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Warehouse Heating/Ventilating: When Energy Matters

by Ken Williams

Direct gas-fired technology is an energy efficient way to provide both space heating and tempered MUA.

You have probably read articles about energy efficiency as it applies to warehouse lighting and refrigeration systems, but what about the cost to operate your heating/ventilating equipment?

The cost of energy to heat a warehouse has steadily increased more than 6-fold since the 1960's, it quadrupled during the 2000 heating season and then spiked 500% during the past year due to limited natural gas supplies. Most industry experts agree the era of very low energy prices is behind us and we will continue to see energy costs set "historic records" for years to come.

The good news is that you can save 40% to 70% per year on your combined gas, electric, operating and maintenance costs by using today's most efficient heating/ventilating technology. So if you are putting up a new warehouse, rehabbing or expanding an existing one, converting an old manufacturing facility to a warehouse or just replacing a worn out heating system, it's important to install the right type of heating equipment.

When Energy Matters, an efficient blow-thru, direct gas-fired space heating system is usually the best choice for a large warehouse or distribution center.

What factors determine the BEST warehouse heating system?

Is the heating bill for your warehouse facility too high? What about cold dock door areas and unbalanced temperatures? Is negative building air pressure a problem? Have you experienced employee complaints and lost productivity from heating or indoor air quality problems? How about high maintenance costs for existing heating equipment? These are just a few common problems that result from selecting the wrong heating system, misapplying space heaters or using obsolete heating/ventilating equipment in your warehouse.

The bottom line is that both heating and ventilating requirements must be determined before selecting the most energy efficient way to heat a warehouse. Factors to consider include:

- How will the dock door areas be heated and how fast are temperatures recovered?
- Is spot heating or zone heating required?
- How important are balanced temperatures throughout the building, from wall-to wall and floor-to- ceiling?
- What are the indoor air quality requirements? How much fresh outside air is required by local codes to dilute contaminants generated by LP forklift trucks, out gassing from stored materials, etc.
- Is make-up air (MUA) needed to compensate for exhausted air?
- What are acceptable noise levels?
- Where will the heating system be located? Will it consume valuable floor, ceiling or vertical racking space.

Direct Gas-Fired Space Heater
High Efficiency, Blow-Thru Design
Source: Cambridge Engineering, Inc.

Gas-Fired Space Heating Systems

Gas-fired heating systems normally offer the most cost effective way to heat large warehouses and distribution centers. Electric and oil-fired heaters are sometimes used for very specific space heating applications or when gas is not available for the building.

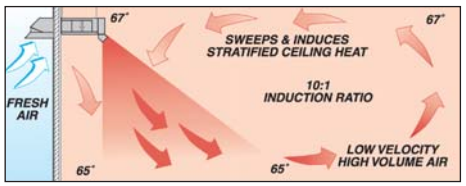
There are seven types of warehouse heating systems that use either "indirect" or "direct" gas-fired technologies. It's important to know the difference.

Indirect fired heaters primarily recirculate inside air with little or no provision for ventilation. They also require a flue to vent products of combustion outside the building reducing their energy efficiency. The four types include:

- **Boiler Systems (Steam and Hot Water)** - These centralized heating systems were used for space heating when energy costs were low, or when steam was a by-product of boilers used for a near-by process heating application. They are usually not well suited for larger warehouse facilities due to their initial high cost, poor efficiency, uneven heat distribution and high maintenance costs. Many older facilities are replacing oil-fired boilers with other, more energy efficient gas-fired heating technologies and using the energy savings to pay for the new equipment.
- **Tube-Style Infrared (Radiant) Heaters** - Excellent method for heating objects, spot warming where people are standing around and specific zone heating applications. They are most efficient when mounted 15 to 18 feet above the floor. Infrared heating systems can be very expensive to install in larger facilities and should be used with a make-up air (MUA) heater if the building has an exhaust system for ventilation.
- **Unit Heaters** - Common method for heating small, open spaces. Multiple heaters are suspended from the ceiling around the perimeter of the warehouse. Initial installation cost is low for small buildings that require only a few heaters, but can get very high for large facilities that need many units. Due to limited air throw, their efficiency significantly decreases with mounting height. Used with MUA units when indoor air quality or negative air pressure problems occur.
- **Air Turnover (Air Rotation) Heating Systems** - Tall, constantly running floor-mounted units that typically rotate building air 1-2 times per hour. A common way to heat large warehouses with indirect gas-fired technology. They can also be fitted with cooling coils for use in the summer. However initial equipment costs can be high, operating costs are high (especially if used for cooling in the summer) and they take-up valuable floor/racking space. Electrical operating costs are a factor since the large, often noisy, blowers run continuously.

Direct fired heaters can be a very energy efficient way to heat a large warehouse because they do not use a flue or heat exchanger of any kind. 100% of available BTUs are delivered to the heated space. Direct gas-fired technology is an energy efficient way to provide both space heating and tempered make-up air (MUA). There are three types of direct-fired air heating systems. Again, it's important to know the difference because not all direct-fired heaters are alike.

- **"Blow-Thru", High Efficiency Space Heaters** - An excellent way to heat large warehouse facilities. This technology offers the highest temperature rise, outlet temperature and BTU/CFM ratio for this type of heating equipment. This translates into smaller units, lower horsepower motors, less heated outside air and lower energy costs. These units can be mounted on the roof, under the roof or through an outside wall so they don't take up valuable floor or racking space. They also provide very uniform heating (even at dock door areas) and some building ventilation.



High velocity blower keeps heated air moving reducing stratification.

- **"Draw-Thru" Make-Up Air (MUA)** Heaters - This design is best suited for facilities that exhaust large volumes of air during the heating season. MUA Heaters are often used in combination with other heating systems that aren't designed to handle negative building pressure problems. A large MUA heater will cost more to operate if it used primarily as a space heater due to its lower temperature rise capability.
- **Air Recirculation (80/20) Heaters** - This heating system is most effective when the warehouse uses a mechanical exhaust system throughout the year. However, this is the only technology that re-circulates and re-heats indoor air with a direct gas-fired burner which may not be appropriate for some applications. *This technology is not approved for use in Canada.* These draw-thru blower systems heat up to 80% recirculated air from inside the warehouse and 20% outside air to maintain a fixed static pressure inside the building. Energy efficiency is compromised if dock doors are left open because then this pressurized system will act like an inefficient MUA heater trying to be a space heater. Electrical consumption is a factor because the large blowers run continuously.

"When Energy Matters", selecting the best and most energy efficient heating system for a large warehouse or distribution center is an important decision that should include a complete evaluation of what system provides the lowest total cost solution for all heating and ventilating needs. It also means don't let the lowest bidder determine what's important to you when comes to saving energy. The benefits of installing the best heating system include low energy costs, good indoor air quality, maximum warehouse storage space, higher employee productivity, minimal maintenance and most important of all, a more profitable warehouse operation. ■

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