OXFORD LPP™ ON ICE

OXFORD REFRIGERATION - OXFORD ENERGY SOLUTIONS INC.

Oxford Energy Solutions Inc

Revolutionizing Sustainability and Savings with Advanced Technology

ICE MAKERS NEED UNCOMPLICATED SYSTEM MANAGEMENT WITHOUT ADDITIONAL COMPLEXITIES OR HIDDEN COSTS.

Facilities deserve straightforward strategies that provide insight into what machines are doing and whether the system is doing it well.

The Sensori ™ Chiller platform empowers arenas and curling clubs with advanced technology to optimize resources, achieve superior efficiency, minimize their footprint, ensure member safety, and achieve excellent ice quality.

ENERGY MANAGEMENT

Sensori™ elevates energy efficiency with it's cutting-edge adaptive system management. Refrigeration is tailored to your facility's fluctuating demand. An integrated energy profile provides complete transparency.

EQUIPMENT RELIABILITY

As a fully digitalized platform, Sensori™ seamlessly connects and controls all system devices with IoT precision, offering redundancy through multiple compressors and enhanced system protection via remote accessibility.

SAFETY

Advanced low-pressure design prioritizes both the environment & your safety - using non-flammable, non-toxic, low GWP next generation refrigerants in a platform based on a 0-leak design. Fully recyclable.

- Lower Life-Cycle Costs
- Smart Controls
- Simplified Safety Requirements

Contact: 226-242-5674

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Upgrading Equipment?
Important Decisions for Your Facility

Conventional NH3 System		Sensori™ Chiller Platform
NH3 is highly toxic, flammable, and corrosive B2L rated - potential leaks can cause serious injury or death. Not suitable for all piping materials due to corrosivity.	**Safety** 	Uses non-toxic, non-flammable next generation HFO refrigerants with ultra-low GWP, A1 & A2L rating. Design based on a 0-leak rate platform for today and tomorrow
Compressors turn on/off to control ice temperatures creating temperature swings. Fixed head pressures force equipment to run at maximum output - regardless of the ambient temperature or cooling demand.	**Energy** 	System automatically accommodates refrigeration requirements in facility, responds to ambient, saves energy during unoccupied times, and avoids unnecessary temperature swings. Full energy profile is built-in.
Large charge size, leak detection/ventilation, specialized training required, extra safety devices required, increased servicing, insurance, and TSSA inspections. Requires large machine room, cooling tower, water consumption.	**Hidden Cost** 	No Hidden Extras - small charge size, no specialized training required, less complexities, installation flexibility frees up machine room, reduced maintenance, lower insurance cost.
NH3 require full system change when upgrading equipment - no retrofit option	**Adaptability** 	Gradual implementation of system upgrades. Outdoor configurations offer flexibility with option for future relocation.
NH3 has high environmental manufacturing impact, and increased energy use during equipment operation which negates GWP value. Consumes additional natural resources. Requires large charge.	**Environment** 	Digitalization optimizes performance, lowers energy use, and ensures system protection without added resources. Charge size significantly reduced
While potentially IoT connected, devices remain independent and do not communicate with other components. Notification of system anomalies are after-the-fact and service is reactive.	**Maintenance** 	Proactive maintenance with monitoring, complete diagnostics, AI, machine learning, system self-regulation, remote access, and notifications that are designed-in and integrated with each device in the system - backed by full OEM support.

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Average Energy Use of Ontario Clubs with the Sensori™ Chiller Platform

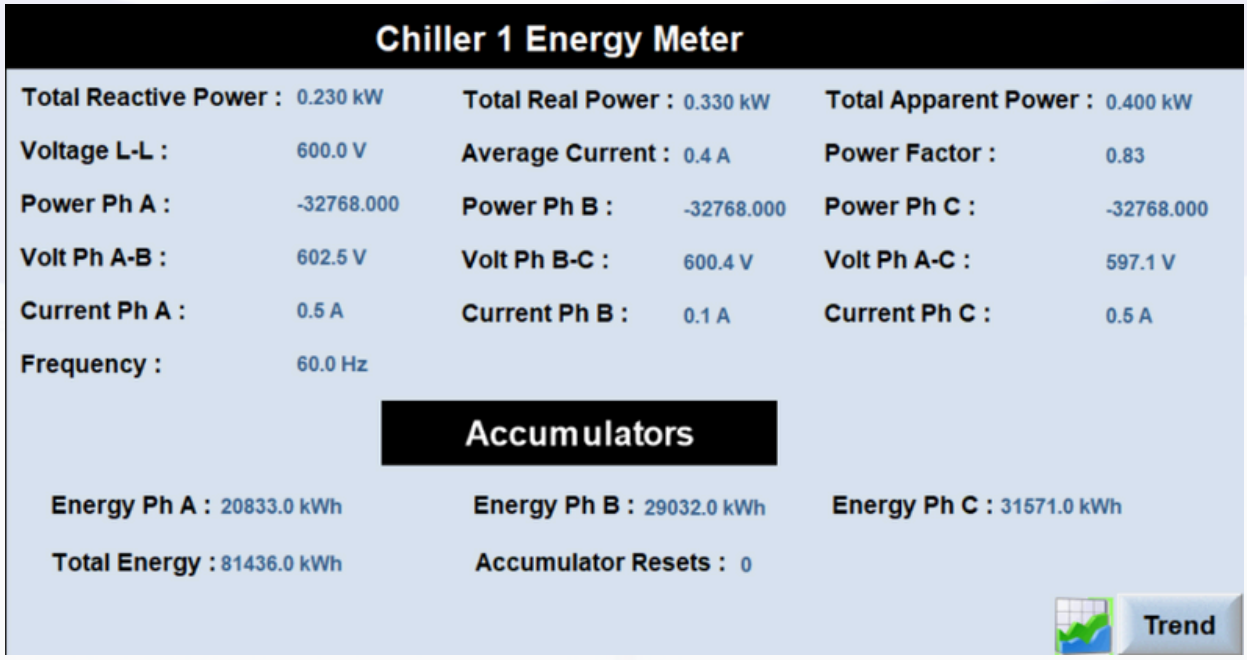
Facility Details	Cost/ kw	Energy kw/day	Energy $/day	Energy $/mon	Energy $/yr
4 ice pads, cement base	$0.15	254	$38.10	$1,144.80	$6,945.12
4 ice pads, sand base	$0.15	313	$46.95	$1,407.60	$8,539.44
5 ice pads, cement base	$0.15	340	$51.00	$1,530.00	$9,282.00
8 ice pads, cement base	$0.15	**533**	$ 79.98	$ 2,399.40	$ 14,556.36

In standard seasonal conditions, clubs' operate within an outdoor temp range of 10 to 40 degrees Fahrenheit. Energy consumption is directly influenced by ambient temperatures, and unseasonably warm conditions may result in increased energy usage.

Total energy use encompasses the brine pump, temperature pull-down for season start-up, & energies required for ice production.

Average temperature delta for the ice typically ranges from plus to minus 1-2 degrees Fahrenheit

All systems include Sensori™ platform, Remote Access System Architecture, Advanced Chiller Control, & Low-Pressure Platform Architecture



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Platform Features: One Unified System

SUPERIOR PERFORMANCE

- Lower compression ratios for superior energy output & most efficient heat rejection
- Danfoss VFDs optimize efficiency and power consumption, providing smooth control for compressors, brine pump & condenser fans to match changing facility requirements
- Sensori's PLC platform establishes connections between all devices enabling intercommunication over ethernet to optimize performance

RELIABILITY & LONGEVITY

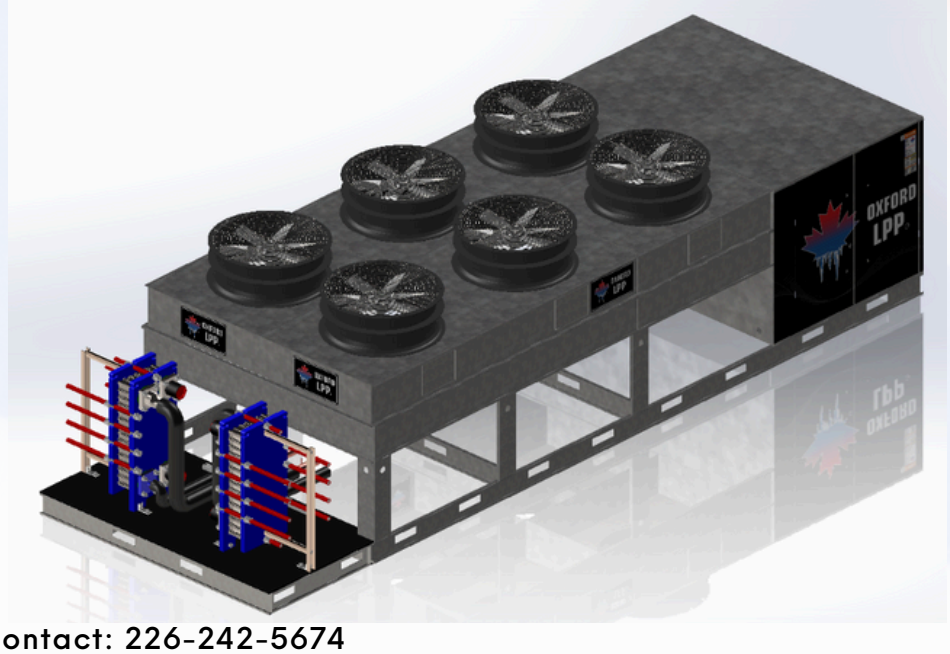
- Comprehensive system monitoring & diagnostics with Sensori™Control
- Multiple compact scroll compressors provide redundancy, safeguarding against potential system failures
- Secure remote access & email notification enables a proactive response to any event impacting operating costs, equipment management, or ice quality

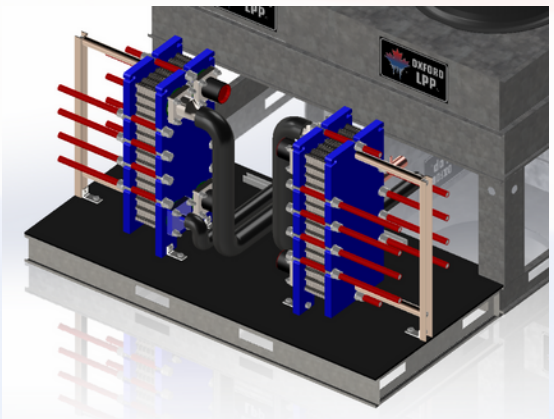
INSIGHTS

- A central HMI screen provides total transparency, displaying temperatures, pressures, oil levels, energy profiles
- Easily accessible graphing & logging features minimize required technician monitoring
- Insights available from any location with remote capabilities

LOWER OPERATING COSTS

- Emerson/Danfoss EXVs provide larger capacity range for faster pull down and control through all stages of compression, without overloading compressors
- Complete floating head condenser control with extra subcooling circuit, utilizing lower ambient temperatures for enhanced energy savings
- Low Pressure design uses less energy to make components work
- Significant reductions in refrigerant charge, maintenance/overall labour, power





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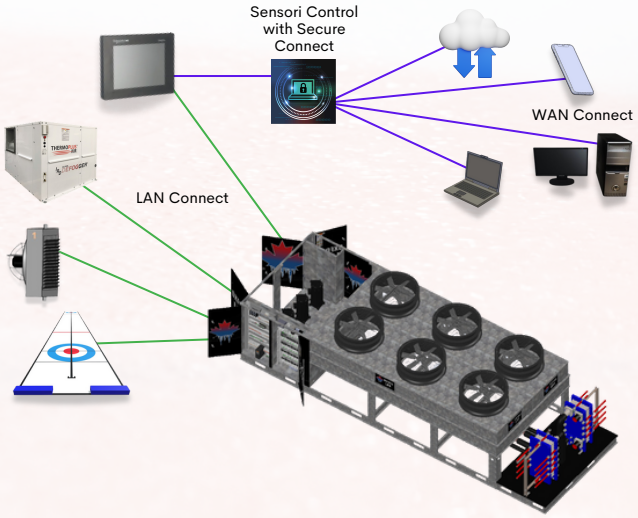
Seamless Ice Control and Collaboration

The platform introduces the first-ever unified system for curling clubs, aligning facility needs with refrigeration performance. It offers a consistent interface across various locations, making it easier for ice makers and staff to collaborate and share expertise. By eliminating differences in equipment, this platform has significantly enhanced the skills and capabilities of the ice-making community.

The entire ice plant is now easily managed by the technician, who can monitor the flow of heat from the ice surface, through the cement or sand deck, into the brine or glycol, and to the refrigeration system. The platform also tracks, controls, and alerts for heating zones and humidity levels in the dehumidifiers—both crucial for ice quality. This system takes the guesswork out of the complex process of creating perfect curling ice.

Design Versatility & Customized Solutions

Oxford's chillers for ice management feature adaptable designs that accommodate various architectural layouts, space constraints, and aesthetic needs.

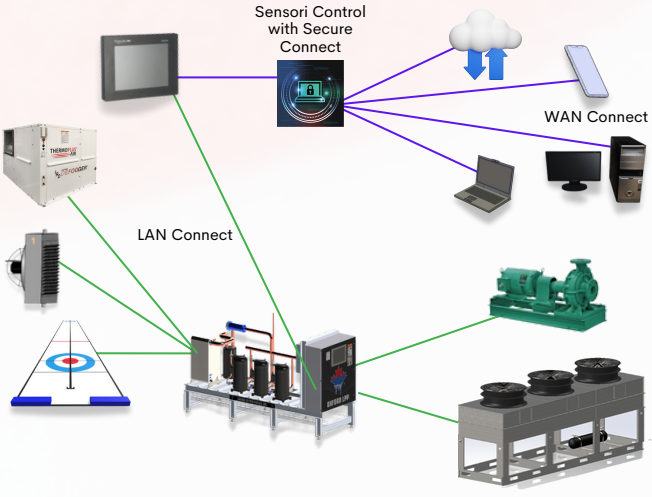


PACKAGED OUTDOOR SYSTEM

Houses all essential components in a single enclosure, which is ideal for facilities with available roof or outdoor space. It frees up indoor areas, eliminates the need for a separate mechanical room, and simplifies installation. Weather-resistant features ensure reliable operation in various climates, with controls conveniently located indoors and accessible through HMI.

SPLIT INDOOR/OUTDOOR SYSTEM

Separates the condensing unit from the indoor compressor rack, allowing the condensing unit to be placed outside. Components are easily accessible for independent servicing, offering flexibility and customization in installation. Explore how digitalization creates a seamless network between devices for optimal ice management at www.oxfordenergy.ca/OLPP/OnIce



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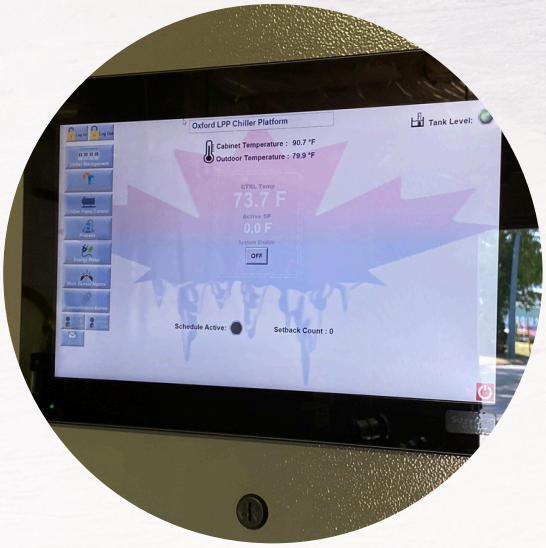
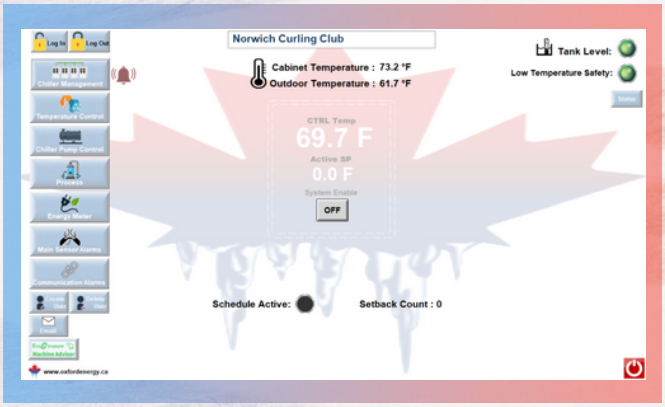
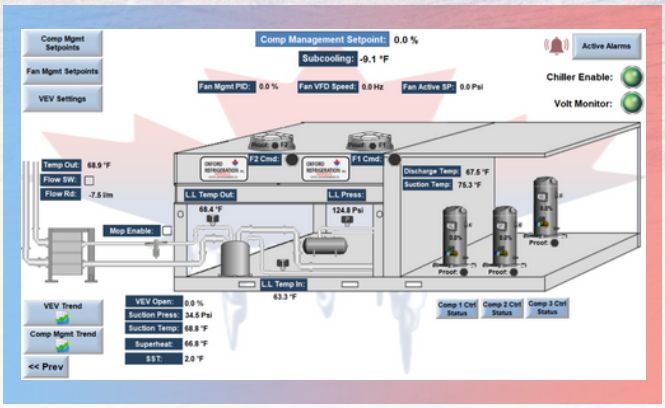
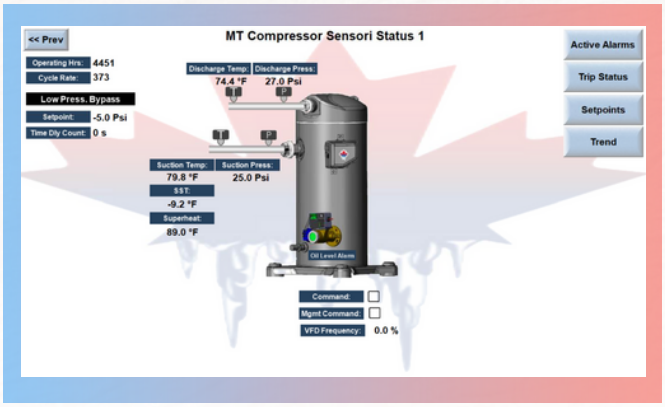
You Can Only Manage Ice Temperature Performance & Energy Efficiency… If You Know What's Happening









- Simple ice temperature adjustments during flooding/pebbling with automatic reset functionality
- Detailed diagnostics for compressors, evaporators, and all connected components
- Oversee, configure, and troubleshoot the system from anywhere, using smartphones, touch screens, or computers – enhancing flexibility and efficiency
- Automatic email notifications and alarm management
- Full visibility into energy consumption, capacity, and pumping levels
- Flow rate optimization, brine level control
- User-friendly, cost effective solution with simplified setup and configuration – eliminates the need for elite skillsets or dedicated IT personnel

One Integrated Management System.

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Cooling with Confidence:

The Long-Term Advantages of Glycol Systems

The decision between propylene glycol and brine systems is critical for curling clubs aiming to maximize equipment longevity, reduce maintenance, and ensure operational stability. Though brine systems are often seen as more cost-effective, a deeper look reveals that glycol systems offer significant advantages in terms of long-term performance and overall cost savings.

MAINTENANCE AND LONGEVITY

Propylene glycol systems stand out for their ease of maintenance and system longevity compared to brine. Brine, typically made of salts like calcium chloride, is prone to scaling, mineral buildup, and corrosion, which degrade heat transfer and damage equipment. Corrosion from brine accelerates wear on metal pipes and components, leading to frequent and costly maintenance or replacement.

In contrast, glycol is non-corrosive, less reactive, and has lubricating properties that extend the life of equipment and piping. Glycol systems do not require the same rigorous filtration that brine demands, reducing labor and maintenance costs. The primary maintenance task is replenishing inhibitors every five years to maintain pH balance, significantly cutting down on intervention and system downtime.

SYSTEM COST

While brine systems have a lower initial chemical cost, their long-term expenses and the need for more robust, corrosion-resistant equipment inflate overall costs. Corrosion in brine systems leads to frequent repairs, replacements, and expensive disposal due to its hazardous nature. In contrast, glycol is non-corrosive, non-toxic, reusable, and easier to dispose of, making it a more sustainable and cost-effective option. Since glycol doesn't require costly, corrosion-resistant materials, the initial cost difference is reduced. Additionally, with a longer system lifespan and lower maintenance needs, glycol systems offer fewer disruptions and superior value, especially for smaller clubs with tight budgets.

CONSISTENT PERFORMANCE

Though brine systems can have marginally better pumping efficiency and heat transfer, modern glycol systems with the OLPP™ close the gap. By operating at a reduced capacity (20-40%), these systems compensate for glycol's slight efficiency reduction, delivering superior overall life cycle cost savings and equipment longevity.

For curling clubs aiming for long-term success, propylene glycol systems provide a more reliable, sustainable, and cost-effective alternative to brine. With easier maintenance, lower overall costs, and dependable performance, glycol systems are an ideal choice for clubs focused on balancing efficiency with reliability.

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CANADIAN CURLING CLUBS SAVE BIG WITH TECHNOLOGY

Curling has evolved from throwing stones on frozen ponds into a strategic sport played in highly controlled environments where the quality of ice is crucial. Many local curling clubs operate as non-profits, relying on membership fees and fundraising to cover operational costs. However, tight budgets make it challenging to manage outdated refrigeration equipment. When the time comes for upgrades, they must carefully assess the overall costs and longevity of new systems.

THE CHALLENGE OF AGING EQUIPMENT

Aging equipment poses safety risks and significant operational challenges. With limited technological advancements, many conventional systems offer only marginal upgrades, making it hard to justify the investment. Frequent breakdowns and high energy consumption burden clubs with soaring costs. Often, ice makers are forced to police equipment to manage repairs at the expense of thousands in parts and labor.

EVALUATING UPGRADE NEEDS

When upgrading, clubs must evaluate both short- and long-term needs. They require solutions that address immediate mechanical and energy issues while allowing for future enhancements. Safety concerns eliminate flammable options like ammonia and CO2, which necessitate specialized training, components and additional resources, creating management challenges. Designs that lack adequate control measures fail to meet maintenance and energy goals, while complete system overhauls can be financially impractical. Retrofit options with comprehensive management offer immediate, sustainable solutions.

THE IMPORTANCE OF EFFECTIVE MANAGEMENT

Ice conditions in curling clubs are affected by various factors, including rock friction, the number of players and spectators, and the building's age, design, location, and climate. Maintaining ideal ice requires constant monitoring and adjustments to temperature and humidity. Ice makers need straightforward system management that avoids complexities and hidden costs, enabling them to effectively monitor machine performance.

Reactive servicing often leads to excessive troubleshooting and reliance on guesswork, including late-night service calls. Visualizing system operations is essential for optimizing performance and protecting equipment. Oxford's Sensori™ Building Automation System features built-in management that connects and regulates all devices in the system. By synchronizing data from various components, it provides a central interface displaying critical metrics like temperatures and pressures. This visibility, along with graphing and logging capabilities, reduces the monitoring burden on technicians.

The IoT-controlled platform offers remote accessibility and alerts, enabling ice makers to receive notifications of inconsistencies and respond proactively to events that could affect operating costs, equipment management, or ice quality. With comprehensive information, Oxford's system management minimizes the need for emergency responses to critical issues caused by a lack of insight.

ADAPTIVE MANAGEMENT FOR QUALITY AND SAVINGS

Maintaining ice quality during warm conditions or busy bonspiels can be energy-intensive without proper control. As temperatures fluctuate, the refrigeration system must adapt to varying demands. Systems lacking automatic load adjustment often lead to temperature swings and inconsistent ice quality. Oxford's platform uses variable frequency drives (VFDs) to allow the brine pump, condenser, and compressors to adjust performance based on sensor data, reducing on/off cycles and maintaining ice temperature swings to less than 1°F.

Instead of relying on large, energy-hungry compressors, Oxford's system employs multiple smaller scroll compressors that operate based on required cooling capacity, providing redundancy for enhanced reliability. If one compressor becomes inefficient, the system automatically switches to another and alerts technicians.

FLEXIBILITY AND FUTURE-PROOFING INVESTMENTS

Oxford systems utilize low-pressure and low-toxicity refrigerants, eliminating the need for special mechanical room features or infrastructure changes. The simplified design allows small, quiet compressors to fit easily into crowded mechanical rooms, reducing waste and enhancing flexibility for future relocation.

When considering equipment upgrades, clubs should focus on informed choices that ensure success and sustainability. Understanding what drives the system, its resource consumption, and its community impact is essential. Conventional refrigeration platforms often burden clubs with complex systems and hidden costs. Meanwhile, 'natural' refrigerants may obscure energy-intensive manufacturing processes, while outdated systems perpetuate inefficiencies.

When technicians have confidence in their equipment's safety and clear performance data, they can manage facilities more effectively. Integrated energy profiles and automated management systems reduce consumption, protect resources, and enhance the patron experience. Clubs should demand transparency in their investments and consider the total cost of ownership. Safer, more efficient systems offer financial benefits and long-term reliability, ensuring the longevity needed for successful curling operations.

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