels.

• High reliability due to simple airflow designs.

• Utilizes lower operating and delivery pressures.
N$_2$ Membrane
Gas Generator Technology

BASIC WORKING DIAGRAM

AIR INLET → AIR COMPRESSOR → AIR DRYER → FILTERS → STORAGE → NITROGEN MEMBRANE → STORAGE → TO USAGE
Small Nitrogen Generator for USMC work stations
Large Nitrogen Membrane Generator
# N2 Gas Generation

## Technologies Available

<table>
<thead>
<tr>
<th><strong>Membrane</strong></th>
<th><strong>PSA</strong></th>
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<tbody>
<tr>
<td>Uses more compressed air</td>
<td>Uses less compressed air</td>
</tr>
<tr>
<td>Max inlet air pressure is 225 psig</td>
<td>Max inlet air pressure is 150 psig</td>
</tr>
<tr>
<td>Lower pressure drop (25 psig)</td>
<td>Higher pressure drop 40 psig</td>
</tr>
<tr>
<td>Lower purity available (max 99.5%)</td>
<td>Higher purity available (max 99.999%)</td>
</tr>
<tr>
<td>Membrane lasts 8 to 15 years</td>
<td>Sieve beds last forever</td>
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<tr>
<td>Fewer moving parts</td>
<td>More moving parts with switching valves</td>
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Why use a Gas Generator?

- Cost effective
- Unlimited supply of $\text{N}_2$
- Produce the purity, volume, and flow rate you need at the point of use.
- Minimal maintenance
- Mechanical operation
- Operating Cost = compressor electricity cost
- No high pressure tanks or cylinders to deal with
“STS has your Nitrogen Generation Solution…”

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