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# HVAC & R NEWSLETTER

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## **Industrial Refrigeration Consortium to Serve End-Users and Service Providers**

*By Dan Dettmers*

The HVAC&R Center has announced the formation of the Industrial Refrigeration Consortium (IRC). The IRC is a university-industry collaborative that conducts applied research, delivers knowledge and information, and provides technical assistance to improve the safety, efficiency, and productivity of industrial refrigerationsystems.

In our work with industrial refrigeration users and service providers, we have found that refrigeration systems are often designed, installed, and operated according to rules-of-thumb and anecdotal experience. Information on improved practices is not widely available, and owners and operators of refrigeration systems have difficulty finding reliable information on best practices for increasing capacity, improving efficiency, and maintaining safety and reliability.

To explore these issues and identify possible solutions, the HVAC&R Center sponsored a workshop in Madison in May of this year. Participants at the workshop, entitled Industrial Refrigeration for the 21<sup>st</sup> Century, represented a wide range of

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## Industrial Refrigeration Consortium to Serve End-Users and Service Provide

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industry stakeholders including food processors, regulatory agencies, warehouses, equipment manufacturers, designers, and the insurance industry. The attendees identified the following four high-priority challenges:

- > Improve training for refrigeration plant personnel
- > Provide information to design and operate refrigeration plants safely and efficiently
- > Identify benchmark efficiencies for refrigeration systems and components
- > Develop improved design and energy analysis tools

The stakeholders' group concluded that the industrial refrigeration experience of the HVAC&R Center and the University of Wisconsin are important resources to help meet these challenges. The group recommended the establishment of a formal University-industry partnership, which has been named the Industrial Refrigeration Consortium (IRC).

The IRC will work in cooperation with existing organizations such as IAR, ASHRAE, IARW, RETA, and ARI to advance industrial refrigeration technology, conduct research to meet the needs of the industry, and disseminate information to the industrial refrigeration community. An interim steering committee of industry representatives worked with Center staff to establish an administrative framework, de-

velop a strategic plan, and begin startup activities. The formal rollout of the IRC occurred at the IRC technical session and advisory committee meeting on January 17-18, 2001 in Madison.


Our goal is to develop the IRC into a premier source of industrial refrigeration knowledge, training, and technical assistance. As a direct result of participating, member organizations can expect to:

- > Upgrade the skills and qualifications of staff
- > Identify and avoid unsafe practices
- > Reduce liability and decrease insurance costs
- > Reduce refrigeration system operating costs by improving system efficiency
- > Eliminate refrigeration-related production bottlenecks
- > Support research & demonstration projects that improve the safety, productivity, reliability, efficiency, and cost-effectiveness of industrial refrigeration systems

In particular, IRC members will have preferred access to IRC resources, staff and technical information, including:

- > Telephone hotline and internet-based information clearing house
- > Immediate access to technical advances as they are developed
- > Technical bulletins, safety updates, and other publications
- > On-site technical assistance providing targeted information
- > Ability to direct research projects to address specific needs
- > Collaboration with IRC staff and members
- > A competitive advantage in recruiting highly qualified graduates

For more information on the Industrial Refrigeration Consortium and the benefits of participation visit the IRC website at [www.irc.wisc.edu](http://www.irc.wisc.edu) or call us toll free at 866-635-4721. Ψ



**IRC**  
Industrial Refrigeration Consortium  
University of Wisconsin-Madison

- > Applied research
- > Technical bulletins
- > Refrigeration education
- > Internet resources
- > Technical assistance
- > Hotline support

*Advancing Industrial Refrigeration through  
Innovation - Knowledge - Progress*

Browse our internet site at [www.irc.wisc.edu](http://www.irc.wisc.edu)  
Call us toll free 866-635-4721 or locally 608-262-8220  
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## Desiccants and Cold Storage Warehouse Dock Conditioning

By Todd Jekel

Recently, solid, rotary desiccant dehumidifiers have been proposed as a method to help condition refrigerated warehouse docks. Therefore, the HVAC&R Center proposed a project to Xcel Energy (formerly NSP) to determine the effect of dock temperature and humidity on the total refrigeration load and analyze both desiccant and mechanical refrigeration methods for obtaining the desired temperature setpoint.

A model was developed that can simulate the loads on a warehouse dock and the portion of the freezer load that is associated with the attached dock. The model estimates:

- Air exchange (between the ambient and the dock and between the freezer and the dock)
- Defrost loads
- Refrigeration loads
- Required conditioning at the freezer door (using hot refrigerant gas) to prevent frost/snow in the freezer

The model predicts total energy size to condition the dock and freezer. In addition the model calculates the humidity level in the dock that is controlled to maintain a dry-bulb setpoint.

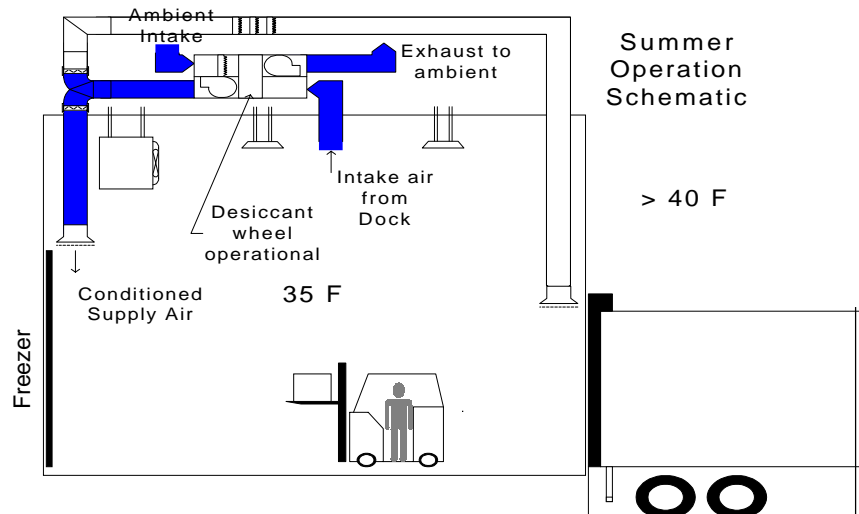
The base case for comparison of the systems was a mechanical refrigeration-only system with dock setpoint of 35°F (1.7°C) and an attached freezer at -20°F (-28.8°C). The mechanical refrigeration with desiccant system is shown in schematic below and is sized from the desiccant manufacturer's recommendations for a facility in Minnesota. Simulation of both systems with a dock setpoint temperature of 35°F (1.7°C) showed that the system with the desiccant had a 20% higher design day operating cost than the base case.

For mechanical refrigeration only, the dock setpoint during the design day to minimize the total system energy cost was approximately 33°F (0.6°C). This agrees well with the operating practices in efficient refrigerated warehouses.

If a desiccant system is used with the mechanical refrigeration, the dock setpoint during the design day to minimize the total system energy cost was approximately 44°F (6.7°C). This is expected because the additional sensible load on the refrigeration system from the desiccant is offset by a reduced total load on the system in response to increasing the dock setpoint.

If both systems are allowed to run at the dock setpoint temperature that corresponds to the minimum operation cost, the desiccant system operating cost penalty is only 13.5%. Further analysis showed that reducing the size of the desiccant system could potentially eliminate the penalty, relative to a mechanical refrigeration-only system.

In conclusion, the results of this study show that there may be potential for desiccant dehumidifiers on refrigerated warehouse docks. However, proper sizing and application is key to realizing any benefit. Oversized or operation of the desiccant during low ambient humidity will result in higher operating costs than mechanical refrigeration alone. Ψ



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## Code Official Training

By Doug Reindl

ASHRAE has taken on the primary responsibility for developing a number of HVAC and building-related codes and standards that are used both domestically and internationally. Two of ASHRAE's standards that have received considerable attention in the past few years encompass energy and indoor air quality. ASHRAE 90.1 (energy standard for commercial buildings) is aimed at providing a standard for achieving energy efficiency in commercial buildings while ASHRAE 62 (indoor air quality for commercial buildings and residential dwellings) is focused on ventilation for acceptable indoor air quality. Both standards are used as the basis for codes in jurisdictions across the US and both are currently undergoing changes as part of their continuous maintenance status.

Recognizing the importance for code officials to understand the philosophy of these standards and to better promote and enforce the intended compliance with their requirements, Siraj Shaikh of GPU along with Susan McLaughlin of the NJ Department of Community Affairs worked with the HVAC&R Center to organize a series of one-day programs on both ASHRAE 90.1 and ASHRAE 62. During the fall of 2000, HVAC&R Center staff developed and delivered the GPU-sponsored training programs. The one-day training programs for code officials in the State of New Jersey were delivered twice – once in September and once in November.

The objective of the training sessions was to give the NJ state code officials a better understanding the concepts and requirements of Standards 90.1 and 62. The sessions also highlighted recent changes to these standards and the impacts of recent changes on enforcement practices.

Overall, 140 people attended the seminars on ASHRAE Standard 62 and ASHRAE Standard 90.1. Although most attendees were code officials, other attendees included architects, engineers, and owners. The feedback from attendees from both sessions was overwhelmingly positive. Ψ

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