



# Uponor

RADIANT HEATING SYSTEMS

PAT'S HEATING & AIR  
CONDITIONING, INC.

CASE STUDY

## High Ceilings Need Not Mean Higher Fuel Bills

After experiencing the benefits of radiant floor heating first hand at Uponor's Apple Valley facility, contractor installs it in his own Wisconsin warehouse.

High-volume, high-ceiling commercial structures, such as warehouses and distribution centers, are an ideal application for radiant floor heating. Capitalizing on the large mass of the concrete slab, a radiant system will absorb, store and re-radiate heat evenly and efficiently right at the floor level where people work.

Just as importantly, this heat will not quickly escape to the outdoors when exterior doors are opened. Instead, the warmth remains indoors, maximizing comfort for the occupants and energy savings for the building owner.

It was roughly a decade ago that Pat McNamee experienced first hand the special benefits of radiant heating in a high-cube environment. In fact, it came during a tour of the Uponor factory in Apple Valley, Minnesota.

"I remember noticing that all the warehouse truck doors were wide open," says McNamee, owner of Pat's Heating & Air Conditioning, Inc. in Oconomowoc, Wisconsin. "It was the middle of winter, but the space inside still felt comfortable. It was obvious the radiant system in that warehouse had a quick recovery time, even with the doors opening and closing all day."

McNamee decided then and there to install radiant floor heating in the

8,000-square-foot, block and steel facility he was erecting for his rapidly expanding contracting business. The company's existing warehouse, heated by a gas-fired forced-air system, was not an especially comfortable working environment during the winter. As he planned his new space, McNamee figured ensuring the physical comfort for his employees would translate into stronger overall performance as well as a stronger bottom line for his company. He also eagerly anticipated creating a warmer and friendlier HVAC equipment showroom setting for his customers.

McNamee's belief that radiant would prove the ideal heating system for his company's new home was quickly confirmed by a sharp downturn in energy costs within the first two months of opening the facility in

January and February 1998. According to Wisconsin Electric and Natural Gas, the heating-degree days for those two months were comparable, creating a perfect test situation for evaluating forced air versus radiant.

- During that first month of January 1998, McNamee heated the facility with a forced-air system he had installed as a backup to the radiant system. The gas-heating bill for the month was \$903.10.
- On February 1, the building switched over to an Uponor radiant floor heating system, and the gas bill dropped 55%, to \$406.50.
- As the radiant heating system continued to operate, McNamee's gas bill dropped again in March, to only \$400 – or 44% of the energy costs of the forced-air system two months earlier.



Employees at Pat's Heating & Air Conditioning, shown installing the Uponor radiant floor heating system in their building in 1997. The company now does up to 15 radiant installs annually.

The head-to-head comparison of forced air and radiant is certainly revealing, but in light of these dramatic savings, you might well ask why McNamee felt compelled to install a forced-air backup in the first place. "We needed air conditioning," he explains, "and it didn't cost any more to install a high-efficiency furnace to preheat the fresh air."

That was then; this is now: "We haven't used forced-air heating since our first months in this building," he says.

Over the past 10 years, the radiant system has continued to perform well, both in terms of employee comfort and fuel consumption, says McNamee. "The monthly bills are very reasonable for the total amount of square footage here."

Which is why an important part of his business is installing radiant floor heating systems for others – both commercial facilities like his own, as well as large custom-residential applications. Pat's Heating & Air Conditioning currently averages between 12 to 15 installs annually, "and we're talking substantial systems – \$30,000 minimum, involving the entire structure in most cases," says McNamee.

"Our customers just can't say enough good things about radiant floor heating, which is probably why there are a lot more people asking for it these days. No doubt, they've talked with family and friends who have systems in their own homes or where they work. Once you've experienced this comfort first-hand, you just have to tell somebody about it."

The design information in this case study is provided for illustrative purposes only. The actual requirements of similar projects are dependent on regional climatic conditions, project-specific heat loss, owner expectations, applicable building codes, etc. Please contact your Uponor representative for assistance in designing your specific projects.

## Summary of Benefits

### Comfort

Workers start the day loading trucks in a warm, comfortable environment. Even with the five overhead doors open, the space remains comfortable. The temperature comes back to the set point within minutes after the doors are closed. The heat is evenly distributed so that office workers enjoy comfort and warm feet everywhere.

### Energy Efficiency

Inside a high-cube warehouse, the radiant system heats the concrete slab, keeping the heat at floor level where people walk and work. When doors to the outside are opened, this heat does not quickly escape to the outside, as is the case with a forced-air system that heats the surrounding

air – all the way up to the ceiling. As a result, when the exterior doors close, recovery time is shorter with a radiant system and less energy is needed to re-heat the space.

### Customer Friendly

Customers are comfortable when walking through Pat's Heating & Air Conditioning, Inc. showroom. The boiler room and manifolds are also available to view, so that visitors can understand how the system works.

### Floor Coverings

The facility uses tile and carpet in the office, concrete in the warehouse. This variety highlights the benefits of radiant floor heating with many types of floor coverings.

## Mechanical System Information

- Installed in a slab-on-grade, the Uponor radiant floor heating system consists of twenty-seven loops of Wirsbo AQUAPEX® tubing, tied to rebar over 1" Blue Dow insulation.
- Loop lengths run from 250 feet to 300 feet.
- Four manifold locations, with 5 to 10 loops per manifold, supply warm water to six heating zones.
- Heat source is a 160,000 Btu/h tank heater.
- Bronze pumps, brass air eliminator and a cupronickel heat exchanger complete the system, which is completely non-ferrous, so that oxygen diffusion was not a concern.
- Temperature information for Oconomowoc:
 

Average temperature:	
Dec. 11 - Jan. 15	27°F
Average temperature:	
Jan. 15 - Feb. 13	28°F
Average temperature:	
Feb. 13 - March 17	33°F

## Project Data

<b>Structure Size:</b>	8,000 square feet
<b>Construction Type:</b>	Block and steel commercial building
<b>Floor Construction:</b>	Slab-on-grade concrete
<b>Outside design temperature:</b>	-10°F
<b>Room set point temperature:</b>	60°F in warehouse; 70°F in offices
<b>Heat plant size:</b>	160,000 Btu/h tank heater
<b>System supply water temperature:</b>	113°F
<b>Tubing type:</b>	Wirsbo AQUAPEX
<b>Number of loops and average length:</b>	27 loops; 250'-300' lengths
<b>Installation Date:</b>	June 1997

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