



Phoenix Convention Center: ON THE RISE

As part of the city's move to drastically upgrade its ability to host major gatherings, this boiler/hydronics design had to be ready for large crowds and surprisingly cold days. By combining simplicity with flexibility, the new system moves the project closer to LEED® certification and boasts a range that can offer service from exhibit hall to symphony hall.

BY JOHN VASTYAN

On April 10, 1874, President Grant issued a patent for the present site of Phoenix, AZ. Total cost of the 320-acre town site was set at \$550. Downtown lots were selling for \$7 to \$11 each. A year later, there were 16 saloons, four dance halls, and two banks.

In the 134 years since then, Phoenix — with about 5 million people in the metro area — has grown from a dusty crossroad to become the most populous state capital in the U.S. and is the region's primary political, cultural, economic, and transportation center.

Today, Copper Square in downtown Phoenix is where history meets the future, showcasing the city's historic sites and recent revitalization. The 24-acre Phoenix Convention Center is in the center of it all. Now in the midst of a \$600 million expansion — and surrounded by restaurants, premier hotels, retail shops, museums and a sports arena — the facility is soon to be one of the world's finest venues for large conventions.

GROWTH MODE

City managers, well aware of the potential for growth stemming from a premier convention center, began planning for the three-phase expansion several years ago. Currently in phase two of the expansion, the center is now open for convention business and will be nearing completion by January 2009; at that time all key facilities will be operable. And that's good news for Phoenix because big conventions are coming to town.

The National Rifle Association — so far, the biggest group signed on — is coming in May 2009 with an estimated 60,000 delegates. That's compared with conventions that, just a few years earlier, averaged 2,600 attendees. By 2113, convention center managers estimate

the number of trade show visitors to reach 375,000.

The convention center's expanded size — with three times the floor space of its puny predecessor, the Phoenix Civic Plaza — shifts the convention center's status in '06 from the 67th largest convention facility in the U.S., now into the top 20. Within a few months, the facility can offer nearly 900,000 sq ft of rentable space and more than 2 million sq ft total.

THE MANDATE: LEED®

When the second phase is complete in early '09, managers hope to get the blessing of the USGBC with approval of the Convention Center's having met LEED® standards as a fully sustainable facility, based chiefly on use of renewable materials, energy efficiency, continuous IAQ, water conservation (a *very* hot topic in Phoenix), recycling programs, and the use of earth-friendly chemicals for cleaning and maintenance.

"I think it will definitely be an added incentive to many groups that the facility is a green building," said Douglas MacKenzie, spokesman for the Greater Phoenix Convention & Visitors Bureau.

In fact, the move toward LEED certification was one of the first mandates from the City of Phoenix when early planning meetings were held. Green Ideas, an environmental building consultant group, and a variety of other LEED certified professionals were commissioned to assist with compliance.

BUILDING SYSTEMS

During phase one of the construction schedule, much of the major work was accomplished, and it was also during this phase that most of the key, ultra-efficient mechanical and electrical systems were installed, including new photovoltaic solar panel technology and a



Peel and stick solar panels were used on the exterior of the Phoenix Convention Center to help supply 150,000 kWh annually.

bank of high efficiency gas boilers by Laars.

Last year, crews from Phoenix-based Code Electric installed peel-and-stick solar panels on roughly a third of the West Building's two-acre roof. The panels will help supply power to the building at an anticipated rate of 150,000 kWh annually, though city officials admit the amount is a small fraction of what the building will use.

The \$850,000, 732-panel project will be the biggest solar-panel installation on a downtown building, and it's the first time this type of solar-energy technology has been used in downtown Phoenix. It's estimated that, in putting the sun's energy to work, the center's carbon-dioxide pollution will be cut by 95 metric tons each year.

According to Lexie Van Haren, director of communications for the convention center, the mechanical equipment specified for the facility is the key ingredient to achieving energy efficiency. "And an energy management system track sand optimizes energy consumption levels, further reducing heating and cooling costs," she added.

HEATING IN PHOENIX?

Well, sure. Even in Phoenix, winter can take the thermometer into the 20s and 30s, though — on average — they get less than a week of below-freezing temperatures a year. But since the city's new convention center is now a hot winter destination for large groups of people, they must accommodate the need for heating.

Phoenix-based Imcor, Inc., a 400+ employee, commercial and industrial mechanical contracting firm, was brought

in to do all of the key Phase 1 and Phase 2 plumbing, piping, HVAC, and hydronic installations.

During the Phase 1 work, according to Bill Mason, president of Imcor, their crews installed 10 high-efficiency Rheos+ boilers by Laars Heating Systems Company, a subsidiary of Bradford White Corporation.

"Each of the ten Rheos+ boilers installed by Imcor were 2 million Btuh in size, for a total heat load of 20 million Btuh," said Victor Rilling, president of the Mechanical Room Inc., the Phoenix-based manufacturer's rep firm that helped specify the boilers, ideally suited for the convention center's needs.

"The boilers feed 58,000 lineal feet of carbon steel and copper heating water piping," explained Dan Brown, Imcor's project manager for all of the firm's phase 1 and 2 work. "From the boilers, it's 800 ft to the newly-renovated South Hall where the boilers are heating 145,000 sq ft of space through air handlers, coils, and VAVs. The other building, 300 feet from the West Hall location where the boilers are, is the Phoenix Symphony Hall, where we provide for 90,000 sq ft of heated space."

It's in the convention center's West Hall where the boilers are providing heat for 210,000 sq ft through 22 air handlers, 178 VAV boxes, and 81 fancoil units, most of which require heating, though some of which carry only chilled water for use during the summer.

A unique feature to Imcor's installation was the way they configured the multiple boiler's exhaust flue. "We manifolded all of the boilers' two exhaust headers, each with five boilers, all of them connected to a com-

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Phoenix Convention Center

puterized draft control system. This allowed us to carry exhaust through roof in just two locations, discharging into VFD-driven chimney fans, minimizing the need for multiple penetrations," added Brown.

"And, with our series, lead-lag boiler arrangement, we set up the system so that each boiler runs for a set number of hours before it

cycles off as another system comes on board to meet the need," continued Brown. "This way, we've set equal run time for all of the boilers."

"When demand requires multiple boilers, they activate one at a time until heat needs are met," said Brown. "We haven't yet seen a situation where all boilers were on at the same time, though it's possible. In most instances, just a

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- *Radiant Precision 2007*

Completely revised in 2007— John Siegenthaler, P.E., one of the undisputed leading experts in the field of radiant heating and cooling, has rewritten this book from cover to cover. *Radiant Precision* is the manual for the RPA's advanced course in the design and control of radiant panel heating systems. It is also designed for self-study.

This book is not for the faint at heart. It is designed for the serious student or consummate expert of radiant heating and cooling. It is filled with the formulas, graphics, and excellent schematics that John has become known for. Within its pages can be found everything from simple tube layout to intense calculations for flow restrictors in manifold assemblies. System design and wiring schematics for the latest in controls are explained in detail. Zoning, hydraulic separation, flow and pressure balancing, buffer tanks, mixing controls, mini-tube systems, proportional- integral-derivative (PID) controls, and multi-load systems are just a few of the topics covered.

- *How Come? Hydronic Heating Questions We've Been Asking For 100 Years (With Straight Answers!)* by Dan Holohan

This useful book about hot water heating is written in a question and answer format. Some of the systems covered in this book are: gravity systems, indirect radiation, diverter tee systems, loop systems, and radiant heating. One hundred years worth of hydronic heating questions (over 600 in all!) are covered, and answered in plain English. There are also easy-to-follow illustrations. This is a terrific reference book and one you'll be glad that you added to your library.

- *Modern Hydronic Heating for Residential and Light Commercial Buildings* by John Siegenthaler, P.E.

From simple applications to multi-load/multi-temperature systems, you can now learn how to use the newest and most sophisticated hydronic heating materials and methods without compromising between comfort and energy. Heavily illustrated with product shots from top manufacturers, plus more than 300 diagrams of system piping/control schematics, this one-of-a-kind introduction to today's hydronic heating systems concentrates engineering-level design information into tools that can be used by technical students and professional contractors alike.

Thoroughly updated, *Modern Hydronic Heating, 2nd Edition* now features the latest information on state-of-the-art techniques for use in residential and light commercial buildings, such as: radiant panel heating, injection mixing, primary and secondary piping, use of buffer tanks to improve system stability, and advanced control methods. Ideal for anyone involved in the heating trades, from basic installers to design engineers, this preeminent resource of the North American hydronic heating industry is as well suited for use in a formal education course or for self-study as it is on the job.

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The 10 million Btuh boilers installed in the Phoenix Convention Center feed 58,000 lineal feet of piping to heat the building.

few of the systems — somewhere between 4 and 6 — are operating simultaneously. But that's just as we knew it would be. This way, all boilers get run time, and we've secured the redundancy the convention center needs for the assurance of no down time, ever."

In the West Hall's mezzanine level is the mechanical room where the boilers are lined up on two sides like soldiers in formation. A bevy of Grundfos TP 80-160/2 pumps circulate the heated water in many different directions.

"We were also thrilled to have an application for 10 of the Rheos+ systems," said Rilling. "The boilers are perfectly suited for the job because their controls monitor the demand for hot water and automatically adjust each boiler's capacity to meet the required heating load from 1.2 million to 2 million Btuh with variability of modulation between 100% and 25% of the input rate."

"They're an environmental win, too," added Mason, citing NOx levels of less than 10 ppm and up to 96% efficiency as positives in Phoenix and with the USGBC.

"Another key need was that the units we selected would need to have a small footprint; the boiler's compact size allowed us to install 10 units in a space where only a couple three-pass boilers could've been installed — if we could have gotten them in there." The smaller footprint allowed entry through a standard 36-in. doorway and transport on any service elevator. The high-efficiency boilers have also reduced the amount of natural gas required to heat the domestic water, Mason reports, lowering energy consumption, and operating cost.

"We particularly like the Grundfos circulators because of their reliable, wet rotor design," Brown added. "They're cooled by the liquid they circulate."

LEED CONVENTION CENTERS, STILL A RARITY

For convention centers, LEED certification is a distinction that sets them apart. To date, only three existing venues in the United States are LEED-certified: the David L. Lawrence Convention Center in Pittsburgh; the Oregon Convention Center in Portland, OR; and the Spokane Convention Center in Spokane, WA.

The project in Phoenix implemented other, non-HVAC basic recommendations of the USGBC as well, including the use of construction materials from within a 500-mile radius of the project and recycling paper, plastic, cardboard, and glass. **ES**

Vastyan, a journalist whose work focuses on the plumbing and mechanical and radiant heat industries, owns Common Ground, a trade communications firm based in Manheim, PA. Vastyan is a graduate of Penn State University. He also served as a US Army journalist for four years, winning the DINFOS Journalist of the Year award in 1984. He can be reached at 717-664-0535, or at cground@ptd.net.



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