



A Rockwell Automation Company

City of Calgary Parks & Recreation City Arenas - Ice Plant Control System Upgrades

The Client:

The City of Calgary Parks & Recreation is a city business unit that manages the day-to-day operations of the city's recreational facilities in Calgary, Alberta. Part of their operations includes the many city owned arenas. The arenas

vary in form and size and are anywhere from stand alone hockey arenas to being part of larger leisure centers or recreation complexes with multiple ice surfaces.

The Requirement:

In general, the arena's artificial ice plant is an ammonia (NH_3) compressor-based refrigeration system. The chilled NH_3 passes through a brine chiller to cool a brine solution. The brine solution is pumped through the many coils embedded in the ice rink floor slab, which in turn keeps the ice frozen on the rink surface. Rink temperature is monitored and controlled by a floor slab temperature sensor.

As Calgary's many arenas continue to age the control systems receive upgrades, usually in conjunction with refrigeration equipment rebuilds and/or replacements. Older relay panels are replaced with the latest evolution in control systems: the Programmable Logic Controller (PLC). The PLC-based system is connected to a color touch screen Human/Machine Interface terminal (HMI) for a truly modern control system.

The philosophy for controlling the city's many ice plants was developed during the first upgrade at the Optimist/George Blundun Arena and is basically the same from one arena to the next. However, the PLC-based systems allow the control to be custom tailored to meet the specific requirements of the arenas in

which they are installed.

Hinz has worked successfully with refrigeration companies such as Cimco, Pace and Startec along with Thermo Carb Consulting Ltd. and Siemens Building Technologies to provide ice plant control solutions at the following City of Calgary arenas:

- Ernie Starr (2002) – single ice surface – 2 compressors
- Optimist/George Blundun (2002) – dual ice surface – 3 compressors
- Murray Copot (2003) – single ice surface – 2 compressors
- Stew Hendry/Henry Viney (2003) – dual ice surface – 3 compressors
- Ed Whalen & Joe Kryczka (Southland Leisure Center) (2006) dual ice surface – 3 compressors
- Max Bell Center (2006) – dual ice surface – 3 compressors

The success of early projects paved the way for additional functionality such as energy saving features.

The Design Solution:

Through these upgrades with the City of Calgary, Hinz has become intimately familiar with the control requirements for operating an arena ice plant.

To start, Hinz designed the PLC panels that replaced the older relay panels and had them constructed by a local panel fabrication shop. The Siemens S7-200 PLC has been used throughout the arena upgrades as specified by the City of Calgary. The panels were installed and the end devices were connected by the individual project's electrical contractors.

The PLC program template developed for use in the first arena project, Optimist/George Blundun Arenas, has been reused with modifications in subsequent arena PLC programs. The use of the template allows for more efficient and consistent program development and operation.

Evolution of the control requirements led to the addition of a temperature setback feature starting with Murray Copot Arena. Much like the setback thermostats people install in their houses, this feature allows for automatic "setback" of the ice temperature during times when the ice is not in use resulting in energy savings (and therefore \$\$ savings) for the client.

In 2006 the addition of Mycom MyPro Safety panels to each compressor saw the emergency shutdown signals for the ice plant compressors moved from the PLC to a dedicated safety panel. The PLC program was altered to interface with the new shutdown panels while still providing all the functional control to the ice plant system.

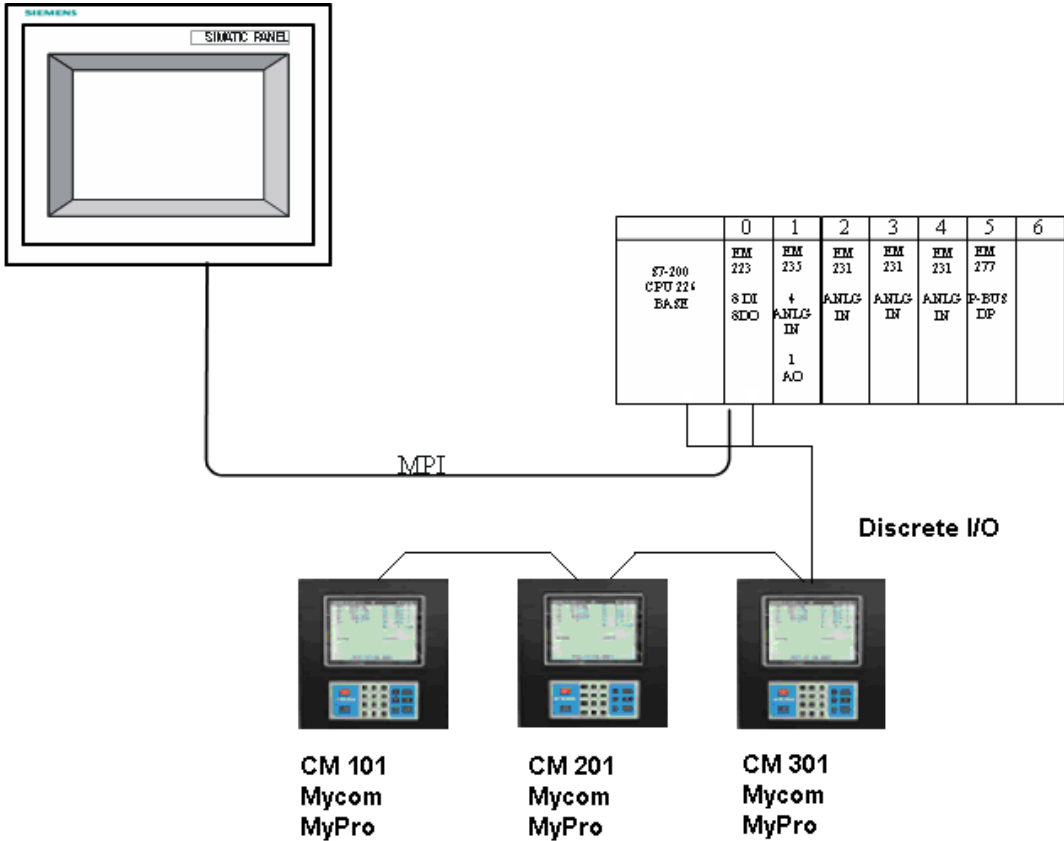
The graphical display HMI program has also been used as a template with site specific modifications. The Siemens HMI, coupled with program developed by Hinz, provides the operators with a host of information that can be quickly navigated and instant access to alarm and operational set points. Consistency in the look and feel of the HMI allows operators to move freely from one arena to the next and yet still be familiar with the control system interface at each arena.

Use of templates for both the PLC and HMI programs has allowed Hinz to refine the operation of the programs and provide effective refrigeration solutions for the City on fixed project budgets. Also included in the fixed budgets were full commissioning and startup assistance to ensure the arenas functioned as required and follow up support for any client questions or issues.



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System Specifications:

Siemens S7-200 based PLC system with varying combinations of:

- CPU 226 Base
- 8 DI/DO Combination Discrete I/O Modules
- 4 AI Analog Input Modules
- 4 AI/1 AO Combination Analog I/O Modules
- 2 Input RTD Modules
- Profibus DP Communications Modules
- TP270 – 10” Color Touch Screen Operator Interface Terminal

For further information or to contact a Hinz office near you, please check our website at:

www.hinz.com