SMART SOLUTIONS

WINTER 2005

Helping contractors save money and enhance productivity

"Extreme Makeover: Home Edition" TV Show Chooses Gastite to Help Build Home in 97 Hours

Approximately 400 feet of flexible gas piping were installed in just two and a half hours at the new home.

Faced with an extremely tight construction timeline, Gastite® Corrugated Stainless Steel Tubing (CSST) proved to be the fastest and easiest option for a newly built three-story, 4,700 sq. ft., Craftsman-style home that was featured on a recent episode of the ABC-TV hit, *Extreme Makeover: Home Edition.* "We didn't want to be known as the trade that held up the entire show when the owners returned from vacation to take occupancy," said Dan Roberts, western regional sales manager for the Gastite Division of the Titeflex Corporation. "The superior flexibility of CSST made sure that didn't happen."

From the Ground Up

Extreme Makeover typically portrays the transformation of an existing residence into a magnificent state-of-the-art home in only five days. This time, however, the producers took the challenge a step further by completely demolishing the featured home in South Central Los Angeles and starting from scratch. Still, the timetable didn't budge. The builder, Shea Homes of Walnut, CA, had just five days to erect the new, 27-room structure on the same site—from demolition to occupancy. (Shea, along with more than 70 other participants, donated time, resources, and labor to the project at the behest of HomeAid America.)

"Normal construction time on a house this size would take from 90 to 120 days, from pushing dirt to applying the last coat of paint," says Roberts.

"That normal cycle time would give the gas-piping installer a comfortable window to put in his system—probably a period of two to two-and-a-half days. But with only five days to build the entire home from the ground up, that window shrank to just a few hours—a time frame that would have been simply impossible with conventional black iron pipe."

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The terminal's wing-like architecture created interesting seismic challenges.

Seismic Design Challenges in JFK Terminal Met by Fireloops

Metraflex Expansion Loops Allow Simpler, Tighter Piping Runs in New York Terminal

Although the new 1,840,000 square foot American Airlines terminal at New York's Kennedy Airport will hold three complete concourses, passenger check-in space as big as Giants Stadium, and will accommodate 14 million passengers annually, the engineers and contractors who are working on the new terminal seem to have less space, not more.

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SMART SOLUTIONS

Helping contractors save money and enhance productivity

Smart Solutions showcases new technologies and promotes cost-saving and productivity-enhancing applications available from members of MCAA's Manufacturer/Supplier Council. *Smart Solutions* is published biannually for contractor members of MCAA and its subsidiaries.

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MCAA
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Manufacturer/Supplier Council

Moving together into new ventures...

Dear MCAA Member,

We're pleased to bring you the winter 2005 edition of *Smart Solutions.* This issue, like its predecessors, features ways in which you can use the products and services of Manufacturer/Supplier Council members to enhance your effectiveness and increase your profitability. These stories do not speculate or theorize; rather, many of them show the possibilities inherent in real jobs that have been implemented successfully by contractors and their manufacturer/supplier partners all over the country. Others present practical information on the optimal use of products and processes.

One particularly interesting section concerns the growing movement toward the environmentally friendly construction method known as "green building." Although this method has long been thought to be too costly, the articles in this issue demonstrate that this method is gaining in popularity with owners and developers, not only for environmental reasons, but also for its life-cycle cost reductions. By working together as a team, contractors and manufacturer/suppliers can profit from the opportunities presented by unusual construction trends, and can also make a real contribution to both comfort in the indoor work environment and conservation in the great outdoors.

We hope you find this issue both useful and interesting. We welcome your comments and suggestions for improvement. Those of you who will be attending *MCAA 2005* will have an opportunity to discuss this publication and the many other ways in which we can work together for our mutual benefit during the annual Manufacturer/Supplier Exhibit on Tuesday morning, March 1, from 8:35 a.m. to 11:45 a.m.

I look forward to seeing many of you there.

Sincerely,

Robert Looman
Chairman
Manufacturer/Supplier Council

Technology and Successful Contracting: Integrated Systems and Your Business

By Curtis Broughton
President, QuickPen International

Technology plays a vital role for successful contractors in the current economic climate of fierce competition and closer margins. With more projects and tighter schedules, companies have to be able to respond to opportunities—and problems—more quickly. This is nearly impossible without sophisticated construction software systems.

Many contractors now realize that they can get the maximum benefit from their computerized systems by integrating them. Systems integration—the seamless sharing of one set of data among compatible software systems—provides a huge edge over the competition by eliminating redundant data entry and human errors and making project managers more accurate and productive. Hours, days, or even weeks can be saved when the data input for an estimate is used straight through a project for scheduling and setting up manpower requirements and material pricing, ordering, and distribution. Setting up budgets for accounting/job costing, schedule of values, and handling change orders can be completed in a fraction of the time. The importance of data sharing is driving the next revolution in construction software.

Integration: Why Now?

Graphical TakeOff has made true systems integration possible. Before the introduction of this technology—a data-rich, clickable graphical representation of takeoff—it was almost impossible to use estimate data to set up a schedule or cost codes. Because contractors didn't know at bid time how a project was going to be built, estimators had to take off the job again once a contract was awarded. But with intelligent Graphical TakeOff, the system knows the layout of the project and knows which items are connected, so project managers and estimators can quickly fine-tune the estimate, break the project out by system or zone to match the construction plans, and generate detailed reports the way the project is going to be built—all without re-stripping the drawing. The advanced value engineering capabilities of Graphical TakeOff allow project managers to instantly compare materials and specifications as they analyze the most profitable way to build a project; then they can export that data to manage the job.

Accounting, Job Costing, Scheduling, and Purchasing

Setting up schedules manually is very time consuming, and many contractors won't do it unless they're forced. Likewise, many contractors aren't using the job cost modules in their accounting packages because they simply don't have time. With integrated systems like AutoBid, however, the actual data on how the project is going to be built can be downloaded in minutes to such scheduling packages as Microsoft Project and Primavera, providing all the data necessary for allocating manpower to a project with no additional data entry. Once these applications are no longer data entry nightmares, they become viable tools. For contractors not using a scheduling program, this labor data is a great resource for quickly estimating manpower requirements and allocating resources. This kind of dramatic time savings is also possible with purchasing—contractors can instantly produce a bill of materials from either their estimating or CAD systems.

Computer-Aided Design (CAD)

You cannot underestimate the advantages of accurate construction drawing and the impact on the profitability of a project. Prefabricating and having materials at the jobsite at the right time is critical. CAD systems dramatically reduce the time required to generate or modify construction and coordination drawings, and 3D CAD provides a realistic visual environment with multiple views. With systems integration, the CAD system can download data directly to the fabrication system and can generate bills of materials for purchasing.

Computer-Aided Manufacturing (CAM)

CAD data can be automatically downloaded to both HVAC sheet metal and pipe fabrication systems. For instance, QuickPen's PipeDesigner 3D is tightly integrated with PipeFab. Isometric drawings can be downloaded to this automated pipe fabrication machine to quickly create precise opening pipe cuts for O-lets and saddles. With no redundant data entry, jobs get to the shop faster and errors are virtually eliminated. Once the drawings for a project are complete, contractors can start fabricating, literally within minutes.

In the near future, all important construction processes will be seamlessly integrated for maximum efficiency. When shopping for any kind of software, contractors have always looked to improve productivity and accuracy. Today, software buyers should also look for a company that can provide a broad range of tightly integrated systems.

More information on QuickPen International can be found on the company website: www.quickpen.com.

MCAA thanks QuickPen for its support of MCAA 2005.

See page 14 for more information technology news.

GREEN BUILDING IS ON THE RISE

The environmentally friendly construction method known as "green building"—once thought to be too expensive for most projects—is gaining momentum. It is earning popularity with owners and developers not only for its lower environmental impact, but also for its positive effect on lower operating costs, greater comfort, and higher occupant productivity. Buildings meeting Leadership in Energy and Environmental Design (LEED™) standards are definitely gaining attention.

Construction projects meeting LEED standards reduce consumption of water, power, and building materials. Efficiency is a natural cost-saving side effect. Although initial costs to implement some of these efficiencies are high, life cycle operating costs are significantly reduced.

Reflecting the increased interest in green building on the part of owners and contractors alike, ***MCAA 2005*** *will offer two educational sessions on the subject:* ***Green = Value, Volume, and Profit*** *and* ***Using LEED to Add Value, Volume, and Profit to Your Business.*** *Each will benefit from the presence of David Gottfried, founder of the U.S. and World Green Building Council, who will demonstrate ways in which plumbing and mechanical contractors can market and educate construction owners on the advantages of environmentally friendly construction.*

The following two stories from members of MCAA's Manufacturer/Supplier Council are good illustrations of the ways in which green building can succeed.

LEEDing the Way: Kansas City Developer Proves "Green" Also Means Profitable

EcoWorks, one of the first speculative office buildings in the U.S. to receive LEED certification, was developed with a straightforward approach: design a building that isn't overpriced and that helps clients attract and retain well-qualified employees. According to Hugh Zimmer, chairman and CEO of the Zimmer Companies, this approach is good for the client and also good for his Kansas City real estate development firm. Many developers and building owners acknowledge that "green" can be comfortable, but most think it's not profitable. With EcoWorks, Zimmer has proved that "green" can be both.

Located in Lenexa, KS, EcoWorks contains 350,000 square feet of office space in six buildings designed for multi-tenant occupancy. Part of a 300-acre technology park, it gives employees access to lakes, trails, exercise stations, and picnic areas. Wind turbines and solar power reduce energy consumption; hands-free faucets and low-flow toilets reduce water consumption; recycled materials are used throughout. And it's comfortable, with plenty of natural light and circulating fresh air. The building received certification according to LEED 2.0 criteria.

Clean, conditioned air and plenty of daylight make Ecoworks a natural for productivity and well-being.

"The consensus among developers and owners is that LEED is a good thing, but it costs too much," said Zimmer. "And we knew that no tenant would pay a premium just because a building is LEED-certified. Our goal was a LEED-certified speculative office building that is competitive with other buildings in Kansas City." Zimmer's rule of thumb is that a sustainable building should not run more than 5 percent above comparable projects. "We discovered that, if you work at it, you can bring the costs to where they are competitive. If something came in at more money than we thought it should, we just went back and looked at our options."

Reviewing Options in HVAC Systems

As far as air conditioning goes, Zimmer states that, "A typical office building uses air-cooled condensers because they're economical to install and operate, but water-cooled recirculating systems are even more efficient and environmental sensitive. They're quiet, they don't require a separate chiller room, and they help boost indoor air quality. That's what we wanted, but they cost more money."

After some research, Zimmer and his team decided to install a reflective roofing system which reduces heat islands and cut their air conditioning tonnage by 10 percent, thereby allowing them to move to a water-cooled recirculating system. As a result, six McQuay vertical self-contained water-cooled units are installed at EcoWorks I, three per floor. In addition, two McQuay RoofPak™ 100 percent outdoor air heating and cooling units provide fresh air to meet the building ventilation requirements. "The key to developing a green building," Zimmer said, "is to review all the options."

HVAC System Meets Requirements

EcoWorks' HVAC system meets sustainability requirements because it is energy efficient and quiet, even though the McQuay SWP vertical self-contained units are adjacent to work areas on each floor. To help keep offices quiet, the supply-air plenum and fans are designed for exceptionally low sound levels. In addition, double-sloped, stainless steel drain pans help eliminate stagnant water and bacterial growth.

From a developer's standpoint, the HVAC system must provide economical installation and operating costs. Self-contained units do not require insulated, chilled water piping systems or a separate chiller room, and they require less floor space than standard, chilled water air handling units. Thus, their installation costs are often lower.

Operating costs, too, are usually lower when compared to alternative systems. McQuay self-contained systems combine high efficiency scroll compressors, direct expansion cooling, water-cooled condensers, and VAV control, all of which add up to high operating efficiencies.

EcoWorks is a Natural for Comfort and Profitability

Now open for business, and already partially occupied, EcoWorks is living up to its name. The HVAC system's clean, conditioned air, combined with plenty of daylight, makes EcoWorks a natural for productivity and well-being—a real boost to the bottom line.

For more information on McQuay, please visit www.mcquay.com.

Herman Miller Building Receives LEED Gold Recognition

"This was a real team effort, that's all I can say." In this way, Douglas Brant, the president/CEO of Beta Design Group, describes the development of the engineering design for the Herman Miller MarketPlace building in Zeeland, MI. His firm was responsible for the design of the mechanical plant for the building which recently received a Gold rating under the LEED program of the U.S. Green Building Council (USGBC). The recognition was given for the building's environmental and financial building design and performance.

Firm Has Commitment to Green Buildings

Herman Miller, Inc., headquartered in Zeeland, is a leading global provider of office furniture and services for the workplace. The firm also has a long-standing commitment to green building design, being one of the original sponsors of the U.S. Green Building Council.

Many of the firm's buildings have been designed and built to meet high building environmental goals, and when plans were made for a new facility, the Herman Miller organization asked that it be designed and built to the newest Green Building standards, with a minimum goal of achieving the Green Building Council's LEED Silver standard.

The Herman Miller MarketPlace is owned by the Granger Group of Companies, a large for-profit real estate corporation headquartered in Grand Rapids, MI, and consolidated Herman Miller employees from five different sites. The goal of the project was to create a prototype office environment that showcases practical applications of Herman Miller products and systems, while also serving as a working office for 450 Herman Miller employees during a 40 hour work week. The Granger Group's intellisys™ process—emphasizing the value of assembling known components on a precisely orchestrated schedule—was used for the entire project.

The intellisys process is a systemized approach to procuring and delivering a building from pre-construction planning to tenant move in. It combines the latest building technologies, a kit-of-parts assembly process, and the USGBC's LEED building requirements. Intellisys delivers smart buildings that are "healthy" and offers clients significant value in overall economic terms, including initial construction

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The building features exposed cabling and ductwork.

Herman Miller

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costs, operational costs, and human productivity. A key part of the design was the mechanical plant. Beta Design Group of Grand Rapids led the effort to develop a system to meet or exceed the LEED Silver level. To do so, it was necessary to achieve at least a 40 percent reduction in energy use over ASHRAE Standard 90.1–1999.

Tenant, Owner Define Building Goals

The building design encompasses 100,000 square feet of floor space, with a very open, two-story interior design. Over 65 percent of the wall area is glazing, providing natural light for much of the office area throughout the day.

Brant points out that the Herman Miller and Granger organizations not only wanted a high level of performance for the building, but stressed the need to contain costs in equipment to achieve this goal. Trane's Grand Rapids office was also deeply involved in the design process, helping to select the optimum equipment for the application.

Trane Rooftop Systems Chosen

The approach ultimately taken was to use package rooftop units for heating and cooling, with VAV distribution. Brant notes, "We knew rooftops would lower the first cost, and VAV distribution would help assure system efficiency and good comfort throughout the building." The rooftop system selected was four Trane IntelliPak™ rooftop units rated at 50 cooling tons each.

The rooftop units use electrically-driven scroll compressors for cooling, with a design that allows the cooling units to operate at 100 percent, 80 percent, 60 percent, or 30 percent of capacity. The units have two-stage gas heating sections with long-life stainless heat exchangers. According to Brant, the tight building envelope and the internal heat gains mean that the heating sections operate relatively few hours yearly. The rooftop units are equipped with Trane's IntelliPak™ controls package to interface with the building controls.

The rooftop comfort system also features two Semco Pinnacle™ air-to-air ventilation air treatment units. The Semco units feature dual desiccant wheels that pretreat air going to the rooftop units. Brant indicates that both the rooftop units and the dehumidification modules are important to plant efficiency.

Protecting the Work Environment

In addition to operating efficiency, the Herman Miller organization also placed a priority on indoor air quality. The Trane rooftops, along with the Pinnacle units, control the humidity of incoming air. Brant notes that humidity control is a prime element of indoor air quality. The system also uses CO2 sensors to adjust ventilation rates to building occupancy. The Herman Miller products showcased in the building were designed to produce minimal emissions from their construction materials, and the building itself was designed for efficient and effective ventilation.

The design and construction process for the building was on a very fast track, with less than 14 months from the beginning of design to building occupancy. Brant says, "It's a myth that to have an energy-efficient design, you need to take a lot of time. What you do need to do is to assemble proven systems, using clearly-understood design goals."

Brant also points out that another myth is that all manufacturers are equal. "This is less true today than ever. Trane understood our need for speed, and the requirement that all the drawing be right the first time. We didn't have time to do drawings twice."

Open design showcases Herman Miller products.

Building Controls Part of Fast-Track Approach

The control systems specified for the MarketPlace facility were Trane Tracer unit controls with a Tracer Summit™ system, which controls the entire comfort system. An advantage to using Tracer unit controls was that they allowed installation and testing of controls to be done in the Trane factories, significantly decreasing field installation time and increasing the high level of confidence that they would smoothly interconnect with the building controls.

The building design features exposed cabling and ductwork. This was done to facilitate rapid changes in building systems to accommodate future needs. Construction of the facility began in May 2001 and was completed in November of that year, taking an astonishingly short 6.5 months. According to Brant, this achievement was possible because of the effort that went into project planning. An independent commissioning agent reviewed the entire building after startup, and documented facility operation.

Building Meets Gold Standard

It soon became apparent that the building was actually operating at levels better than the LEED Silver level that

had originally been set. Ultimately, the review of the entire building—including the types of materials used, the operating economy, and the emphasis on environmental consciousness in the design—resulted in the building receiving the LEED Gold level certification.

According to Brant, who fields many questions about the mechanical plant from site visitors, "The most important thing is to assemble a good team in the beginning. And it's important to keep an open mind on options, to be inquisitive." In the MarketPlace building, the successful use of this approach has resulted in an award-winning building, as well as a very comfortable place to work.

American Standard is a global manufacturer of air-conditioning systems and services for commercial, institutional, and residential buildings sold under the Trane® and American Standard® brands.

For more information, visit www.us.amstd.com.

MCAA is grateful to Trane for being a major sponsor at MCAA 2005.

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JFK Terminal

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The terminal—started in 1999 and slated for completion in 2007—will centralize ground access and passenger processing at JFK Airport. Seeking to create clean, modern lines as well as functional space, terminal architects have challenged all disciplines to help them keep their vision. This means squeezing utilities into as little space as possible, including a fire sprinkler system that would meet the new seismic codes.

No Room for Traditional Seismic Joints

As a rule, seismic joints are not small, and not pretty. They require convoluted connections that allow movement in all directions. David McMahon, senior project manager for MCAA member SIRINA Fire Protection Corp. (Garden City, NY) explained, "There was just no room for all that extra hardware. Seismic codes are a relatively new issue in our part of the country and to use the traditional grooved coupling configuration just would not cut it. That's when we found the Fireloops. They solved all our problems."

The unique design of seismic Fireloop expansion joints makes designing fire sprinkler piping runs a lot simpler. Capable of ± 4 and ± 8-inches of movement in all directions, Fireloops can fit snugly up in the ceiling, in walls, and can even be nested within each other, making them a more elegant and efficient solution for extremely tight piping runs.

"We installed dozens of Fireloops throughout the terminal in places I know we could not have used any other type of seismic joint," commented SIRINA's Executive Vice President Rocco Abbate. "The loops solved a lot of issues."

"In fact, it was the first set of Fireloops we ordered that convinced us it was the right product," he continued. "They were so easy to install in the first phase of construction we knew it was the perfect seismic joint to use for the rest of the project."

What Happens When it Starts to Fly?

The wing-like architecture of the terminal created an interesting challenge. "We had to have some special Fireloops created that would accommodate up to 12 inches of movement and installed them in the ceiling at building separations," explained Tom Field, eastern region sales manager for Reliable Automatic Sprinkler Company, from whom SIRINA purchased the Metraflex Fireloops. "We needed extra movement and flexibility there because of the expected rise and fall of the facility from wind and snow." High winds across the wing-like roofline were expected to raise the roofline up to five inches, and snow loading could cause the roof to deflect downward as much as an inch.

Fireloop expansion joints, developed and manufactured by Metraflex, have been used in thousands of seismic applications nationwide. Their unique design provides the flexibility and freedom architects and engineers need to advance their designs. And, the ease of installation and small footprint help contractors meet construction schedules, deadlines, and budgets.

For more information, CAD downloads, pressure drop charts, and other valuable data on designing with and installing Fireloops, visit www.fireloop.info.

Fireloops offer efficient solutions for tight piping runs.

Don't Send Profits Down the Drain

Automotive Service Center Installs Efficient Wastewater Drainage System

When the owner of a high-end, luxury automobile showroom decided to build a new location in central New Jersey, his main requirement was for an efficient, reliable wastewater system that could be designed and installed without delays and with minimal disruptions to the construction schedule. The architect on the job knew of previous successful automotive drainage applications in the area—and suggested that the owner consider Jay R. Smith Mfg. Co.'s custom automotive drainage applications.

Beating the Competition

When he received the customized drainage/wastewater package from Jay R. Smith Mfg. Co., the owner compared it with a competitive system from another oil water separator manufacturer. He found that Jay R. Smith Mfg. Co. not only provided the best solution for his application, but also provided easy access to the equipment for future maintenance needs.

Catch basin with custom fabricated slotted steel grate.

Ultracept oil water separator—no coalescing plates and no moving parts.

The solution consisted of a custom designed, labor saving, easy-to-install wastewater package: High Capacity Presloped Fiberglass Trench Drain System, 3' x 3' polymer concrete catch basin with trash bucket, and Ultracept® Oil Water Separator (with related accessories).

The presloped trench drain was designed and sized to work in conjunction with the Ultracept® Oil Water Separator as an efficient, easy-to-use wastewater system.

The catch basin has an engineered, newly designed custom fabricated slotted steel grate to satisfy requirements where heavy duty grates are not needed. The grate weighs significantly less than a cast iron grate, allowing for easier installation while providing the safety and drainage required by the application.

The plumber on the job was appreciative of the products' labor saving features and simple installation. He was able to handle and install the fiberglass trench drain easily as a 6-foot channel and frame assembly only weighing 40 pounds. The wastewater system/line was channeled to a catch basin and from there to the Ultracept Oil Water Separator for cleaning/discharge. The oil water separator came pre-plumbed from the factory with all drainage outlets connected into one manifold requiring only three plumbing connections. With the separator installed above ground, all the connections were easily accessible.

As a result of the Jay R. Smith system, the dealership operation now has an environmentally friendly wastewater system which efficiently separates oil from water and provides a simple way to properly dispose of the waste oil.

The owner liked Jay R. Smith Mfg. Co.'s turn-key approach: "The job went very well and the products represented the right application for the service center," he said. He expressed his intent to work with the company in the future on other projects requiring plumbing and drainage solutions. And, upon completion of the job, the local plumbing inspector recommended another job in which an architect was facing a similar problem and was looking for a reliable and efficient solution.

For more information on Jay R. Smith Mfg. Co. solutions, please go to www.jrsmith.com.

MCAA thanks Jay R. Smith Mfg. Co. for its support of MCAA 2005.

Extreme Makeover

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The installer was well versed on the benefits of CSST, having previously used the product on other jobs. "Given the sizing and the speed with which CSST can be installed, we knew it was the only option for this hurry-up project," he said.

The Best Laid Plans

Compounding the challenge were last-minute changes to the new home's plans. CSST routing paths that Gastite's Roberts initially configured, based upon original blueprints, either weren't there when it came time to install the gas piping, or had been taken over by the venting and water systems.

"A pre-fabbed, iron piping system never could have accommodated those design changes onsite," said Roberts, who reconfigured the routing paths on the fly while waiting in the show's staging area for the go-ahead to install.

In just 30 minutes, Roberts came up with a new layout that would supply gas to seven different appliances in the home that was rising before his eyes. The new plan was to run a one-inch trunk line straight up through the garage to the attic where the manifold was located. From there, the manifold would feed the various appliances with individual runs of 3/4-inch CSST. "We oversized the piping because we wanted to be able to accommodate any reasonable appliance load changes," Roberts commented.

According to Roberts, a rigid pipe system would likely have been routed from the meter to the garage and then to each appliance on the first floor before running through the ceiling to feed the second-floor appliances. "That would have been extremely difficult due to the home's panelized construction," Roberts noted.

The installation began at the unseemly hour of 3:00 a.m. on a Sunday morning—12 hours after they were originally slated to start. But the entire installation was completed in just two and a half hours, using approximately 400 feet of CSST. Roberts estimates that with black iron pipe, the project would have required two installers and a minimum of 10 hours, including eight hours to install the pipe and two to chase down any leaks.

"Running up and down three flights of stairs in such a tight time frame can take its toll," says Roberts, "but Gastite's light weight makes the work go much easier. I can't imagine how an installer would feel if he had to do this job in black pipe, with all that heavy-duty cutting and threading equipment."

Not only did Gastite eliminate all the cutting and threading needed with iron pipe, it also minimized the number of fittings. Roberts and colleagues used a manifold system and separate runs, so the installation required only two fittings for each appliance line: one at the beginning, one at the end. What's more, fewer fittings effectively reduce the number of potential leaks.

Gastite's Dan Roberts (center) on the jobsite in south central Los Angeles with design team leader Ty Pennington (right) and designer Michael Moloney of the hit TV show *"Extreme Makeover: Home Edition."*

The old house demolished, volunteer workers get ready to construct the new one—in only five days.

Done in Four Days

Ninety-six-and-a-half hours after the demolition was finished and construction commenced, the new house was done. The owners, Johnny and Veronica Garay, who were vacationing at Disney World in Florida during the makeover, were brought home to see the happy results.

"We had roughly 1,500 craftsmen from every trade imaginable, plus more than 100 volunteers, fighting for time and space during those four days," Roberts says. "Black pipe would have held up the construction of this home, as well as the work of the many other trades that were nipping at our heels. Thanks to Gastite, we had no problem staying ahead of the pack and helping to keep the show on schedule."

Gastite, a division of the Titeflex Corporation, is a manufacturer of flexible gas piping systems from 3/8 inches to 2 inches for residential, commercial, and industrial applications.

For more information, contact marketing coordinator Tania Pierre-Kopy, c/o Gastite, 603 Hendee Street, Springfield, MA 01139–0054; telephone 413–739–5631 or visit the Gastite web site at www.gastite.com.

Put Cooling Costs on Ice

Since 1996, Comfort Link, in collaboration with MCAA contractor The Poole and Kent Company (Baltimore, MD) and Baltimore Aircoil Company, has helped building owners in downtown Baltimore put cooling costs on ice; ice thermal storage, that is. Comfort Link, a partnership between Baltimore Gas & Electric Company and the Monumental Investment Company, supplies chilled water and related HVAC building services to downtown Baltimore enterprises, including government and commercial office buildings, hospitals, a convention center, and entertainment/retail establishments. Because of the use of ice thermal storage, district cooling plants provide several benefits for both the customer and the contractors. With three interconnected ice thermal storage district cooling plants strategically located around Baltimore's Inner Harbor, Comfort Link supplies cooling to its customers with a greater degree of system reliability than others can achieve without district cooling.

Customer Benefits

Ice thermal storage provides benefits to the customer as well as the contractor. For customers, ice thermal storage provides:

- lower first cost,
- lower operating cost,
- reduced environmental risk (the ability to eliminate CFCs),
- enhanced building comfort,
- deferred capital investment (for new or replacement chiller plant), and
- overall increase in asset value.

The use of low temperature water from ice storage reduces piping, pumping, and air handling equipment costs. In some newer buildings, the use of low temperature air distribution supply air allows additional savings from smaller ductwork, smaller fans, and increased useable space.

Operating costs also decrease because ice thermal storage systems have the flexibility to adjust to changes in peak electrical rates. In June of 2002, industrial and commercial businesses in Maryland were required to switch to independent suppliers of electricity and enter the world of deregulation. While many owners dreaded the thought of deregulation, this change was welcomed by Comfort Link as a great opportunity to manage energy costs. The Comfort Link plants were originally designed and operated to minimize energy usage by melting ice during well-defined peak cost hours, weekdays from 10:00 a.m. to 8:00 p.m., established by the local utility. Comfort Link has the flexibility to change operating schedules to minimize spot market energy charges and transmission fees. This includes the ability to shut down all compression equipment and melt ice only during a two-hour to four-hour window. The transition between cooling sources goes unnoticed by Comfort Link customers as system supply temperatures are consistently maintained at 37°F.

Contractor Benefits

The Poole and Kent Company plays a key role in the success of the Baltimore (Comfort Link) District Cooling Plants. On district cooling projects, contractors can be brought in early in the design phase and become part of a team comprised of the owner's representative, the engineer, and equipment supplier. This partnership provides an open forum where value-engineering ideas are developed to meet the budget and the project time frame. Additionally, the details of the project are coordinated and any potential pitfalls eliminated to assure smooth field installation and start-up. Additionally, the size of the pumps, piping, and valves decrease in size in ice thermal storage district cooling plants because of the cold water temperature and flows, easing handling, layout, and installation for the contractor. Generally, smaller pipes require shallower trenches (meaning less effort and sometimes no need for special city permits). Also, contractors with knowledge of ice thermal systems are in higher demand.

Connecting to Comfort Link Beats Chiller Conversion

Because of new, stricter CFC legislation (requiring owners of R-12 and R-11 refrigerant systems to convert the systems to acceptable materials and install ventilation systems to prevent exposure to accidental leaks), several building owners in Baltimore needed to change out their chillers. Since the buildings are older, replacing chillers can be complicated and very expensive. Rather than replacing chillers, connecting into Comfort Link's district cooling loop and purchasing chilled water has proven to be the best choice economically for these owners. Comfort Link's District Cooling Loop, made up of three interconnected plants, provides redundancy in service.

Convention Center Chilling Station (Plant 1)

Comfort Link's initial chiller plant, constructed by The Poole and Kent Company in 1996, is located within the Baltimore Convention Center. Custom, field-erected glycol chillers are of the industrial screw compressor type with remote evaporative condensers. BAC supplied model VC1 evaporative condenser and ice thermal storage coils for the project. Specifically, 49,055 ton-hours of BAC ice coils, configured for air-agitated, internal melt operation, sit in concrete tanks located in the convention center basement and below a parking lot adjacent to Oriole Park at Camden Yards. Peak plant capacity, based on a 10-hour ice burn cycle and the total chiller operation, is nearly 12,000 tons.

Market Center Chilling Station (Plant 2)

Plant 2 started supplying chilled water in 1999. Custom, dual-evaporator screw chillers can efficiently chill glycol for ice or water directly during peak load periods. Packaged centrifugal chillers handle day and night base load water chilling duty. Heat rejection is handled by BAC model Series 3000 cooling towers equipped with low sound fans and discharge sound attenuation installed next to the round ice thermal storage tanks. A total of 27,000 ton-hours of BAC ice coils, configured for air-agitated, external melt operation, are installed in two 39' diameter, steel storage tanks. Overall plant capacity is 13,750 tons. The peak plant capacity is based on a 10-hour ice burn cycle and the total chiller operation.

Municipal Center Chilling Station (Plant 3)

Due to very tight site constraints, Plant 3 is being constructed and put into service in several phases. Initial operation began in 2001 and, when completed, Plant 3 will be Comfort Link's largest, with capacity exceeding 16,000 tons. Large capacity centrifugal chillers will handle water chilling and ice-making duties; 30,500 ton hours of BAC ice coils, configured for air-agitated external melt operation, will be installed in a 55-ft. diameter steel storage tank. Heat rejection is handled by BAC model Series 3000 cooling towers located on the roof. The peak plant capacity is based on a 10-hour ice burn cycle and the total chiller operation.

With all three plants in operation, Comfort Link will be able to provide 41,750 tons of cooling to the building owners of downtown Baltimore.

For more information about Baltimore Aircoil Company please visit www.baltimoreaircoil.com.

MCAA thanks Baltimore Aircoil Company for being a major sponsor of MCAA 2005.

5 Tips for Hanging or Supporting Grooved Piping Systems

By Dan Walsh
National Product Manager of Hangers & Supports
ANVIL International, Inc.

Grooved piping products have a very good maintenance track record out in the field. Whenever there are perceived problems with installed grooved product, a high percentage is often related to the hanging or supporting method or the application chosen. Although grooved piping systems are supported very similarly to welded piping systems, there are a few considerations for assuring the proper selection and application of hangers and supports used on a grooved piping system such as ANVIL's Gruvlok® brand.

Review Requirements and Logistics

A variety of hangers and supports are typically used on grooved piping systems, ranging from a simple band hanger, clevis hanger, and trapeze supports to more intricate rack designs using structural steel or a mechanical framing/strut system. All of these are acceptable hanging or supporting methods, but they depend on the project's type, design, and specification requirements. With this in mind, a vital first step is to refer to the project and code requirements when choosing the proper hanging or supporting method.

Project logistics are another consideration, regardless of system type. Quite often, hangers and supports are an afterthought on a project simply because the big-ticket items—labor, major equipment, and schedule—are the focus of the project team. However, hangers and supports are among the first components needed on a project since you cannot hang pipe without them.

In nearly every hanger or support assembly, there are three components that make up the assembly:

- upper attachment (beam or structural attachment);
- intermediate attachment (rod, couplings, eye nuts, etc.);
- lower attachment (pipe clamps, U-bolts, trapezes).

All three components should arrive on the project site together and early. To save costly field labor hours, consideration might be given to having the hangers or supports pre-assembled by the manufacturer or fabricated in the contractor's shop. Components can also be bundled and tagged by system or area of the project so they can be easily assembled and located onsite.

Make a Match

The type of grooved coupling used on a project is the next consideration for

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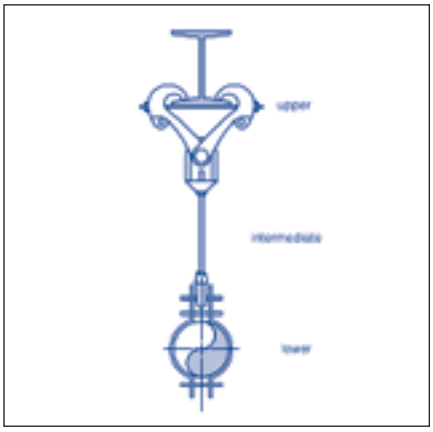

Double Bolt Pipe Clamp Assembly.

Grooved Piping Systems

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choosing the correct hanger or support method. The proper maximum spacing allowable is governed by project specifications, the applicable code, and/or the hanger manufacturer's recommendations, all of which must be reviewed. Flexible couplings used on horizontal runs of pipe need to be supported at every coupling and usually require intermediate supports to satisfy the maximum spacing requirements. Rigid couplings, on the other hand, can be hung or supported on the basis of maximum spacing requirements only. In addition, wherever there is a change in direction of the piping system, a hanger or support is usually required immediately following that change in direction.

Pressure Point

System pressurization also should be reviewed when choosing the proper hanging or supporting method. As the couplings are installed, the pipe ends can either be butted up tight to one another or a gap can exist. Once the system is pressurized, those areas or joints where the pipe ends are butted up tight and held by a grooved coupling can "pop," or grow to the maximum gap, depending on the coupling chosen. The joint at a flexible grooved coupling can expand about 1/4" at each coupling, whereas the joint at a rigid grooved coupling can grow about 3/32". If there is a long run of horizontal or vertical pipe with multiple joints, the overall length of the system will grow, depending upon which grooved coupling you have chosen.

For example, if you have a grooved piping system that is 400 ft. long, there will be roughly 19 grooved joints (assuming 21 ft. lengths of pipe are used). If you multiply the number of joints by the growth of each joint, you can determine the overall growth of the system due to pressurization. If it is a flexible system, 19 joints x .25" equals 4.75" of overall growth. A rigid system would be 19 joints x .0938", equaling 1.78" of overall growth.

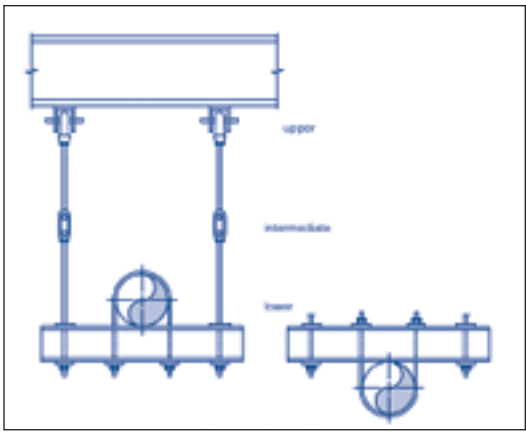
As one can see, this growth due to pressurization can have a significant impact on the hangers or supports used on a project. One way to avoid this growth is to install the grooved joints at full gap so that pressurization has no impact at testing or start up. If this is not possible, then periodic air pressurization during installation will expand the grooved joints to full gap and the hangers or supports can be adjusted accordingly.

Hot and Cold

Thermal expansion is another important consideration when choosing hangers or supports for a grooved system, since temperature varies from ambient installation conditions to operating conditions. This is especially important on hot systems versus chilled systems since the amount of thermal expansion will be greater on hot systems.

For example, if you again take 400 ft. of grooved piping, let us assume the system is heating hot water that will operate at 170º F. The pipe is installed under ambient conditions assumed to be at 70° F, so you have a 100° F variation in temperature. At 70° F, the pipe has a coefficient of thermal expansion of 0.0 in/ft., but at 170° F the pipe has a coefficient of thermal expansion of 0.0076 in/ft. To determine the total thermal expansion of the pipe from ambient temperature to operating temperature, multiply the length of pipe by the coefficient of thermal expansion. In this case, 400 ft. x 0.0076 in/ft. = 3.04 in. In other words, the pipe has grown in length over three inches because of the thermal expansion.

This is significant growth, especially if there is a change of direction at the end of the 400 ft. pipe run or if there are branch lines coming off the main run. If this thermal growth exceeds the allowable deflection of a grooved joint, especially where a change of direction or a branch line connects, then problems could occur. Thermal growth cannot be stopped, it can only be controlled by the use of anchors and expansion joints or expansion loops.



Trapeze Assembly.

It is also important to hang or support the pipe with rolls or slides and to use guides to control the thermal expansion of the pipe into an expansion joint or expansion loop. The use of static hangers, such as clevis hangers, should not be considered on pipe that is thermally expanding. When using trapeze hangers for multiple systems, it is important to have systems on the trapeze that are operating near the same temperature. If you combine hot systems with cold systems on a trapeze, the thermal expansion of the hot system can cause the trapeze to possibly twist and fail, or excessive stress could be induced on the grooved joints on all of the systems on the trapeze. If hot systems cannot be hung or supported independently of cold or ambient systems, a means should be provided—such as pipe rolls or pipe slides—to allow the hot systems to thermally expand on the trapeze.

If the pipe is a vertical riser, consideration must be given to the use of spring hangers to allow the supported pipe to grow up or down, depending upon how the pipe is anchored. Vertical pipe thermally expands by the same amount as horizontal pipe and this has to be taken into consideration when choosing supports, expansion joints, or expansion loops. If the vertical pipe is supported by friction/riser clamps only and the pipe expands upward, the clamps will grow with the pipe off the penetration or supporting structure and will no longer provide support. If the growth is downward, the friction clamps resting on the penetration or supporting structure can either fail or the pipe may overcome the friction force and push its way through the clamp as the pipe thermally expands downward. In either case, the clamps are no longer supporting the pipe as intended and this may induce excessive stress on the grooved joints.

Whether it is horizontal or vertical grooved pipe, growth of the piping system due to pressurization and thermal expansion must be considered. On hot systems, both must be taken into account and added together to determine the overall growth of the system and the effect on the hangers or supports that are used. In the previous examples, pressurization expansion on the 400 ft. run of pipe was 4.75" for a flexible joint system and 1.78" for a rigid joint system, and the thermal expansion was 3.04". Adding these combinations together would result in a total pipe growth of 7.79" for a flexible system or 4.82" for a rigid system, regardless of the horizontal or vertical orientation of the pipe. Again, this is a significant amount of growth relating to hangers and supports and the resulting stresses induced on grooved joints.

Consider Some Restraint

Although grooved systems in seismic zones perform extremely well, consideration should be given to how a grooved system is seismically restrained. If you have growth due to pressurization and/or thermal expansion, consideration should be given to restraining the system, while still allowing growth to occur. Seismic restraints in the longitudinal direction of a long pipe run may restrict the growth of the pipe, inducing stresses into the grooved couplings. Seismic restraints in the lateral direction should have little impact on expansion, except where the system has a change in direction. If the seismic restraints are placed laterally after a change in direction at the end of a long run of pipe, the expansion of the long pipe run may be restricted and this could induce excessive stress into the grooved joints.

By reviewing the couplings to be used on a project, pressurization, thermal expansion, and seismic restraints, one can best determine the proper selection and application of hangers and supports for a grooved piping system. This will, in turn, help ensure that grooved piping systems will continue to enjoy a solid reputation in the areas of maintenance and downtime.

For more information on ANVIL International, please visit the company website at www.anvilintl.com.

MCAA is grateful to ANVIL International for being a major sponsor at MCAA 2005.

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Please contact Dennis Langley (dlangley@mcaa.org) for more information.

INFORMATION TECHNOLOGY EVOLVES TO ENHANCE CONTRACTORS' BUSINESS OPERATIONS AND PROJECT MANAGEMENT

Less than 20 years ago, information technology began to make slow inroads into the world of construction. Now, IT is central to just about every aspect of industry operations: contract administration, spec writing, field operations, scheduling, estimating and bidding, and project management.

The very nature of the construction industry—highly fragmented and operating in a very competitive environment—invites the kind of improvements that IT can offer. With communication problems resulting in expensive delays, during which costs can escalate dramatically while discrepancies are resolved or rework is undertaken, well-informed use of information technology can improve communication, effectiveness, and have a dramatically positive effect on your bottom line.

A study recently published by the Mechanical Contracting Research & Education Foundation—The Value Chain: Adding Value to the Supply Chain—*spells out many of the ways in which commitment to intelligent use of information technology can improve your business. Products offered by the following members of MCAA's Manufacturer/Supplier Council illustrate ways in which you can implement some of these ideas.*

Controlling Documents Simplifies Project Management

Maxwell Systems, Inc., has recently released the Project Document Control Module for its Maxwell Management Suite, allowing project managers to control the flow of information to and from the office directly. A fully-integrated document creation and tracking system, the module allows you to initiate and manage RFI's, transmittals, submittals, submittal packages, meeting minutes, and more. Using your current Word® documents, or by creating new ones, you can easily create, print, and e-mail documents right from the system. Records also can be marked for a specific action and/or follow-up, and vital project documents, such as drawings and specifications, can easily be processed, creating an indisputable record and project audit trail.

Compatible with popular e-mail programs, including Microsoft Outlook® and Lotus Notes®, Project Document Control is easy to use, multi-functional, and ready to use upon installation. For project managers who do not normally process data through the Maxwell Management Suite, a lower cost, limited-use license is available. This gives project managers access to key areas of the Maxwell Management Suite, including the award winning Business Center, work flow approvals, job cost reports, ticklers, scanned images and documents, and project documents. And, security access is easily controlled.

More information about Maxwell Systems, Inc.—a leading supplier of business management software for the construction, service, and property management industries—can be obtained by visiting the company website at www.maxwellsystems.com.

Ease Estimation through E-Mail Pricing

Sometimes the simplest solutions can lead to big improvements in business processes. Such is the case with e-mail, not a new technology by any means, and the way in which it can improve the speed and accuracy of your bid. By sending and receiving material price quotes electronically, you can eliminate some common barriers to the generation of timely and accurate bids. Estimation has put an innovative spin on this practice with its new EZ-Pricer program, which allows you to automatically send requests for quotes over the web without having to draft an e-mail message to your supplier.

Due for official release in April of 2005 at Estimation's annual User Conference, EZ-Pricer uses InfoPath™, the latest information gathering program from Microsoft®, to facilitate information sharing between contractor and supplier. This program is included in Microsoft Office Professional Enterprise Edition 2003 and allows you to create unique forms which can be sent, filled out,

and stored electronically. Typical uses of InfoPath include creating employee time cards and expense reports for a business. Instead of sending and filling out hard copies of these documents, the information is sent by e-mail and the receiver fills out the fields specified by the sender. This reduces the possibility of lost documents or unauthorized alterations and ensures consistency in documentation and business processes.

Estimation's EZ-Pricer is based on InfoPath technology. Estimation takes it a step further by automatically drafting and sending the e-mail containing a list of materials that need price quotes to selected suppliers by allowing you to create a custom column for different suppliers for detailed item quotes. After highlighting the items and choosing suppliers, an e-mail is automatically sent to those suppliers.

Using InfoPath, the supplier opens the e-mail, fills in the required information in the protected fields, and sends the completed form back. The information is then automatically updated in the program, where you are able to select the best price from that supplier or choose from multiple supplier prices.

When you are generating a bid and the deadline is fast approaching, you may not have time to wait around for a returned phone call or fax from your supplier with your discounted material price. Estimation's EZ-Pricer not only helps reduce the turn-around time for receiving a quote, it also minimizes the possibility of errors—caused by typos, illegible handwriting, or smudged faxes, for instance—that can occur with re-keying data.

Using InfoPath has several advantages because it has the same usability as Outlook®, so there is little-to-no learning curve. It also uses XML (Extensible Markup Language), an industry standard, so it does not require any special program. Estimation's EZ-Pricer, however, does require that your supplier have Microsoft InfoPath, either as a stand-alone product or as part of Office Professional Enterprise Edition. Once your suppliers appreciate how use of e-mail can simplify the quoting process—and minimize the damage done by missed calls or lost faxes—their cooperation will be easy to acquire. This innovative use of e-mail can be an easy way to improve your business without making huge changes—and Estimation has already done the work for you with EZ-Pricer.

For more information on Microsoft InfoPath including system requirements and pricing, visit www.office.microsoft.com. For more information on Estimation's EZ-Pricer, call 800–275–6475.

Alliance Permits Combination of Engineering Design and Fabrication Software

EastCoast CAD/CAM recently announced the formation of an alliance with Autodesk® that will deliver a remarkable combination of engineering design software and fabrication software. Developments from this collaboration will allow users to obtain an actual drawing without ever needing to redraw the system.

"Through our alliance with Autodesk, we are developing a means to electronically transmit engineering drawings directly into our EC-CAD fabrication software," said David Derocher, president of EastCoast CAD/CAM. "Transmitting the drawings electronically will benefit our customers in two major ways: first, the entire system will not have to be redrawn for fabrication, and second, an actual cost estimate can be obtained without ever having to perform a manual takeoff of the system. These developments are revolutionary and will have a major impact on the entire construction industry. EastCoast's strong background in plumbing, heating, ventilating, and air conditioning, together with Autodesk's software specifically designed for MEP building systems design and documentation, is a combination that can't be matched."

For more information on EastCoast CAD/CAM products and services, visit www.eccadcam.com.

Benefits of Streamlined Dispatching and Service Operations

Efficient dispatching can mean the difference between a smooth operation and a state of near chaos. The release of an advanced dispatch schedule for its Dexter + Chaney's Forefront® Construction Management Software can help streamline dispatching and service operations for plumbing, mechanical, and HVACR contractors. The advanced dispatch schedule is part of Forefront's Work Order module, which provides a complete billing, tracking, and dispatch system for construction companies that perform service work.

The advanced dispatch schedule's "drag and drop" functionality enables you—with a few clicks of the computer

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Streamlined Dispatching

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A field technician can easily access scheduling information.

mouse—to schedule and reschedule service calls, change the estimated length of an individual call, and assign work orders to multiple technicians. Its user-defined color-coding displays dispatch status at a glance, indicating whether the call is a priority and the status of the technician assigned to the call.

The product integrates with Forefront's Mobile Service application and connects the field service technician to the main office in real time. Using a handheld PC (equipped with the Windows CE operating system) while in the field, the technician can access his current service call and indicate when he has completed that call. This information is immediately seen by the dispatcher back at the office.

If Mobile Service is not in use, the dispatcher can notify the technician of changes to the schedule and provide service call information via automatically generated e-mail.

The advanced dispatch schedule is available in Forefront Version 12 for SQL databases.

More than 1,000 construction companies throughout the United States use Dexter + Chaney's Forefront Construction Management Software.

For more information about Dexter + Chaney or Forefront, visit www.dexterchaney.com.

Integration Can Increase Efficiency, Improve Customer Service, & Boost Profit Margins

Busy construction firms that perform construction, installation, repair, and maintenance operations can now access all of their service and construction management information directly from their accounting and financial management software with Penta. The project and financial management software from Penta Technologies, Inc. is now available with a robust, fully featured Service Management system capable of reducing operating costs, enhancing customer service, and giving your remote or jobsite service personnel access to essential information.

Integrating complete service management capabilities with Penta's construction management software, Penta Service Management consolidates all of your key data into a single, powerful database delivering real-time information anywhere it is necessary—in the field, at the home office, or at the site of your work order. It allows you to manage your construction and service operations without compromising on either side or having to deal with multiple systems from different vendors. Penta offers:

- a single integrated system for a global view of all of your business operations, including customers, vendors, and employees;
- an inventory of each customer's equipment to aid taking calls and dispatching technicians, thereby improving service response and quality;
- maintenance contracts with complete support and integration with work order setup and dispatching to help you manage an important profit center;
- fast, easy setup of new work orders with predefined templates to improve response, customer satisfaction, and maximize efficiency and productivity;
- the ability to monitor and capitalize on opportunities by assigning, tracking, and generating work orders based on quotes;
- the ability to view documents such as warranties, diagrams, and instructions associated with customer equipment during work order entry and dispatching;
- instant access to warranty information related to customer equipment;
- a complete cost picture on construction jobs while allowing costs and revenues to be associated with the specific department performing the work;
- a graphical schedule board that is easy to learn and use;
- a single point of entry for work completed, including labor, equipment, material used, and description of work performed;
- fast, flexible invoicing options.

Penta with Service Management provides large specialty contractors with one system capable of meeting all of their needs: accounting, job costing, equipment cost control, labor management, project management, and service.

Learn more about Penta with Service Management by calling 262–782–7700.

A Guide to Proper Pipe and Valve Identification

Marking for Improved Safety and Efficiency

Properly marked pipes, including accurate representation of flow direction, improve response time in emergencies and make maintenance work easier and less expensive.

Sometimes the decision of whether or not to label pipes is based solely on OSHA and other requirements (Process Safety Management, Hazard Communication, International Institute of Ammonia Refrigeration, etc.). Often, however, there are other important benefits of pipe labeling, including:

1. reduced accidents (reduced workers compensation rates);
2. reduced errors (information at the point of need);
3. improved operating efficiency;
4. improved maintenance efficiency;
5. increased training effectiveness;
6. training reinforcement;
7. improved, uniform plant appearance;
8. enhanced ISO and other quality programs.

The information that follows will give you a quick guide to proper labeling.

How to Properly Label Pipes

- Obtain a list of all pipe contents in your plant. This list should include all hazardous chemicals as well as utilities and safety related systems like chilled water and fire protection. Most plants have this "legend list" already available.
- Collect the following data on your piping systems. This may require tracing lines to determine quantities and sizes or you may be able to use blueprints or P&IDs if they are current instead of walking down all of your lines.
  - pipe contents;
  - outside diameter of pipe (including insulation);
  - quantity of markers needed per ASME/ANSI A13.1 or other standards;
  - pressure;
  - temperature;
  - to/from information;
  - location of specific legends by area (for aid in installation).
- Select color and size of marker (See ASME A13.1 for color/size selection).
- Select the proper pipe marker material based on your plant environment.

Where to Label Pipes

1. Markers should be readily visible to plant personnel from the point of normal approach.
2. Pipes shall be marked:
   a. adjacent to changes in direction;
   b. adjacent to all valves and flanges;
   c. at both sides of floor or wall penetrations;
   d. at any other point of entry into the line;
   e. at 50 foot intervals on straight runs.

Pipe Marking Standards

There are two main pipe labeling standards.

The most universal is the ASME A13.1–1996 (formerly ANSI A13.1) "Scheme for the Identification of Piping Systems." This is the suggested standard to follow.

If you have ammonia refrigeration systems, you should follow the standards set forth by the International Institute of Ammonia Refrigeration (IIAR) detailed in its Bulletin 114 entitled "Guidelines for: Identification of Ammonia Refrigeration Piping and System Components" for marking your ammonia lines and components. The remainder of your lines should be marked per ASME A13.1.

A short summary of each standard follows.

ASME (ANSI) Standard A13.1–1996 Summary

The ASME(ANSI) Standard for pipe identification—a widely used guideline in determining pipe identification requirements—is designed to "assist in identification of hazardous materials conveyed in piping systems and their hazards when released into the environment…pipes are defined as conduits for the transport of gases, liquids, semi-liquids, or fine particulate dust."

Visibility

Markers shall be located so that they are readily visible to plant personnel from the point of normal approach. Seton Pipe Markers, in meeting the ASME(ANSI) A13.1–1996 visibility standard, instantly tell you all you need to know about pipe contents, direction of flow, and whether contents are hazardous or safe.

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Pipe and Valve Identification

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Size of Marker Outside Diameter of Pipe (including insulation)	Length of Color Field	Size of Letters
1/4″ to 1 1/4″	8″	1/2″
1 1/2″ to 2″	8″	3/4″
2 1/2″ to 6″	12″	1-1/4″
8″ to 10″	24″	1-1/2″
Greater than 10″	32″	3-1/2″

Letter Size

The A13.1–1996 standard also makes recommendations as to the size of letter height and length of color field for various pipe diameters. These recommendations are shown in the following table on the next page. Seton markers, used properly with arrows and banding tape or arrow tape, meet or exceed the standard.

Color of Marker	Color
Materials Inherently Hazardous	Black Letters on Yellow Marker
Flammable or Explosive	
Chemically Active or Toxic	
Extreme Temperature/Pressure	
Radioactive Materials of Inherently Low Hazard	
Liquid or Liquid Admixture	White Letters on Green Marker
Gas or Gaseous Admixture	White Letters on Blue Marker
Fire Quenching Materials	
Water, Foam, CO2, Halon, Etc...	White Letters on Red Marker

Color

Unmarked pipes mean danger—to both life and property. Numerous injuries have occurred through ignorance of pipe contents, particularly when outside agencies are called in under emergency conditions. Color is an important labeling component, and Seton Pipe Marking Systems meet ASME(ANSI) color recommendations.

IIAR Bulletin 114 (Identification of Ammonia Refrigeration Piping and System Components)

In order to comply with this standard, you must label all ammonia refrigeration piping and components.

Marker Sections

- Marker Body—shall be yellow with black legend stating “Ammonia.”
- Physical State—must state Liquid, Vapor, or both; can be abbreviated LIQ (orange) and VAP (blue).
- Pressure Level—must state HIGH (more than 70 psig) (red) or LOW (70 psig or less) (green).
- Abbreviations—for names commonly given to piping in ammonia refrigeration systems (see following chart.)
- Directional Arrows—to indicate flow direction.

Placement of Markers

- Before and after changes in direction of piping.
- On both sides of penetrations into walls, ceilings, and floors.
- Every 40 feet on straight runs of piping.
- At least once on the piping in every area which contains refrigeration piping.

IIAR Abbreviations Chart

BD = Booster Discharge
HTRS = High Temperature Recirculated Suction
CD = Condenser Drain
LTRL = Low Temperature Recirculated Liquid
DC = Defrost Condensate
LTRS = Low Temperature Recirculated Suction
ES = Economizer Suction
LIC = Liquid Injection Cooling
HGD = Hot Gas Defrost
LSS = Low Stage Suction
HPL = High Pressure Liquid
RV = Relief Vent
HSD = High Stage Discharge
TSR = Thermosyphon Return
HSS = High Stage Suction
TSS = Thermosyphon Supply
HTRL = High Temperature Recirculated Liquid

To get a copy of the full standards summarized here, it is suggested that you contact either ASME or IIAR at:

The American Society of Mechanical Engineers (ASME)
Phone: 800–843–2763
www.asme.org

International Institute of Ammonia Refrigeration (IIAR)
Phone: 202–857–1110
www.iiar.org

Choose the Right Pipe Marker for the Job!

Select the proper material for your pipe markers based on your plant environment. Seton Identification Products offer 3 main pipe marker types:

1. Opti-Code Self-Sticking Pipe Markers

- Ideal for indoor pipes.
- Self-adhesive vinyl—simply peel and press marker into place.
- Five sizes to mark pipes with diameters from 3/4" to over 10".
- Suitable for dry and clean pipes.
- All standard markers meet ASME (ANSI) standard when used with Arrows on a Roll Tape.
- Pipe temp range is 40°F to 175°F.
- To indicate flow direction and/or provide extra adhesion, use Arrows-On-A-Roll tape.

Self-sticking pipe markers.

Snap-around pipe marker.

2. Setmark Snap-Around Pipe Markers

- Precoiled markers SNAP in place, with no tape or adhesives necessary and no need to clean or degrease pipes.
- For larger pipes, markers "strap around" with FREE nylon ties.
- Arrows are included on every marker and each marker is reversible so you don't need to know the flow direction before you order.
- UV resistant inks and heavy vinyl withstand harsh environments.
- Over 150 standard wordings are available in a variety of sizes.

3. UltraMark High Performance Pipe Markers

- The ultimate marker for harsh environments and outdoor pipe identification.
- PVF over-laminated polyester construction seals in and protects graphics.
- Markers resist abrasion, chemicals, high-humidity, and outdoor weather.
- Pre-coiled for easy wrap-around installation on pipes up to 8" in diameter.
- Larger pipes fasten with FREE nylon ties.

High performance pipe markers.

- Ideal for dirty, oily, greasy, or rough surfaces including stainless steel.
- Arrows included on every marker to indicate flow direction.
- Stock markers meet ASME (ANSI) standard.
- Pipe temp range is 40°F to 248°F.

Seton Identification Products have been written into construction specifications for quality pipe and valve mechanical identification since 1956. Seton specializes in Pipe Markers, Valve Tags, Room Identification, Facility Marking, and Wayfinding Solutions.

For more information, visit the company website at www.seton.com or call 800–243–6624 to receive our latest catalog. For submittals and spec information, go to www.seton.com/aec.

Size of Marker Pipe Diameter (O.D.) (including insulation)	Marker Width	Marker Length	Letter Size	Physical State	Pressure Level
3/4" to 1 1/4"	1"	8"	1/2"	1/2"	1/2
1 1/2" to 2"	1 1/2"	8"	3/4"	3/4"	3/4"
2 1/2" to 6"	2 1/2"	12"	1 1/4"	1"	1"
8" to 10"	3 1/2"	24"	2 1/2"	1 1/2"	1 1/2"
Over 10"	4 1/2"	32"	3 1/2"	2"	2"

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