Nitrogen Gas Generation Systems

Presented by:
South-Tek Systems

“Manufacturers / Designers of Nitrogen Generating Equipment”
Who is South-Tek Systems?

- Founded in 1997
- Designs and Manufactures Membrane and PSA, reliable, high purity Nitrogen Generators
- Corporate Offices located in Raleigh, NC
  - Accounting
  - Administrative
- Manufacturing and R&D located in Wilmington, NC
  - Engineering and Product Development
  - Manufacturing
  - Service
  - Sales
  - Marketing
Applications / Customer examples

- HRSG purge - Progress Energy / Florida Power and Light / PSEG
- Rail Car oil purge and Peanut butter load out – Little Debbie snacks
- Food Manufacturing - Chiquita Banana
- Plastic injection molding – Gram packaging / Gatorade
- Nano Lab – Ostendo,
- Electronic boards, automotive – Delphi, CKNA
- Electronic boards – Teledyne, Hewlett Packard
- Fire Suppression Systems – The Discovery Channel, Lockheed Martin
- Vessel Blanketing – Memphis Bio-Fuels / Sofix
- Snack Food manufacturing – Frito Lay
- Pharmaceutical Processing – Pfizer / Abbott Labs
- Transmission Tower purge – WSOC TV, WCPE FM
- Tire Filling – Rent and Roll, Buick, GM
- Medical/Laboratory – FDA, USDA (15+)
- Draft Beer – BWW, Friday’s Outback, Ruby Tuesday (3K+)
- Optics / NVG Equipment – ARMY, USMC, USAF, USN (200+)
- Brazing – TRANE
- Heat Treating – Robinson Helicopters
• Nitrogen gas (N₂) makes up 78.1% of the volume of the Earth's air
• Nitrogen was sometimes referred to as 'burnt', since air that no longer contains oxygen is almost all nitrogen
• Your body is 3% nitrogen by weight
• You breathe oxygen, yet air is mostly nitrogen. You need nitrogen to live and encounter it in the foods you eat and in many common chemicals
WHY Nitrogen?

- In all applications, nitrogen is used to replace or remove oxygen.
- This stops the burning triangle by removing the oxygen needed for the reaction.
Stopping Oxidation

rapid and violent oxidation reaction

Slow oxidation
How do you GET Nitrogen

• **Buy It**
  • Local gas company
  • High Pressure Bottles
  • Dewars (small liquid tanks)
  • Large Liquid N2 tanks

• **Make It**
  • PSA or Pressure Swing Adsorption
  • Membrane
How do you GET Nitrogen

- Buy It
  - Local gas company
How do you GET Nitrogen?

• Buy It
  • Local gas company

• High Pressure Bottles

• Holds 245 SCFH of N2

• Storage pressure of 2400 psi
How do you GET Nitrogen

• Buy It
  • Local gas company
  • Dewars (small liquid tanks)
  • 4500 CFH of nitrogen
  • Least efficient method due to evaporation
  • Even with no use, empty in 30 days
  • Requires handling by personnel
How do you GET Nitrogen

• Buy It
  • Large Liquid N2 tanks
Cryogenic Nitrogen Production Technology

- Chill/Freeze Air
- Nitrogen liquefies at -320 degrees F
- Transport the liquid to the site and store in liquid bulk tanks
- Liquid N2 boils off at 2% of the volume of the storage tank per day.
- Required if N2 is needed for the application to flash freeze
How do you GET Nitrogen

• Buy It
  • Large Liquid N2 tanks
How do you GET Nitrogen

• **Buy It**
  • Local gas company
  • High Pressure Bottles
  • Dewars (small liquid tanks)
  • Large Liquid N2 tanks

• **Make It**
  • PSA or Pressure Swing Adsorption
  • Membrane
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
Non-cryogenic Nitrogen Production Technologies

Two distinct Air Separation Technologies

- Pressure Swing Adsorption (PSA)
- Membrane

Both technologies mechanically separate Nitrogen Molecules from the air.
The Basics of MEMBRANE Technology
**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**

Membrane Unit

Cut-away of Membrane unit
internally packed straws
**N₂ PSA**
Gas Generator Technology

PSA = “Pressure Swing Adsorption”
What is Pressure Swing Adsorption (PSA)?

- A technology used to generate non-cryogenic (gaseous) Nitrogen on-site
- Carbon Molecular Sieve (CMS) adsorbs oxygen and water vapor molecules under high pressure - while allowing Nitrogen to pass through
- Skid-mounted units can supply up to 75,000 SCFH of continuous Nitrogen product
Sieve Bed Pressure Vessels Filled with Carbon Molecular Sieve
**N₂ PSA**

Gas Generator Technology
Designers and Manufacturers of N2 Generators
Advantage STS

• Purity Certification on all systems

• Standard and optional electronics packages

• Nitrogen Audit or Flow Verification

• Engineering and Experience
Advantage STS

- Purity Certification on all systems
  - Customers are provided with a DAS, purity certification

Purity Certification

N2 GEN MODEL: N2 GEN 70C

SERIAL NUMBER: 23765
PRODUCTION / DAS DATE: 1/24/2012
NITROGEN PURITY LEVEL: 99.99%
NITROGEN FLOW RATE: 154 SCFH

NITROGEN GENERATOR

NOTARY SIGNATURE

DAS / TEST SUPERVISOR
Advantage STS

• Purity Certification on all systems
  – Customers are provided with a DAS, purity certification
Advantage STS

- Standard and optional electronics packages

- Oxygen analyzer
- RS 232
- Ethernet
- Mod Bus
- 4-20
- 0 – 10
- Maintenance reminders
- Low pressure alarms
- Nitrogen flow rates
- AB or other controllers available
South-Tek Systems

Advantage STS

• Nitrogen Audit
• Flow Verification

South-Tek Systems now offers the Nitrogen Flow Verification Program designed for your company to verify your flow rate requirements prior to purchasing a Nitrogen (N2) Generator. This ensures the N2-Generator you purchase will be sized correctly for the flow requirements of your Nitrogen gas application.

The flow meter is housed within a predetermined length of pipe with flare fittings on either end. It connects easily to the tubing of an existing Nitrogen gas line and features an easy-to-read flow rate display. Simply valve off the pressure in the line in which you want to measure flow, ensure the pressure is at zero PSI, cut your tubing, insert the flow meter pipe section into the two ends of the tubing, use hose clamps provided to secure the hose to the flow meter pipe section, plug the flow meter into a 110V outlet and monitor the flow rate display to record the maximum nitrogen flow rate used in your process. Once your test has been concluded, remove the flow meter pipe section, and insert the coupler and use the hose clamps provided to re-connect your tubing for continued process use.

Provide South Tek Systems with the maximum flow rate you see during your test and we will size a N2-Generator properly to meet your Nitrogen usage needs.

To learn more about the Nitrogen Flow Rate Verification Program or South-Tek Systems, please visit the Products tab at www.southteksystems.com or call 888-526-6284.
Advantage STS

- Engineering and Experience
Advantage STS

• Engineering and Experience
Advantage STS

• Engineering and Experience
Liquid N2 back up
Advantage STS

- Engineering and Experience

Quality, we build it
Applications / Customer examples

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“STS has your Nitrogen Generation Solution...”

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