Industrial Plant Utilities

The webinar will begin in less than 10 minutes.





Industrial Plant Utilities

The webinar will begin in less than 5 minutes.





Webinar starting soon; until then...

TEST YOUR KNOWLEDGE

Which of the following is <u>not</u> a type of compressor?

Rotary Screw

4-Cycle

Reciprocating

Rotary Vane





Webinar starting soon; until then...

TEST YOUR KNOWLEDGE

Which refrigerant is the most used in industrial refrigeration systems?

CFC

HCFC

NH₃

 CO_2





Webinar starting soon; until then...

TEST YOUR KNOWLEDGE

Which heat transfer system is operated at higher temperatures?

Open Loop

Thermal Graphic

Closed Loop

Induction Heater





Industrial Plant Utilities





Amber Fessler– CLGS, CLS & OMA-I

- CITGO Senior Technical Services Representative
- Materials Engineer
- 13 Years of Experience in Lubricants
- STLE Certified
 - Certified Lubrication Specialist
 - Oil Monitoring Analyst I
- NLGI Certified
 - Certified Lubricating Grease Specialist



Want Resources?





Future Webinars

October 18: Food, Bottling & Pellet Mill Industries

December 13: Upcoming OTR Specification Updates



Frank Hayes - CLS, OMA-I, MLA-I, MLT-I, CLGS & CRC

- CITGO Product Specialist
- B.S. Mechanical Engineering
- 25+ Years Experience in Lubricants, including with
 - Petro-Canada Lubricants, Sr. Technical Services Advisor
 - Conoco, Lubrication Engineer



Matthew Gerber – STLE OMA-I

- CITGO Sr. Product Specialist
- B.S. Mathematics & Chemistry
- M.S. Mathematics
- 13 Years of Experience in Lubricants
- 10 Years of Laboratory Experience



Greg Withers – STLE CLS & OMA-I

CITGO Sr. Account Manager

 10 Years of Selling Experience in the Lubricants Industry



Heat Transfer System

Heat Transfer Fluids

- CITGO Hytherm Oil 46
- System Assessment and Product Transition
- Fluid Condition Monitoring

Compressor Oils

Industrial Refrigeration System

- Refrigerant Types
- CITGO Refrigeration Compressor Fluids
- System Assessment and Product Transition
- Fluid Condition Monitoring

Prospecting and Initial Meetings in Industrial Sales

Industrial Plant Utilities

Critical systems used to help sustain a manufacturing process

- Air Compressors for pneumatic systems
- Refrigeration systems for cold applications
- Heat Transfer Systems



Heat Transfer Systems Overview



Diagram Source: <u>https://www.semanticscholar.org/paper/SAFETY-IN-DESIGN-OF-THERMAL-FLUID-HEAT-TRANSFER-Ennis/ff26ae243f96d9dc3d926a7e56180055cf38699c</u>

Heat Transfer System

Heat Sources:

- Furnace
- Electric Immersion Heater
- External Heater Coil

Functional Consumers:

- Asphalt Tanks
- Heated Roll Presses
- Plastic Injection Machines
- Hot Chemical Baths
- Heated Storage Vessels
- Process Temperature Control

Closed Loop Heat Transfer System



Open Loop Heat Transfer System





Heat Transfer Fluids

Heat Transfer Fluid Ranges

Max Bulk Temperature °F





CITGO Hytherm Oil 46

Used in most manufacturing settings

- Asphalt plants
- Heated roll presses
- Plastic injection industry
- Chemical treatment facilities
- Hot product storage
- Petroleum and chemical processing

Safe for use in

- Closed heat transfer systems, at temperatures up to 600°F
- Open heat transfer systems at temperatures up to 400°F

Features, Benefits and Differentiators to address Customer Priorities

Premium-quality high viscosity index, paraffinic base stocks

Special high-temperature detergent/dispersant additive package helps maintain system cleanliness and operational performance, reducing downtime and maintenance costs

Contains rust and oxidation inhibitors to reduce deposit formation tendencies



Highly efficient heat transfer due to high specific heat and good thermal conductivity at all temperatures.

ISO VG 46

46



System Assessment and Product Transition

System Assessment

1	2	3	4	5	6	7
Understand heat transfer system type	Know fluid type and specifications in service	Know design and expected system heat transfer rates	Calculate heat transfer rates at temperature	Determine fluid compatibility	Determine system cleanliness level	Possibly recommend system cleaning

Fluid Transition Process

2

Calculate fluid expansion rates vs expansion tank capacity Implement an onstream or off-line system cleaning protocol

CITGO CompKleen CITGO CompressorGard DE Take sample of new oil in early service

3



Fluid Condition Monitoring

Fluid Condition Monitoring

Test every six to twelve months

One-quart samples

Test Package

- Elemental Spectroscopy
- Viscosity at 40°C or 100°C
- ASTM D1500 Color
- Membrane Patch Colorimetry
- Oxidation by FTIR
- Acid Number (AN) by ASTM D664
- Simulated Distillation
- Initial Boiling Point



Compressor Oils

Principles of Compression

Compressors can be thought of as a pump for gases. Much like a pump for liquids, the output pressure of the gas is increased after going through the compression stage.

Two main types of compressors

- Positive Displacement compressors increase the pressure of a gas by decreasing its volume.
- Dynamic compressors increase the pressure of a gas by converting the kinetic energy of a high-speed gas into pressure.




Rotary Compressors



Rotary Vane Compressor

- Air drawn through intake and trapped between the rotor and stator wall
- As the vanes rotate, the available volume for the air decreases, causing the pressure of the air to increase



Rotary Screw Compressor

- Air drawn through intake and enters the space between the rotors and housing
- As the rotors turn, the area between the rotors becomes progressively smaller, compressing the entrapped air





Air is pulled into the compression chamber on the downward stroke of the piston

On the upward stroke, the volume of the compression chamber decreases, pressuring the gas As the impeller rotates, the gas is pushed outward due to the centrifugal force produced.

This causes an acceleration of the gas, increasing its kinetic energy.

The gas then enters a diffuser which slows down the gas, converting the kinetic energy into pressure.



Centrifugal compressor schematic diagram



Air Compressors

Critical equipment in an industrial plant Several Uses: Drive pneumatic tools Operate machinery Control manufacturing processes

Rotary Compressors

- Most common
- Generally, up to 150 psi
- Compact and quiet

Dynamic Compressors

 Industrial applications requiring large volumes of gas

 Output pressure dependent on the number of compression stages Reciprocating Compressors

- Still in use, but in decline
- Generally, up to 150 psi, but some models can go up to very high pressures
- Noisier than rotary compressors

Air Compressors

Compressor Fluid Functions

Seal	Seal the Compression Mechanism
Transfer	Transfer Heat from the Compression Area
Lubricate	Lubricate Moving Parts
Protect	Protect the Metal Parts of the Compressor

CITGO Compressor Oils

CITGO offers a wide range of compressor oils

Various factors to consider:

- Viscosity Profile
- Compressor Type
 - (Reciprocating, Rotary, Dynamic)
- Compression Gas
- Operating Conditions



CompressorGard PS 68

Synthetic Blend formulation

Made with ultra-high purity base stock

Good oxidation resistance and thermal stability

Low oil carryover

Recommended for rotary and dynamic compressors

CompressorGard SS

Synthetic Blend formulation

Good oxidation resistance and thermal stability

Low oil carryover

Recommend for rotary and reciprocating compressors

Available in ISO 100, 150, and 220

CompressorGard PAO

Made with polyalphaolefin (PAO) base stock

Wide temperature operating range

Excellent oxidation resistance, thermal stability, and deposit control

Compatible with most elastomers and seals

Designed for use with rotary and dynamic compressors

Available in ISO 32, 46, 68, 100, and 150

CompressorGard DE

Made with diester base stock

Excellent oxidation resistance and thermal stability

Increased solvency reduces sludge and deposits formed by thermal and mechanical stress

Not compatible with all elastomer and seal types

Available in ISO 32, 68, 125, and 150

DE 32 and DE 68 are recommended for rotary compressors

DE 125 and DE 150 are recommended for reciprocating compressors

Available in ISO 32 and 46

ISO 32 specifically formulated for Sullair rotary screw compressors

ISO 46 specifically formulated for Ingersoll-Rand rotary screw compressors

CompressorGard GE

Made with polyglycol (PAG) and alkylated hydrocarbon base stocks

Excellent oxidation resistance, thermal stability, and deposit control



Industrial Refrigeration System Overview

Simple Refrigeration Cycle



Typical Industrial Refrigeration Syste CO

- Receiver
- King Valve
- Expansion Valve
- Vessel
- Pump
- Metering Valve
- Evaporator
- Compressor
- Condenser





Rotary Screw Compressor

Reciprocating Compressor



Suction Sliding Vanes

Rotary Vane Compressor

Refrigeration Compressor Types



Refrigeration Types

RETU

Ammonia (NH_3 or R-717)

Natural and plentiful refrigerant

Environmentally and ozone friendly

Has a strong odor, so leaks are easy to detect

High concentration to cause serious potential health effects

Flammable

Strict safety precautions necessary

Generally low solubility in oil

Ammonia



CFC (chlorofluorocarbon)

HCFC (hydrochloroflurocarbon)

Originally developed in the 1930s as non-toxic replacement for ammonia

Phased out (1970s)

Contribute to the depletion of the ozone layer

Replaced CFC's as a refrigerant

Expected to have a product life cycle of only 25 - 30 years due to environmental regulations

Phased out, due to environmental regulations

HFC (hydroflurocarbon)

Environmentally friendly refrigerant

Developed to replace chlorinated refrigerants (CFC's and HCFC's)

CO₂ (carbon dioxide)

Replaced CFC systems

Used in extremely low temperature systems (-30C to -50C)

Used in cascade systems in conjunction with ammonia systems.





CITGO Refrigeration Compressor Fluids

CITGO Ice Machine Oil 68

Applications:

- Reciprocating, rotary vane and rotary screw ammonia compressors in:
 - industrial refrigeration systems
 - industrial evaporating ice machines

Features & Benefits:

- Pour point depressed
- Paraffinic oil
- Quick and complete separation from water and refrigerant
- Comparable to Frick Co. Refrigeration Oil #3
 ISO VG 68

CITGO North Star Refrigeration Oil

Applications:

- Refrigeration compressors where lowtemperature fluidity and floc points of -50F or lower are required
- Not recommended for use with hydrofluorocarbons (HFC) such as R-134A

Features & Benefits:

- Low pour and floc points
- Good seal control
- Naphthenic oil
- 54 cSt @ 40C

CITGO North Star Refrigeration Oil 68

Applications:

- Refrigeration compressors
- Extremely low temperature applications requiring low floc points.
- Not recommended for use with hydrofluorocarbons (HFC) such as R-134A.
- Suitable for lower cooling temperatures than CITGO Ice Machine Oil 68.

Features & Benefits:

- Low pour and floc points
- Good seal conditioning
- Naphthenic base oil
- ISO VG 68

A commonly held misconception is that the floc point is a meaningful characteristic of an ammonia refrigeration lubricant
Relates to a CFC system
The highest temperature at which waxy particles solidify in a mixture of 10% oil in refrigerant R-12 (Freon)



System Assessment and Product Transition

System Assessment and Product Transition



Learn lowest temperature in system



Know time on compressor since overhaul



Pour point 20°F above lowest temperature in system

If following a naphthenic with Paraffin, replace seals



Clean and flush lubrication system before running new fluid



Fluid Condition Monitoring

Fluid Condition Monitoring

Test Package

Test every month

4oz sample

Elemental Spectroscopy
Viscosity at 40°C and 100°C
ASTM D1500 Color
Oxidation by FTIR
Acid Number (AN) by ASTM D664





Difficulties and Differences Selling into Industrial

CITGO

Difficulties

Barriers to Entry
Empty Reception Areas
Wearing Many Different Hats/Time

STOP

Differences

More sophisticated buyer
Not as price sensitive
More complex systems
More influencers

What is

Prospecting?

The activity of identifying and contacting potential customers to generate new revenue.



Current Customers Online

Cold Call



Observe industrial facilities near current customers

Find out who your customers work with

Ask for referrals

3 approaches:

Timing
Ask for help
Compliment

Identifying Prospects Through Current Customers
Identifying Prospects Online

Manufacturing facilities near me







Identifying Prospects via Cold Call (On-Site)

Cold calling is not dead

Do quick research prior to cold callsReceptionist or Guard Shack

- Main goal, get contact name and
- Main goal: get contact name and info
- Ask for help!
- Always ask for introduction
- Unconventional Approaches

Connecting via Phone/Email

Prepare

- Research company/person
- Form your script

Tips

- Cell phone > Office Phone
- Voicemail 3 approaches
- Don't be afraid to text
- Consistency/Persistence is key

"I'm <your name> with <local oil distributor>.

We are a locally owned fuel and lubricant supplier that has been serving the community for 50 years. I help maintenance managers improve their lubrication program and overall plant reliability.

I'll be in your area at one of my current accounts next Tuesday, I'd like to come by and introduce myself. I know you're busy, so we'll keep it brief. Please let me know what time works for you."



Prepare (Again)

Research the company
Understand their work
Research the person
Get your SAM involved
Set goals for the meeting

You Got the Meeting! Now What?

It's Meeting Time!

- Be prompt
- Build credibility
- Get out of the office
 - Ask open-ended questions
 - Take pictures (ask first!)
 - See the lube room
 - Refrain from pointing out every issue
- Set the next meeting





Industrial Plant Utilities

Look for:

- Engine Room
- Utility Room
- Compressor Room
- Hot Oil Furnace

Start asking questions about:

- Air Compressors for pneumatic systems
- Refrigeration systems for cold applications
- Heat Transfer Systems

Heat Transfer Systems

What heat transfer fluid are you using now?

What is the maximum bulk temperature (at heater/furnace discharge) of your heat transfer fluid?

Is your furnace or heater operating at the OEM-prescribed setting?

Is the service point reaching design process temperature?

Are there any heat transfer fluid leaks?

How often is oil analysis performed on the heat transfer fluid?

Plant Air Compressors

What are the makes and models of the air compressors?

What compressor fluid(s) are used in the compressors?

What is the annual maximum sustained air discharge pressure of each compressor?

How much condensation reaches the pneumatic service points?

How often is oil analysis performed on the compressor fluids?

Refrigeration Systems

What are the makes and models of the refrigeration compressors?

What refrigeration compressor fluid(s) are used in the compressors?

How many hours of operation has it been since the last overhaul of each compressor?

What is the coldest temperature of the refrigeration cycle?

How often is oil analysis performed on the compressor fluids?

Questions?



Please post your questions using the O&A function.

For technical inquiries or issues: Lubes Answer Line 800-248-4684 <u>lubeshelp@citgo.com</u>



Thank You!

See you next time!