Ammonia Refrigeration Series
Achieving Energy Cost Savings for Ammonia Refrigeration Systems
May 22–24, 2013
Madison, Wisconsin

- Develop strategies to reduce refrigeration-related energy costs
- Identify methods for improving system energy efficiency
- Validate your efficiency improvements

A practical course for:
- Plant, design, and consulting engineers
- Energy and utility managers
- Refrigeration system operators
- Contractors
- Energy service providers and others

Save time and money! Inquire about on-site & online courses. Call 800-462-0876 today!

ENROLL ONLINE TODAY!
Or visit our Web site
Achieving Energy Cost Savings for Ammonia Refrigeration Systems
May 22–24, 2013 in Madison, Wisconsin

Practical, Fast-paced Course
Expand your knowledge of energy-efficiency improvements in industrial refrigeration systems! By participating in this practical, fast-paced course, you will gain the information and know-how to identify and implement energy-efficiency improvements in your plant’s industrial refrigeration systems.

Results-oriented Learning Objectives
Four key learning objectives will guide your instruction and enhance your ability to deliver energy savings back on the job:
• Understand factors that influence system energy efficiency and energy costs
• Identify methods for improving system energy efficiency
• Develop an action plan
• Validate your efficiency improvements

Interactive Workshops
Your instructors will mix classroom sessions with interactive workshops and real-world case studies, giving you the opportunity to maximize knowledge transfer and to interact with the instructors and other course participants.

Key Topics for Energy Efficiency
• Single and multi-stage compression systems (overview)
• Compressor and condenser selection, operation, and control strategies
• Evaporators and evaporator piping
• Heat recovery options
• Utility rates and rate structures
• Benchmarking systems
• Maintenance considerations
Most of Wednesday afternoon’s instruction and all of Thursday’s will focus in-depth on helping you identify specific energy-saving opportunities for improving your plant’s refrigeration systems.

Who Will Benefit
This course will assist plant engineers, energy managers, utility managers, refrigeration system operators, design engineers, contractors, energy service providers, plant operations staff, consulting engineers, and others interested in improving the energy efficiency of industrial refrigeration systems.

To maximize the benefits from this course, you should understand the basics of industrial refrigeration systems, including refrigerant properties and system component configurations.

We recommend that you bring a laptop or calculator to the course.

Why This Course
Rising energy costs and the dwindling availability of reliable energy sources are major concerns for companies that rely on industrial refrigeration systems for their operation. The surge in energy costs is impacting significantly the bottom line for many companies. Industrial refrigeration systems have come under closer scrutiny since they are one of the single largest consumers of energy in many facilities. Establishing goals and setting priorities are important preliminary steps in the overall process aimed at achieving more energy-efficient refrigeration systems. However, many owners and operators of industrial refrigeration systems have broader concerns and interests that may include
• Decreasing overall plant energy consumption and energy costs
• Increasing production capability
• Maintaining quality of stored products
• Maximizing capital utilization
• Reducing maintenance costs
• Minimizing environmental impacts and off-site consequences

By helping you to improve the energy efficiency of your refrigeration systems, this course can also enhance many of the above attributes.

Past Participants Say...

“\[I will be able to save the cost of this course in one month.\]
Steve Ardiana
Gerber Products

“The ideas I gained should show large savings.
Thomas Maxwell
Ben & Jerry's

“I now have several ideas to incorporate on future projects.”
Peter Brennan
Ancora, Inc.

“Valuable insight on energy reduction opportunities. Enjoyed every aspect. Value for the time spent.”
B. Ray Chambers
McCain Foods USA, Inc.

Dear Colleague,
Attending this course is your opportunity to identify proven methods to achieve both energy and energy-cost savings in industrial refrigeration systems.

Douglas Reindl
Program Director

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Course Outline

Wednesday, May 22
8:00  Registration and Coffee
The Pyle Center
702 Langdon Street
Madison, WI
8:30  Welcome
Douglas T. Reindl
Professor, Engineering Professional Development
Director, Industrial Refrigeration Consortium
University of Wisconsin–Madison

8:45  Refrigeration Systems Overview
• Basic single stage compression systems
• Evaporator configurations
  – direct expansion
  – flooded
  – liquid overfeed
Douglas T. Reindl

9:30  Break

9:45  Refrigeration Systems Overview (continued)
• Multi-stage compression systems
  – direct liquid expansion
  – indirect liquid expansion
• Preview of energy conservation measures
Douglas T. Reindl

10:15  Compressors and Compressor Performance
• Technology alternatives
• Interpreting compressor maps
• Correcting for actual compressor application/operation
• Factors influencing performance
  – off-design operation
  – unloaders and part-load performance
  – economizers and side-port loads
• Oil cooler heat rejection methods (screw compressors)
Douglas T. Reindl

12:00  Lunch

1:00  Billing Analysis/Utility Rate Workshop
Daniel J. Dettmers

2:15  Methods of Heat Rejection
• Air-cooled condensers
• Water-cooled condensers
• Evaporative condensers
• Performance characteristics
• Control strategies
• Influence on system performance (capacity and efficiency)
• Dry operation
Douglas T. Reindl

3:00  Adjournment

Thursday, May 23

7:45  Coffee and Conversation

8:30  Utility Rates and Rate Structures
• Overview
• Rate structures
  – flat rates
  – time-of-use
  – seasonal rates
  – real-time pricing
  – ratchets
• Influence of deregulation on rates
• Gas rates
Daniel J. Dettmers
Research Engineer, Industrial Refrigeration Consortium
University of Wisconsin–Madison

9:30  Break

9:45  Performance Analysis
• Measures of performance
• Performance measurement techniques
• System modeling
• Billing analysis
• Benchmarking
Daniel J. Dettmers

11:00  Break

11:15  Case Studies in Energy Efficiency Improvements
Todd B. Jekel
Assistant Director, Industrial Refrigeration Consortium
University of Wisconsin–Madison

12:00  Lunch

1:00  Uncovering Energy-Saving Opportunities (continued)
• Creating a recipe for success
• Floating head pressure control
  – Why float head pressure?
  – What are the limitations?
• Condenser sizing and selection considerations
  – case studies
Douglas T. Reindl

2:15  Next Steps
• How/when to implement
• Validation/verification
• Continuous improvement
Douglas T. Reindl

3:00  Open Discussion

3:30  Final Adjournment

Friday, May 24

7:45  Coffee and Conversation

8:30  Uncovering Energy-Saving Opportunities (continued)
• Compressor control
  – recips vs. screws
  – fixed vs. variable volume ratio
  – selection considerations
  – sequencing and control in multi-compressor systems
Douglas T. Reindl

9:30  Break

9:45  Uncovering Energy-Saving Opportunities (continued)
• Compressor control
  – recips vs. screws
  – fixed vs. variable volume ratio
  – selection considerations
  – sequencing and control in multi-compressor systems
Douglas T. Reindl

2:15  Methods of Heat Rejection
• Air-cooled condensers
• Water-cooled condensers
• Evaporative condensers
• Performance characteristics
• Control strategies
• Influence on system performance (capacity and efficiency)
• Dry operation
Douglas T. Reindl

3:00  Adjournment
Four Easy Ways to Enroll

Please enroll me in

Achieving Energy Cost Savings for Ammonia Refrigeration Systems
Course #N216 May 22–24, 2013 in Madison, WI Fee: $1195

I cannot attend at this time. Please send me brochures on future courses.

Name ________________________________
Title ________________________________
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Billing Information

- Bill my company
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Please check the box if you are a person with a disability and desire special accommodations. A customer service representative will contact you. Requests will be kept confidential.

Additional Enrollees

Name ________________________________
Title ________________________________
E-mail ________________________________

Contact:
Mary Danielson
Program Associate:
Douglas Reindl, PhD, PE
Program Director:
Call toll free 800-462-0876 and ask for
800-462-0876 or go to epd.engr.wisc.edu
工業冷凍機器システム

Industrial Refrigeration Consortium (IRC)
The IRC, a collaborative effort between the University of Wisconsin–Madison and industry, offers its members practical refrigeration information and application-oriented research, a telephone hotline, Internet-based information resources, on-site technical assistance, and specialized publications. To learn more, check the IRC website at www.irc.wisc.edu, e-mail IRC director Douglas Reindl, dreindl@wisc.edu, or phone toll free 866-635-4721.

Need to Know More?
Call toll free 800-462-0876 and ask for
Program Director:
Douglas Reindl, PhD, PE
Program Associate:
Mary Danielson
Or e-mail custserv@epd.engr.wisc.edu

Other Ammonia Refrigeration Courses

Process Safety Management Audits for Compliance and Continuous Safety Improvement
January 16–18, 2013
Course #N212

Introduction to Ammonia Refrigeration Systems
March 6–8, 2013
Course #N213

Design of Ammonia Refrigeration Systems for Peak Performance and Efficiency
September 9–13, 2013
Course #N218

Process Hazard Analysis
September 24–26, 2013
Course #N322

Principles and Practices of Mechanical Integrity for Industrial Refrigeration Systems
November 6–8, 2013
Course #N226

Intermediate Ammonia Refrigeration Systems
December 4–6, 2013
Course #N221

For additional information, call 800-462-0876 or go to epd.engr.wisc.edu/ammoniarefrigeration.

General Information

Fee Covers Notebook, course materials, break refreshments, lunches, and certificate.

Cancellation If you cannot attend, please notify us seven days in advance, and we will refund your fee. Cancellations received after this date and no-shows are subject to a $150 administrative fee. You may enroll a substitute at any time before the course starts.

Location The Pyle Center, 702 Langdon Street, Madison, WI. Phone messages: 608-262-1292.

Accommodations We have reserved a block of guest rooms (rates starting at $89, including continental breakfast) at Lowell Center, 610 Langdon Street, Madison, WI. Reserve a room online at epd.engr.wisc.edu/lodgingN216 or call 866-301-1753 or 608-256-2627. Room requests after April 23 will be subject to availability. Other fees and restrictions may apply.

Earn Continuing Education Credit By participating in this course, you will earn 2.0 Continuing Education Units (CEU) or 20 Professional Development Hours (PDH).