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ENGINE IMPROVEMENTS:

Making CHP Even Sweeter





on the cover

A Waukesha APG2000 engine generator set installed by Kraft Power Corporation of Woburn, Mass. This is one of four serving the Bradley Energy Center at Bradley International Airport.



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Engine-Driven CHP Makes Inroads

New Technologies, New Applications

FOR THE RIGHT INDUSTRIAL application – and there are many of them – a combined heat and power (CHP) engine system fueled with natural gas is an ideal package. The concept is simple. A rugged internal combustion engine turns an electric generator. Engine byproduct heat generates hot water. In this way, the fuel utilization is far more efficient than electricity and water heating fuel purchased separately.

CHP Being Viewed Positively

CHP (cogeneration) is increasingly viewed as a smart choice for industrial energy users, especially those who normally use significant amounts of hot water. Central-station thermal generation of electric power – whether it's coal-fired, oil-fired, nuclear, gas turbines or engines – produces large quantities of waste heat. Normally, about two-thirds of the thermal energy produced is wasted. By moving the generation source close to the industrial or institutional energy user, that heat can be used for hot water heating, steam generation or process applications. It may even support a cooling system.

Today, CHP providers offer engine-generator-heat recovery packages that allow the owner to use more than 90% of the energy purchased. Improvements in extended engine maintenance intervals and enhanced heat recovery make these systems more attractive than ever.

Growing Potential in the Energy Marketplace

A presentation by Michael Turwit of CENERGY at a recent Technology & Market Assessment Forum sponsored by the Energy Solutions Center stressed the potential market for engine-driven CHP systems. CENERGY offers packaged systems by MAN ranging in size from 265 to 450 kWe. Turwit points out that while more than 20% of electric generation in much of Europe and Asia is

achieved with CHP systems, in North America that number is less than 10%. Thus, the potential for growth here is huge. He also points out that 96% of the potential CHP market are systems less than 500 kWe in size. This is an area where he feels CHP is very attractive.

Improved Efficiency Makes CHP More Attractive

Turwit also noted that the electric generation efficiency of new engine-driven systems has increased from around 30% in the late 1980s to over 40% for the best systems today. This makes

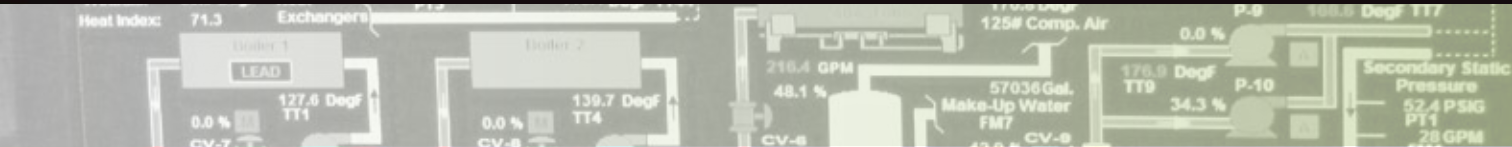
Tecogen's InVerde is a 100 kW CHP unit that was developed under sponsorship by the California Energy Commission and Sempra Utilities. It is the first commercial engine-based CHP module utilizing an inverter power interface. It features a low-emissions natural gas engine. Photo courtesy Tecogen.





“We ask for a copy of their utility bills, gas and electric. Based on their historical consumption of gas and electricity, we can determine how large a plant they can support.”

Jeffery Glick — Tecogen



these units especially attractive for energy users in regions where electrical costs for industry are rising. The MAN CHP line includes the Agenitor® package at 265 kWe and the newest offering, the Agenitor 450 kWe package. These units operate at total thermal efficiencies of approximately 88% and are shipped completely assembled and factory tested. They are ready to connect to plant electrical, hot water and natural gas supply lines.

Turwit said, “In the distributed energy industry, nothing is more important than CHP unit efficiency and equipment durability.” He states that the MAN package has high reliability and availability, with the first top end overhaul scheduled at 30,000 hours and the first major overhaul at 60,000 hours. Turwit’s firm, CENERGY, has installed more than 1,000 CHP systems worldwide, and has become a growing presence in North America, with a sales and service network headquartered in Jacksonville, Florida.

Ideal for the Right Customer

Jeffery Glick is a regional sales manager for Tecogen, another important supplier of CHP systems. He explains, “The CHP modules are ideal where the customer has a large and consistent hot water requirement. The Tecogen line of CHP modules range from 60 kW up to 100 kW in size.”

Glick notes that the use of multiple CHP units provides redundancy, allows for better part-load efficiency and greater operating flexibility. “For instance, this allows

service to be performed on one unit without having to shut down the entire CHP plant. Over the past couple of years, the typical total installation capacity in which we have been involved averaged around 400 to 500 kW.”

How to Get Started

Glick indicates that his firm can do an initial feasibility study for a potential CHP customer. “We ask for a copy of their utility bills, gas and electric. Based on their historical consumption of gas and electricity, we can determine how large a plant they can support.” Glick emphasizes that the key is not to oversize the plant so that units are sitting idle when there isn’t hot water demand. He continues, “If we determine there is sufficient hot water load and the electrical rates are high enough, then the next step is to get a qualified engineering firm involved.” The engineering firm would perform a detailed economic study and will be able to provide the owner with both an estimate turnkey installation price and the expected savings.

Interest Growing in North America

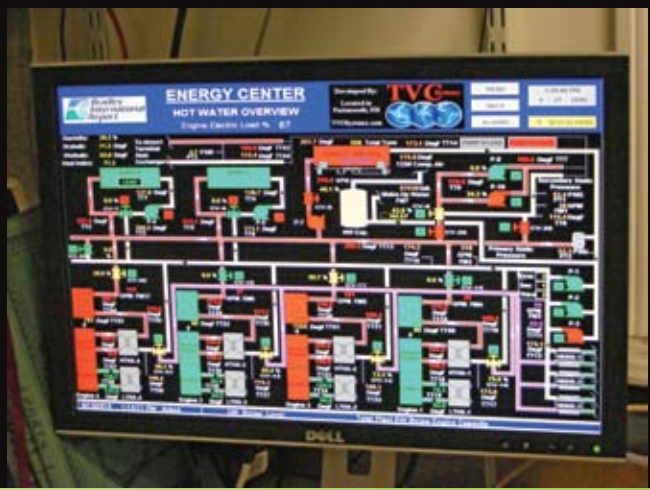
According to Ben Ross, product manager for CHP packages for Waukesha, there is growing interest in these factory-packaged CHP systems for industrial applications in North America. “There still isn’t the market penetration that has been achieved in Europe, but interest is growing. Industrial energy users show increasing interest in this option, especially in the 500 -1000

kWe sizes. In our experience, they are looking for ‘plug and play’ solutions that can match their existing electric energy and hot water use patterns.”

Ross also indicates that the key to a successful unit selection is usually to look first at the hot water requirement and size the CHP unit based on that. “This is the opposite of what some might think, but the point is, you have to be able to economically use the hot water on your own premises. For these larger CHP systems, if it happens that you have surplus electric energy at some times of the day or year, you may be able to sell that to your electric utility.” Ross also points out that in installations with varying hot water usage through the day, it is possible to store the heated water in a large tank for use when needed.

New Efficient CHP Offering

Waukesha has a new packaged CHP offering, the APG1000, which features a 16-cylinder engine that is among the world’s most efficient in its size class, with an electric generation efficiency of 42%. The unit also features exceptionally low emissions and high collection efficiency for byproduct heat from the engine jacket. According to Ross, it is practical to use the byproduct heat from the engine exhaust for steam generation, and heat from the engine jacket for hot water at temperatures up to 230°F. However, this packaged CHP system is flexible in its design potential and can alternatively produce a larger volume of lower temperature hot water. In



Installation of multiple units allows redundancy for service outages and allows units to be staged on to meet changing electrical demand. Photo courtesy Tecogen.

Advanced digital controls for engine CHP units not only optimize operation of the engine, but also provide a seamless connection to the plant's usage of byproduct heat from the engine cooling water and engine exhaust.

addition to the APG1000, Waukesha offers other CHP packages with capacities from 475kWe to 3.5 MWe. All are available in both in 50 Hz and 60 Hz versions.

Reducing the Carbon Footprint

Ross believes that an increasing number of industrial energy users are looking for ways to reduce their carbon footprint. "CHP packages fired with natural gas offer significant total reductions in carbon emissions when compared to the use of electricity from coal-fired central stations. Often the total carbon emission from CHP is one-half or less than with central station electricity."

He indicates the hot water from CHP generation can be used in a wide variety of industrial applications. He adds that one application that's sometimes forgotten is using the hot water to power absorption chillers to meet process cold water requirements. Some absorption chillers can use hot water source temperatures as low as 160° F.

Powering a Major Airport

An example of a major project that has selected a CHP solution for site power and hot water is Bradley International Airport in Windsor Locks, Connecticut. The facility was designed and built by Ameresco, Inc. The same firm operates and maintains the energy plant and related chiller plant. The facility has been in operation since 2002 and features four Waukesha engine-generators. The engines were supplied by Dresser Waukesha's distributor Kraft Power Corpo-

ration of Woburn, Mass. Byproduct heat is used to supply a 500-ton Trane single-stage hot water chiller, which supplies chilled water year round for the airport.

According to Ameresco Operations Manager Richard Ogurick, the motivations for establishing the CHP energy center were several. "The airport wanted to lower their operating costs and needed hot water for the chiller plant. Further, they wanted to increase energy supply security, because they were encountering power outages from their central power supplier." CHP met all their needs. The original 2002 plant had three Waukesha VHP engines totaling 3.9 MWe. Two years ago the facility added a fourth engine, a Waukesha APG2000 rated at 1.9 MWe.

Can Carry Entire Load

The facility operates in parallel with the electric utility, but normally uses all the electric power generated on the premises. Ogurick notes, "The airport's full electrical needs can be met by the engine-generator sets. In addition, because heat recovered from the engines is used for absorption cooling in the summer and heating in the winter, overall energy costs are lower than a conventional heating and cooling plant." Ogurick points out that because the energy used for electric generation also provides cooling and heating, the airport's carbon footprint is greatly reduced.

Importance of Maintenance

Ogurick advises that owners who are

contemplating a CHP installation should carefully evaluate their hot water requirements, because it is often the hot water usage that determines the viability of the plant. In addition, he stresses that it is important not to downplay the importance of performing scheduled equipment maintenance. "A well-maintained machine can produce power at an attractive rate, but if you don't do the required maintenance on schedule, you will have problems."

The bottom line is this: if your industrial or institutional plant needs both electric power and hot water, there's a good chance that installation of a natural gas-fired engine generator set will make good economic sense. An experienced power engineer can evaluate for you the feasibility of choosing CHP. **GT**

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CENERGY

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Coil Tube Boilers

Solving the Industrial Boiler Replacement Riddle

IT'S A FAMILIAR STORY. Your plant has a need for steam that changes throughout the day, or from day to day, or with different seasons of the year. You have an existing boiler plant, but it's getting old and unreliable. Sometimes your older boilers are still running fine, but you know their efficiency isn't very good. You need to keep them running when you aren't using steam at all, but need it to be readily available. Does this sound familiar?

An Attractive New Approach

For many owners, the solution has been to install one or more compact, efficient coil tube natural gas-fired boilers, often called steam generators. This approach is attractive because these packaged units take up little floor space and can either supplement or replace an existing traditional boiler. Units are factory engineered, skid mounted, and many can fit through a standard double door. Most offer efficiencies in the 85% area, far exceeding most older firetube or conventional watertube boilers.

Andy Wales is the Western Regional Sales Manager for Clayton Industries, a manufacturer of a line of coil tube steam generators. Wales notes that these units are being used in a wide variety of industrial plants. "They almost always offer both operational and installation savings over more traditional designs. Over the past years we have seen a multitude of installations, both batch and continuous duty profiles, where these steam generators have replaced traditional designs."

Numerous Inherent Advantages

The Clayton design uses a helically wound coil design in its main heat exchanger sections. According to Wales, its main advantages are compact size, high thermal efficiency, rapid startup and good load-following characteristics. He also cites low blowdown volumes and its high level of operator safety. A very attractive feature of the coil tube boilers is that because they have a very low volume of feedwater to be heated, they can be on line from a cold start in ten minutes or less.

For this reason they are ideal for intermittent steam uses and for plants that do not operate around the clock. In many plants, it has been necessary to keep a conventional boiler in warm standby status, often with a licensed operator on duty, to assure that steam is quickly available when needed. In most cases, this warm standby requirement can be eliminated by installing a coil tube boiler.

Shut Down Main Boiler Plant

Industrial operators are also increasingly appreciating the value of a "pony" boiler, which can meet all of the plant's steam requirements during summertime operations, or during off-shift hours. Again, this is an ideal application for the compact and



Whether it's new construction or a retrofit, owners appreciate the small footprint of a coil tube boiler, as with this Clayton compact vertical unit in a grain processing plant. Photo courtesy Clayton International.

efficient coil tube boiler. The heavy main boiler plant can be shut down for the season, or until greater steam volumes are required for manufacturing loads.

Because the typical coil tube boiler does not include a pressure vessel, in many areas it does not require a licensed attendant to be on duty. According to Bryan Heppell, President of Thermogenics Boilers, his company's product is exempt from licensed operator requirements in Ontario, Manitoba, Quebec, Newfoundland and in the U.S. in Ohio, Detroit and several other areas." According to Heppell this attribute, along with the Thermogenics coil tube boiler's quick steaming, small footprint, 10:1 turndown ratio and high efficiency, are attributes that make it a popular choice for industrial and institutional applications.

The main reason why operator licensing is often waived is that steam generators have a substantially lower water volume than traditional firetube designs (around 5% to 10% of the water volume) and have no pressure vessels full of water at high temperatures and pressures. This makes them inherently safer to operate. In all cases, owners should check with their local boiler code authorities and insurance agencies.

Look at Total Operating Efficiency

In looking at operating efficiency, it is useful to look at the overall load profile and include all operating costs in the buying decision. This includes both direct costs and operator costs. A steam generator with a quick startup characteristic can save a significant amount of operating labor for a plant that operates less than 24 hours per day or fewer than seven days per week.

Andy Wales from Clayton points out that a plant that has a large difference between summer and winter steam loads can save by having a smaller summer unit or by using multiple units to handle varying loads. He adds, "Fuel is not the only operating cost. Blowdown can also be a large expense if the user is not able to easily dispose of it in the municipal sewer system."



Coil tube boilers fit in well with existing plant units. Here a 450 bhp Vapor Power Circulatic® horizontal coil tube boiler stands alongside a 250 bhp firetube boiler. Note also the similar footprint for the larger capacity coil tube boiler. Photo courtesy Vapor Power.

Every Application Different

Each industrial application has different characteristics and drivers for a boiler replacement or addition. The size and condition of condensate return systems can influence what type of system is the best fit. Vendors offer a wide range of systems, using either single or multiple units. Choosing the right control package will help units follow load conditions.

According to Marc Dupuis, National Sales Manager for Vapor Power, coil tube boilers are proving to be the best choice for a wide variety of industrial and institutional applications, including food and beverage industries, pharmaceuticals, universities and hospitals, and more. "Basically, any type of process or heat and process steam application can utilize these boilers." Vapor Power offers two types of coil tube boilers. The Modulatic® is available in sizes from 18 bhp to 300 bhp and design pressures to 3200 psig, and the Circulatic® has sizes from 75 bhp to 600 bhp with pressures to 530 psig.

Payback for Higher Initial Cost

Dupuis feels that its operating efficiency is a driving force for the choice of coil tube boilers over other designs. "In many cases a coil tube boiler will be more costly for the initial purchase of the equipment than other boiler technologies. However, when overall life cycle costs are considered, such as installation costs and operating costs, there is a payback for the coil tube technology. This can far offset any difference in initial purchase cost." Dupuis explains that

other advantages for the coil tube boiler are fast startup, compact size, low weight, full range modulation, available high operating pressures and safe operation.

Support after Installation

In selecting a boiler, it is valuable to consider all of these points, as well as such issues as availability of parts and service, how well it will match up with the existing steam plant and feedwater system, and whether it can be included in the present steam plant control scheme. Other low volume designs, as well as high efficiency condensing boilers can also be considered. A qualified mechanical engineer can help find the answers to these questions, using the technical assistance of manufacturers.

Although coil tube boilers are not the only option for boiler replacement or addition, they are certainly an important option that should be considered. They may match up well with your steam plant needs, and save your company energy and money as well. **GT**

MORE info

CLAYTON INDUSTRIES
www.claytonindustries.com

GASMASTER INDUSTRIES
<http://www.gasmaster-ind.com>

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VAPOR POWER INTERNATIONAL
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A NEWER GENERATION Of Industrial Burners

**Efficiency, Control,
Reduced Emissions**

THE NATURAL GAS-FIRED BURNER is a cornerstone of industrial technology. Burners serve heat treating, non-ferrous metal smelting, aluminum melting, glass furnaces, dryers, and many other industrial operations. Although most burners are based on time-honored combustion technologies, burner manufacturers haven't been resting on their laurels. Instead, there is a new generation of industrial burners, coupled with advanced controls, that has the potential to reduce manufacturing energy costs, increase productivity and, through better temperature control, improve your product quality. On top of that, these newer burners offer dramatically reduced NO_x emissions.

Various Approaches to Efficiency

Burners come in a wide range of sizes and applications. Most are designed for a specific temperature range and firing rate to match specific industrial processes. Industrial process burners can be categorized as direct-fired or indirect-fired designs. In direct-fired systems, the surface being heated is directly exposed to combustion products. For many applications, this is no problem and is indeed the most efficient and economical system. Direct-fired designs are used for such applications as aluminum melting, ceramic kilns, and some types of heat treating.

With indirect-fired designs, combustion takes place within a tube or, sometimes, another type of enclosure. These are suitable where the process requires that the product be separated from combustion products. Examples of these burner applications include food and feed drying,

and many types of metal heat treating processes.

With older indirect-fired designs, fuel efficiency was generally low because the combustion enclosure was often just a straight tube and the thermal component of the exhaust was high. Newer burner designs overcome much of this problem with the use of U- and even W-shaped tubes to create a longer combustion path. The newer indirect-fired designs also often have a recuperative or regenerative combustion approach.

Recuperative burners recover heat from the tube exhaust and use it to preheat fuel

gases. Regenerative burners are alternately fired in opposite directions and discharge exhaust through a refractory bed or case, which captures a large portion of the heat. When the refractory is heated, the flow is reversed and the opposite end of the tube collects exhaust heat. The goal of both regenerative and recuperative designs is to capture heat energy that would otherwise be wasted.

Bloom Engineering provides a wide range of burners, with a special emphasis on the metals industries. Bloom spokesman Jim Checkeye says, "The main driving factors in the burner industry

Ultra-low NO_x burners on a steel billet heating furnace allow an owner to stay in compliance with tightening emissions regulations. Photo courtesy Hauck Manufacturing Company.



right now are NO_x emissions and energy savings. Our work with regenerative and recuperative burners has resulted in great fuel savings for our customers all over the world.”

He says that the industry continues to make improvements in both of these key areas. “On those fronts, the systems will get ‘smarter’ due to advancements in controls and related electronics. Simplicity and ease of operation will be the key.” Checkeye explains, “Bloom prefers to provide the controls with our burners since we feel we know best how they operate. Typically a third party is not involved. The OEMs (furnace builders) or end users at times have provided the controls.”

Manufacturers such as Hauck Manufacturing provide a wide range of burner options for all of the thermal process industries, including heat treating, secondary steel processing, brick and ceramics, glass, aluminum and other non-ferrous metal processing, air heating and aggregate drying. According to Hauck spokesperson Rick Carpenter, the firm has made numerous improvements in their burner product in recent years, including higher burner efficiency while simultaneously lowering NO_x emissions. He explains, “This is achieved with higher temperature insulated burners that use staged introduction of preheated air. Higher efficiency is also enhanced with Hauck’s proprietary pulse firing system.”

The NO_x Challenge

The other major development in industrial burners is great advances in reduction in burner exhaust NO_x levels. These reductions have been driven by tightening state and federal emission standards and the improvements have been made possible by metallurgical and control improvements that allow burners to operate efficiently while keeping combustion temperatures below those that contribute to the formation of excess NO_x.

According to Rick Carpenter from Hauck, industrial buyers today look closely at payback and return on investment. “This is an important factor, with a requirement of less than two years being common.” Carpenter also notes that owners are asking for more advanced combustion controls and state of the art burners to meet more stringent emissions requirements and fuel efficiency demands. “They increasingly look for the capability of combustion systems suppliers to also service this equipment due to limited in-house knowledge.”

Pulse Firing Technology

Hauck, as do most other burner companies, also provides control systems with the project. Carpenter says, “We specialize in pulse fire control technology and this requires our thorough understanding of the technique for successful implementation. We also design and sell many customized control systems and also stock several ‘off the shelf’ single burner control panels. That said, there are certainly times when we only provide the burners. In that case we work directly with the customer on their control designs.”

New Products Continually Appearing

Burner manufacturers offer a new generation of burners and controls featuring better heat recovery, longer service life and lower NO_x emissions. For you as an owner, it is important to find the burner provider that understands your application and can provide a product that matches both your production needs and your regulatory limitations. The field of industrial burners is large and dynamic, with many new products for a host of applications. **GT**



Bloom regenerative burners on an aluminum melting furnace improve efficiency by capturing heat that would otherwise be lost to the burner exhaust. Photo courtesy Bloom Engineering.



One key to improving burner efficiency while reducing emissions is advanced digital burner controls, as with this multi-burner control panel by Hauck Manufacturing Company. Photo courtesy Hauck.

MORE info

BLOOM ENGINEERING
www.bloomeng.com

HAUCK MANUFACTURING COMPANY
www.hauckburner.com

MAXON
www.maxoncorp.com

PYRONICS, INC.
www.pyronics.com



Air Curtains

Can Make a Difference

Invisible Wall to Separate Environments

ONE OF THE MOST FRUSTRATING problems for industrial building energy managers is large openings between conditioned and non-conditioned spaces. Often dock doors, warehouse access doors and other openings need to be kept open to facilitate movement of personnel, equipment and goods. Unfortunately, these openings also represents a major building energy leak and source of indoor contamination. A solution to this challenge that is increasingly being used is air curtains, sometimes called air barriers. These can not only help reduce energy loss, but can prevent entry by other environmental contaminants such as fumes, dust and insects.

Challenges Where Environments Meet

Most industrial buildings have several openings to the outdoor environment, or openings between a non-conditioned warehouse environment and conditioned storage or manufacturing spaces. These are problem areas because forklift, conveyor and foot traffic require that doors be kept open much of the time. Yet open doors allow the escape of conditioned air and entry of outdoor air contaminants. Various solutions have been tried.

One approach has been to use suspended vinyl strip doors. While these can be effective in separating environments, they have several drawbacks. According to one industry spokesperson, "Vinyl strip doors are unsightly and do not provide effective environmental separation."

Potential Visibility Hazard

Though quite transparent when new, vinyl strips quickly become scratched, stained and dusty, particularly if they are used for motorized traffic, creating a potential hazard for traffic through or near the doors. When there is a breeze on one side of the door,

they are of limited usefulness in preventing intrusion of outdoor conditions. They can require frequent maintenance because the strips are often damaged by forklift operations.

In addition to doors to the outside and between conditioned and non-conditioned spaces, another area where environmental separation is needed is entrances to refrigerated spaces and freezers, particularly where forklift transport is being used. Where these are high-traffic entrances, physical barriers like motorized doors or vinyl strips are impractical and inevitably slow down production. Here also, a better solution is needed.

A Better Solution for Reducing Infiltration

The approach that is gaining in popularity is the use of air curtains. These use an overhead air pressurizer that directs a narrow laminar flow of recirculated air down or across the door opening. This high-speed stream prevents entry of outdoor environmental elements and escape of conditioned indoor air. This is achieved without any visual or physical barrier to foot or motorized traffic.

Enershield Industries, headquartered in Edmonton, Alberta, is a manufacturer of air barriers for the U.S. and Canadian markets. Dan Hallihan is the Regional Manager for the firm and was a recent presenter at a Technology & Market Assessment Forum sponsored by the Energy Solutions Center. Hallihan indicates, "One of the greatest energy inefficiencies in any building is an open door. Enershield Air Barriers can create up to a 90% seal on open doors against a 15 mph wind. We supply our clients with an energy loss calculation using an ASHRAE formula to show what the client is losing in energy as well as what we can save them based on the amount of time the door is opened."

Hallihan feels there are numerous locations in the industrial building where it is important to prevent the infiltration of out-

side air into facilities. “This not only affects indoor temperatures but in some cases also affects manufacturing processes. When outside air infiltrates into a facility, it puts an instant demand on either the heating or cooling system. The installation of an air barrier helps to reduce the cycle time of those systems and thus reduces wear and tear on those units and saves facility energy.”

Air curtains are often designed to start automatically when the physical door is opened and stop when it is closed. Often, conditioned warehouse facilities have rows of multiple bay doors. Where each of these is equipped with an air barrier, the indoor environment remains stable and comfortable, and temperature sensitive products and equipment are protected. Air curtains are available for doors in a wide range of sizes. Systems are available for openings as small as retail food takeout windows, or as large as aircraft hangar doors.

Air Barriers Withstand Tough Environments

Standard models are typically constructed of a welded, powder-coated frame with a galvanized metal jacket. Manufacturers also

produce models for harsh, damp climates or areas that require a frequent washdown and need to be able to tolerate a wet environment. Other considerations in specifying an air barrier are building orientation to prevailing winds and the local climate.

Another provider of air curtains is Mars Air Systems of Gardena, California. Mars offers a broad line of air curtains for door and window openings of virtually all sizes. Betiel Abraham from Mars emphasizes that their air curtains help maintain comfortable indoor temperatures, so employee productivity increases and energy costs decrease. Abraham also points out that through the use of air barriers, an industrial or commercial facility can garner points toward a LEED certification.

Air Curtain Heating Available

For users of air curtains in cold climates, Mars offers doors that use heated air to increase comfort for workers near the opening. Several heating options are available, including electric, gas-fired hot air and steam heat. The Mars website includes a calculator to help owners determine potential energy savings through the use of an air door. According to Abraham, the

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www.biddle-air.co.uk

ENERSHIELD
www.enershield.ca

MARS AIR SYSTEMS
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doors can be installed over any door opening and are available in a variety of colors. “These can be customized to conceal into any opening and are available with a standard five year warranty on all unheated systems and and 18 month warranty on heated units.”

As energy costs become increasingly critical with tight manufacturing margins, the savings and improved environment realized from an air curtain can be important. Engineers have designed air curtains to solve the challenges of traffic safety, energy conservation, facility comfort and control of the indoor environments. Now is the time for owners to take a look at this valuable technology. **GT**

➤ Another ideal energy saving installation is in front of refrigerated and freezer areas. Photo courtesy Mars Air Systems.



◆ Even relatively small office and retail doors that are frequently open can benefit from an air curtain installation. Photo courtesy Enershield.

◆ Long rows of loading dock doors can be individually protected with air curtains that switch on when the door is opened. Photo courtesy Enershield.



Liquid Desiccant Systems

Finding New Friends

Green Features Also Good for the Pocketbook

LIQUID DESICCANT DEHUMIDIFICATION systems fill an important niche in industrial environment management by providing highly efficient and tightly controllable humidity levels, both for building comfort and process control. One of the major providers of these systems is Kathabar-Niagara, providers of both Kathabar and Niagara Blower “No-Frost” liquid desiccant dehumidification systems.

Wide Range of Industrial Applications

Kathabar-Niagara spokesperson Jennifer Dorman points out that because of growing interest in green technology, her firm sees many industrial markets as offering opportunities. “Liquid desiccant dehumidification is extremely energy efficient and can make use of low cost coolant and heat sources. This technology is ideal for biotech labs, brewing, bulk handling, chemical facilities, cold

the liquid desiccant formulations utilized by both Kathabar and “No-Frost” systems act as effective biocides to capture and neutralize airborne pathogens. “In addition, there is no potential for cross-contamination of airstreams.”

Improve Product Quality, Consistency

Liquid desiccant systems have the potential to improve the quality of manufactured products by eliminating possible mold growth, neutralizing airborne microorganisms, extending product shelf life and maintaining a consistent manufacturing environment. In processes that require product drying, these systems can lower production cost and accelerate drying. Maintaining correct humidity levels helps prevent product sticking or lumping, thus avoiding blockages in conveying lines.

One approach that has been recently developed is the use of solar energy to economically regenerate the liquid desiccants. In the right application, this approach can lead to significant utility savings for applications requiring levels as low as 29% relative humidity. According to Dorman from Kathabar-Niagara, these systems can also use low cost cooling tower water as a coolant source in the desiccant regeneration process. In addition, for applications that require large amounts of outside air, manufacturers offer enthalpy recovery devices.

Heat Recovery Potential

The Niagara “No-Frost” unit also offers an option to incorporate a distillation column concentrator (DCC), a highly efficient desiccant concentrator. This option provides reliable moisture removal with even more stable air conditions and increased energy efficiency by recovering up to 75% of heat energy in the form of hot water. It can utilize low pressure steam, natural gas or rejected condenser energy as heat source options. With this technology, the energy efficiency of the unit is increased and even higher levels of dehumidification are achievable.

For industrial operators who are looking for a more stable humidity environment, the modern liquid desiccant system is a reliable and efficient solution. Manufacturers offer technical assistance and economic analysis programs to assist in the selection process. Whether your issue is employee comfort or product quality assurance, liquid desiccant systems are worth considering. **GT**

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Liquid desiccant units like this Kathabar installation can be used for a wide variety of industrial process and comfort dehumidification applications. Photo courtesy Niagara Blower Company.

storage plants, film and glass production, food processing and packaging, pharmaceuticals, plastics plants and water treatment facilities.”

According to Dorman, liquid desiccant systems offer a simple design approach that requires less energy than conventional refrigeration or dry desiccant systems. “Due to their design principle, where air passes through the desiccant spray, the system also provides microbiological decontamination.” She points out that