



Project Case History

High performance, low profile draft inducing system cures backdrafting and sightline issues

Shortly after starting up a new heating system in an historical Minneapolis building, the boilers began intermittently shutting down. The backdrafting problem was linked to wind turbulence caused by the exterior building configuration. The remedy was installation of a Tjernlund mechanical draft system using a CPC-3 Constant Pressure Controller and an Auto-Draft® Inducer.

International Market Square, located near downtown Minneapolis, is the home of the Minneapolis Design Center and Minneapolis Home Furnishings Mart. Built from 1890 to 1915, the structure was originally used as a Munsingwear Company production facility. It was added to the National Register of Historic Places and reopened as commercial space in 1985. In 2005, large areas of floors three through eight on the north side of the building were converted to 96 owner-occupied condominiums. Mark Brengman, President of Minneapolis-based Steen Engineering, was the design engineer and Bill Roskos, Project



Arrow points to roof where wind swirled to create downdraft and boiler shutdowns prior to installing a mechanical draft system using Tjernlund's modulating draft inducer and CPC-3 Constant Pressure Controller.

Manager for St. Paul-based Doody Mechanical, was responsible for the materials installation.

"There were six boilers located on the third level," Brengman explained. "That part of the building goes up one floor and then steps back. The rest of the tower containing the condos is behind it. So there's a very short stack on that boiler plant."

Continued on back side



Above: Tjernlund's VSAD Auto-Draft Inducer terminates the stack connected to six boilers. It is controlled by a CPC-3 Constant Pressure Controller.

Left: Six boilers in the International Market Square Building are vented via a single stack by a Auto-Draft Inducer.

Brengman originally designed the draft system with two independent 14-inch Class B stacks. However, soon after the system was completed, the boilers began intermittently shutting down due to backdrafting.

According to Roskos, for several weeks while the solution to the backdrafting problem was being worked out, Doody had its service people out at all times of the day and night keeping the boilers running. "There was a cold spell in late November, early December and we had to keep the heat on."

As a trial-and-error effort, the stacks were extended ten feet to see if additional draft would



The Tjernlund System controls include VFD in the middle and CPC-3 Constant Pressure Controller on right

be generated. But it didn't work. Roskos said that even if the extension would have worked, the Historical Preservation Council (HPC) would not allow it because the taller stacks violated sightline regulations for National Historical structures.

After verifying the equipment was installed per design specifications, Brengman concluded that down drafts were being caused by a combination of prevailing winds and the building's exterior geometry.

"The stacks were located on the roof of a five story section adjacent to an 11 story tower. When high northwest wind hit the building, it swirled and air was forced down the stacks creating a negative pressure throughout the ventilation system out the combustion air louvers," explained Brengman.

Roskos added that he could hold his hand near the combustion air damper in the mechanical

room and feel the warm air going out as soon as the wind outside picked up. "At times the carbon monoxide level in the mechanical room was high enough that wearing safety equipment was necessary."

After consulting with Arnie Jenson and Jeff Clapp, Sales Representatives for ventilation materials vendor, Air Control Essentials. Brengman prescribed a mechanically induced power draft system.

To keep costs down, Brengman had Doody reconfigure the two stacks so all six boilers were tied into a common stack and one power venting system was needed instead of two.

The mechanical draft system selected was made by Tjernlund Products. Components consisted of a VSAD variable speed Auto-Draft® Inducer mounted on the roof, and a CPC-3 Constant Pressure Controller with a Variable Frequency Drive and an auto-calibrating pressure transducer.

The system has been operating successfully since its installation.

Tjernlund CPC-3 Features:



- Large lit display and easy to use soft touch keypad.
- Primary functions can be programmed via dedicated keys, eliminating scrolling through multiple screens.
- Additional LED's indicate limit(s) status, VFD operation and fault status.
- Correct Inducer/Blower rotation is determined by display prompts and changed through DIP switches on the circuit board.
- System fault diagnosis readout and retrieval.
- Built-in alarm alerts building maintenance personnel if system faults. Alarm relay also allows interface with building management system.



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