Membrane Nitrogen Gas Generation Systems

Presented by:

South-tek Systems

“Manufacturers / Designers of Nitrogen Generating Equipment”

REV 81309

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Non-cryogenic Nitrogen Production Technologies

Two distinct Air Separation Technologies

- Pressure Swing Adsorption (PSA)
- Membrane

Both technologies mechanically separate Nitrogen Molecules from the air.

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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**

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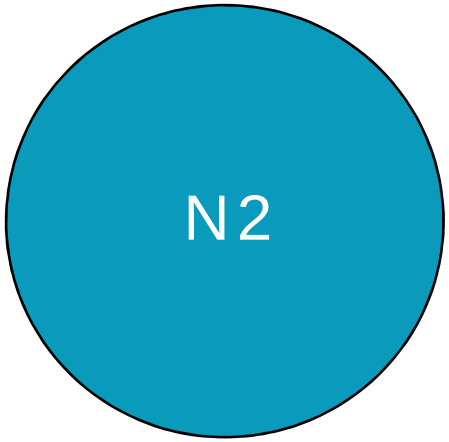
Why can you separate Nitrogen from the air?

- 78% N2
- 20.9% O2
- 1 % Ar
- Balance CO2, CO, rare gases



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How can you separate N2 from the other molecules?

Two ways of mechanically separating N_2 and O_2 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.

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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

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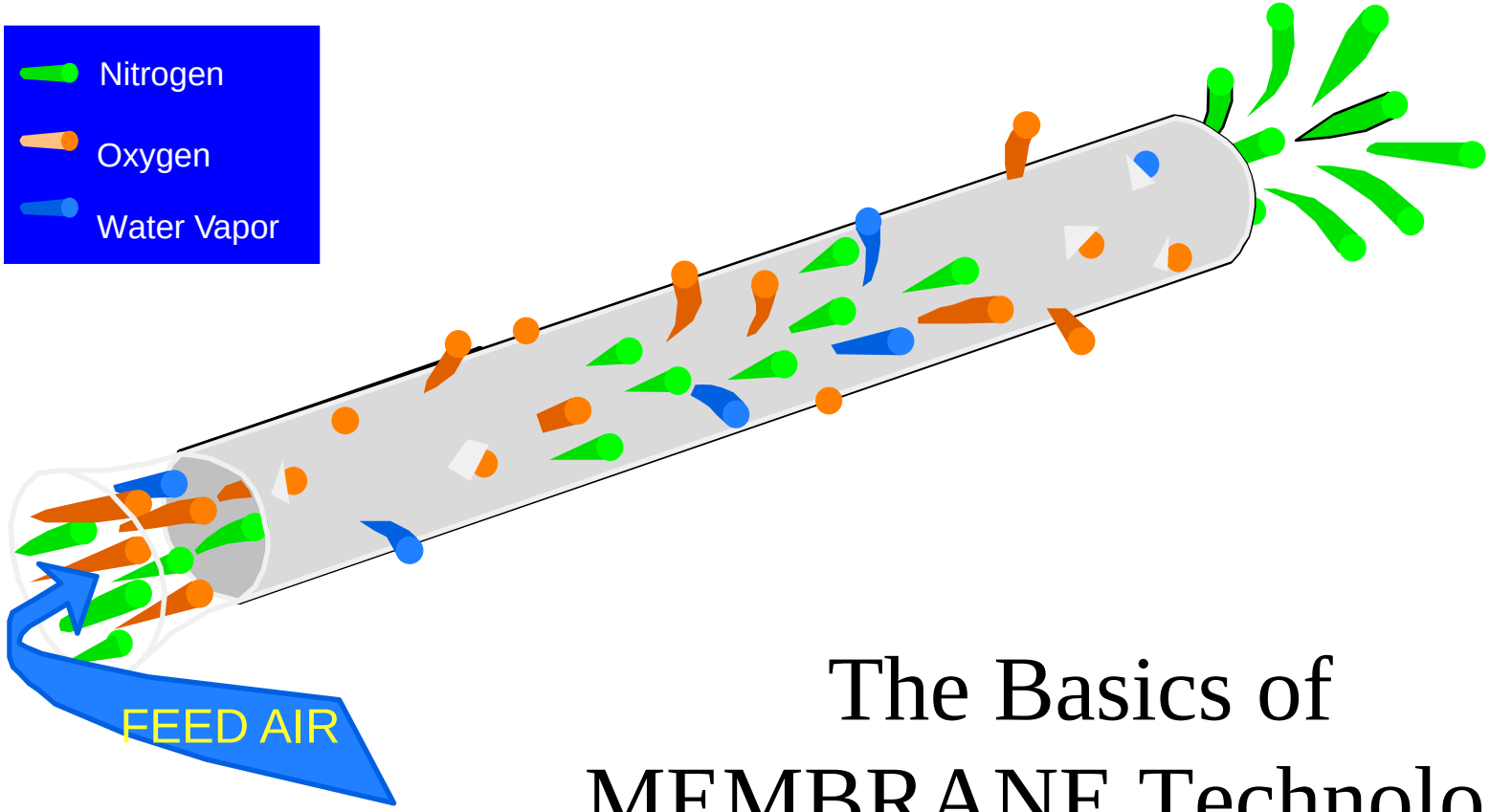

The Basics of MEMBRANE Technology

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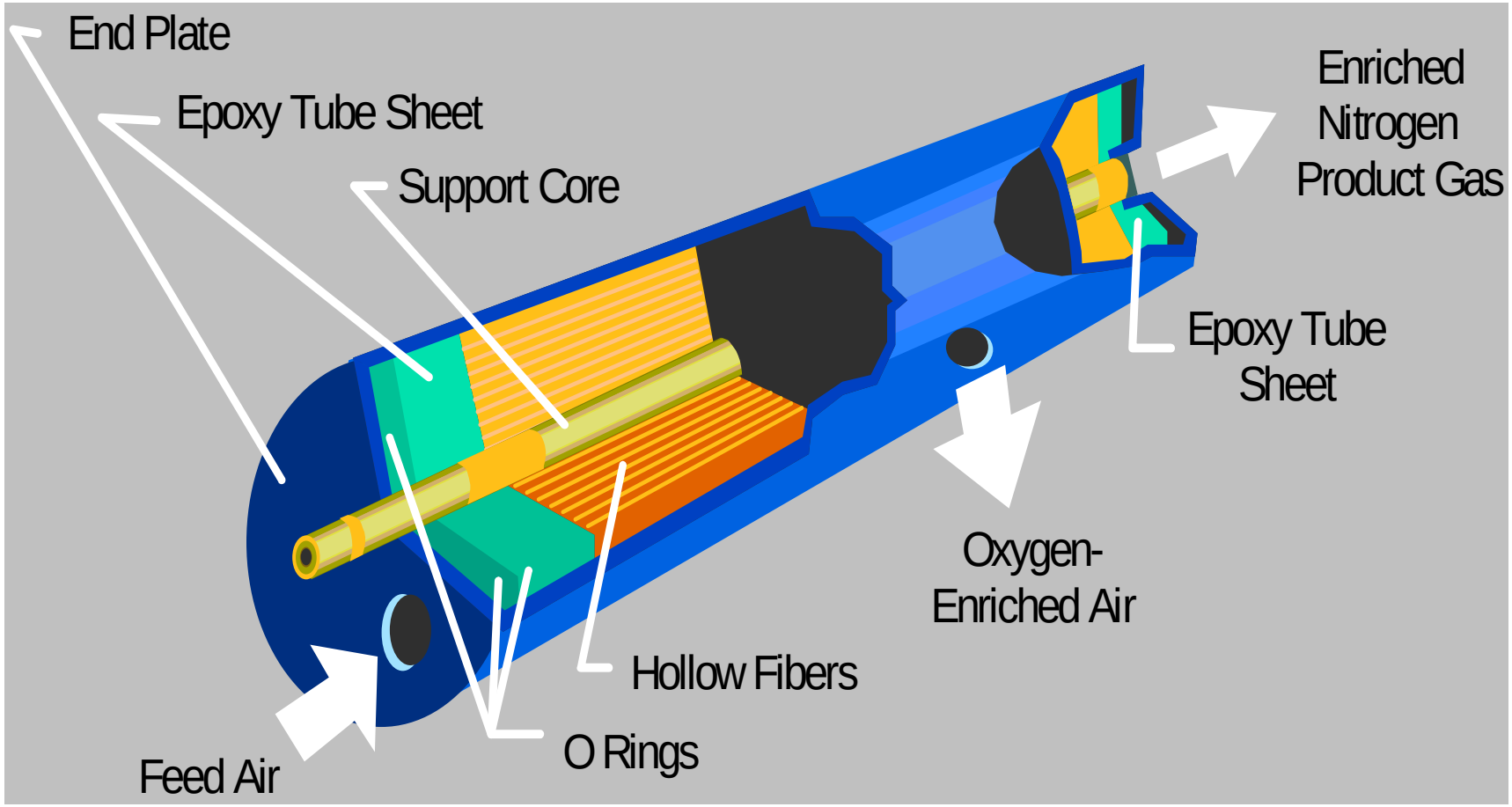
The Basics of MEMBRANE Technology



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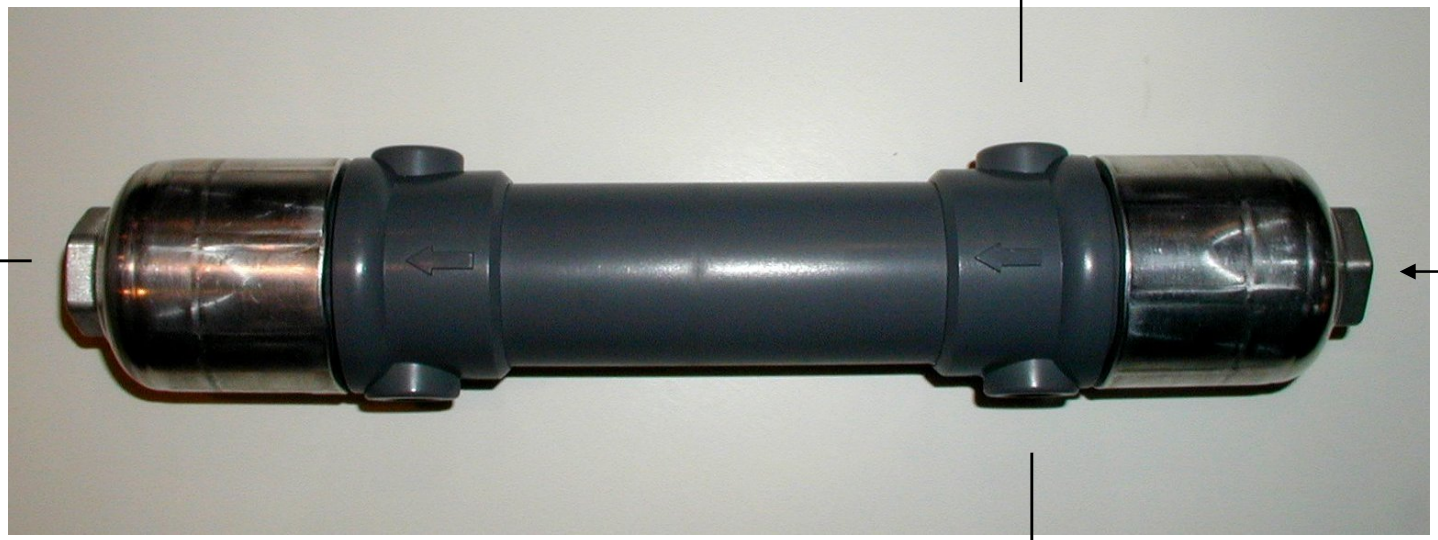
$\underline{N_2}$ Membrane

Gas Generator Technology

O_2 Out (and other residual gases)



Compressed Air In

N_2 Out

O_2 Out (and other residual gases)

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A Membrane "*mechanically*" separates N_2 from O_2 and other molecules
It is not a chemical process!!!
It is a safe process!!!

Membrane Unit

N_2 Membrane

Gas Generator Technology

Cut-away of Membrane unit
internally packed straws

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N_2 Membrane

Gas Generator Technology

Features:

- Least expensive N_2 production method.
- High N_2 purities, or high N_2 volumes at lower purity levels.
- High reliability due to simple airflow designs.
- Utilizes lower operating and delivery pressures.

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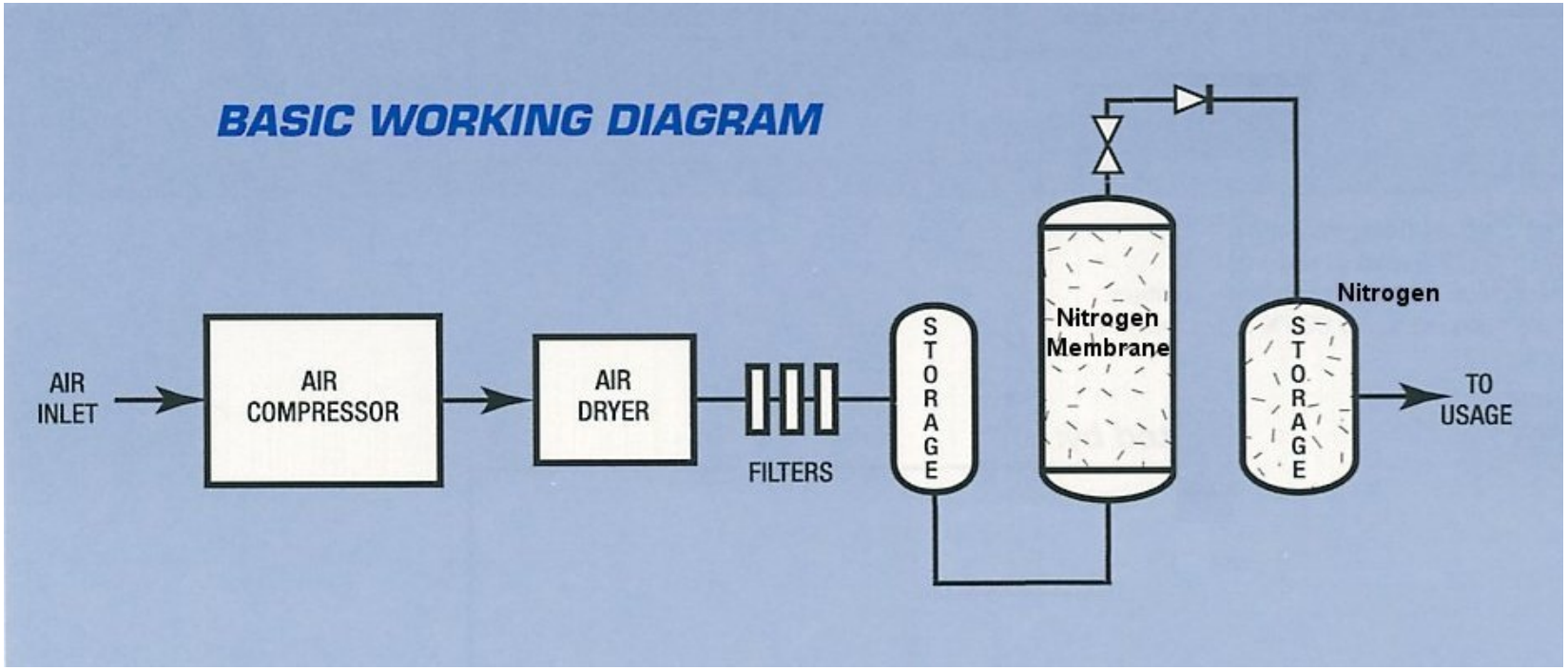
$\underline{N_2 \text{ Membrane}}$

Gas Generator Technology



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Small Nitrogen Generator for USMC work stations

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Large Nitrogen Membrane Generator

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N2 Gas Generation Technologies Available

Membrane

- Uses more compressed air
- Max inlet air pressure is 225 psig
- Lower pressure drop (25 psig)
- Lower purity available (max 99.5%)
- Membrane lasts 8 to 15 years
- Fewer moving parts

PSA

- Uses less compressed air
- Max inlet air pressure is 150 psig
- Higher pressure drop 40 psig
- Higher purity available (max 99.999%)
- Sieve beds last forever
- More moving parts with switching valves

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Why use a Gas Generator?

- Cost effective
- Unlimited supply of 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 South-Tek Systems

“STS has your Nitrogen Generation Solution…”

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