

NOTHING TYPICAL ABOUT IT

Solar-collecting Walls Breathe
New Life into an Industrial Structure

Built in the 1880s, Building 3 had become an eyesore on an industrial campus in Pottstown, Pa. Once owned by Bethlehem, Pa.-based Bethlehem Steel Co., Building 3's illustrious history included the production of components used in the Golden Gate Bridge. However, as the years passed, the building was abandoned and neglected.

In 2007, Cigas Machine Inc., Pottstown, discovered Building 3 and determined the 73,000-square-foot space provided the room needed to manufacture stainless-steel plate products for industrial, commercial and architectural applications. Despite Building 3's age and appearance, the basic metal structure was in good condition. However, the lack of heat and insulation, as well as inadequate ventilation, made the building's temperature extremes unbearable most of the year. A solution to Building 3's problems was a transpired solar collector wall system. →

TEAM

BUILDING OWNER AND LEAD-PROJECT ENGINEER:

CRAIG CIGAS, Coatesville, Pa.,
www.cigasmachineinc.com

ARCHITECT:

AP3C ARCHITECTS, Philadelphia,
www.ap3c.com

CONTRACTOR:

SCENIC RIDGE CONSTRUCTION,
Gordonville, Pa.,
www.scenicridge.com

ENGINEER:

WACHTER & ASSOCIATES,
West Deptford, N.J.,
www.wachterbsd.com

STRUCTURAL ENGINEER:

PROVIDENCE ENGINEERING CORP.,
Lancaster, Pa., www.proveng.com,
and **MACINTOSH ENGINEERING**,
Wilmington, Del.,
www.macintoshengineering.com

CIVIL ENGINEER:

D.L. HOWELL & ASSOCIATES INC.,
West Chester, Pa.,
www.dlhowell.com

MANUFACTURERS:

InSpire Transpired Solar Collector
System, **ATAS INTERNATIONAL INC.**,
Allentown, Pa., www.atas.com;
TECTUM INC., Newark, Ohio,
www.tectum.com; **POWRMATIC
INC.**, Finksburg, Md., [www.
powrmatic.com](http://www.
powrmatic.com); **AIRIUS**, Longmont,
Colo., www.airius.us; **HUVCO**,
Rohrersville, Md., www.huvco.com;
RUFFIN BUILDING SYSTEMS, Oak
Grove, La., [www.ruffinbuilding-
systems.com](http://www.ruffinbuilding-
systems.com); **SYNERGY LIGHTING
CONTROLS**, Conyers, Ga., [www.
synergylightingcontrols.com](http://www.
synergylightingcontrols.com);
and **BRAE**, Oakboro, N.C.,
www.braewater.com

Wall Wisdom

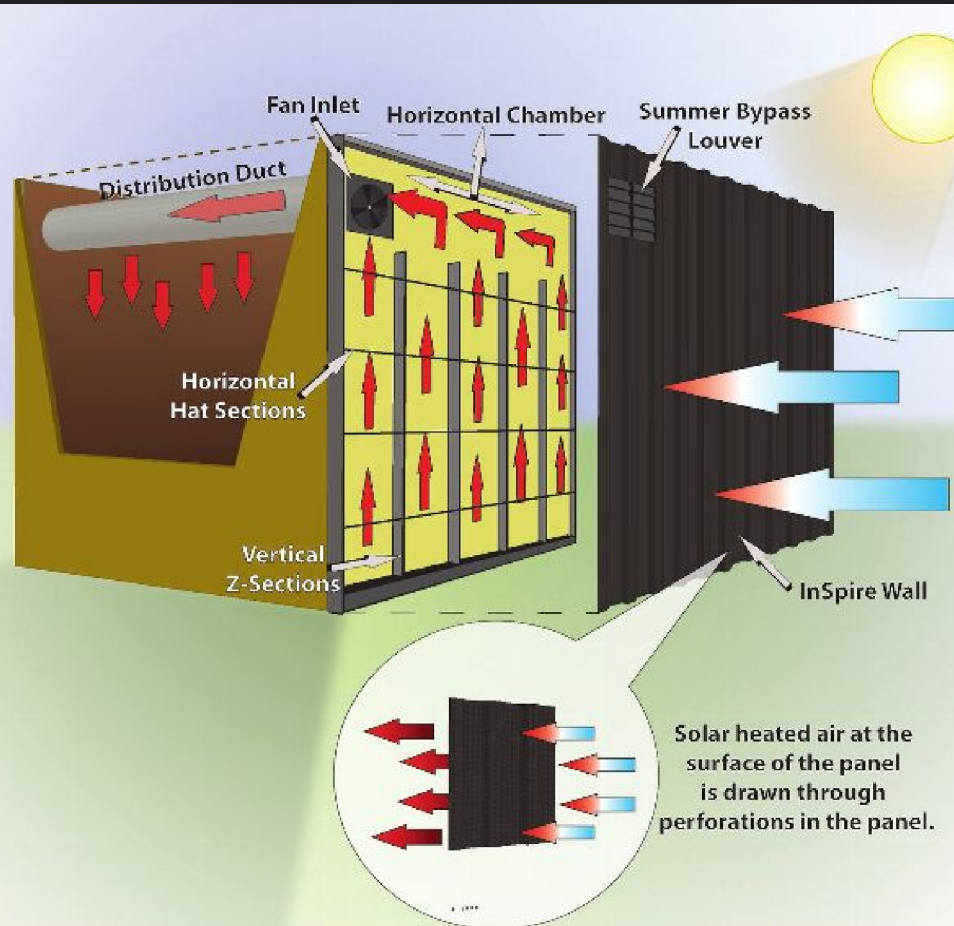
In its original condition and based on 2006 fuel prices, the annual cost to heat Building 3 was estimated to be \$350,000. The challenges of the renovation were not only to bring the structure up to current building and safety standards, but also to make it as efficient as possible while maintaining the original architectural character and craftsmanship.

The solution was to add insulation to the walls and roof, as well as retrofit the south-facing walls using an outer layer of metal wall panels that capture the heat from the sun to pre-heat ventilation air. A total of 11,670 square feet of 0.032 aluminum wall panels with a black KYNAR 500 PVDF- or HYLAR 5000 PVDF-based paint system were used in the installation.

The solar-collector panels are perforated and installed several inches from the waterproof wall of the building, creating an air space between them. During cold months, the system is designed to provide pre-heated fresh air for the building by collecting the heat from the sun, generated when the sun's rays warm the air at the surface of the dark-colored panels. Ventilation fans mounted inside the building draw the solar-heated air through the perforations, into the wall cavity and then into the building's interior through conventional ductwork.

The wall system also provides passive cooling in the summer by using a bypass damper that is opened at night to draw in cool air via the ventilation fans. The air then is distributed inside the building using ductwork. Because Cigas Machine's production area is not equipped with air conditioning, this feature provides a more comfortable environment for employees as they start their workday. In extreme weather conditions, a thermal economizer air turnover unit is installed to supplement the system during days when there is weak sunlight and cold temperatures.

Because ceilings in the building are more than 65-feet high and there is limited



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clearance between overhead cranes and structural ironwork, destratification fans were installed to further achieve optimal air circulation.

More to the Eye

Further renovations to Building 3 include replacing the roof deck and roofing with a cool metal roof that reflects solar heat back into the atmosphere, reducing the building's cooling needs during summer months.

Skylights were installed throughout the building, and fluorescent fixtures using

T5HO lamps were installed where additional lighting was needed. Lights are on preset schedules and connected to lighting sensors that continuously evaluate information to determine light levels in various parts of the building. In addition, rainwater from the roof is captured in a 78,000-gallon barrel and used for process and sanitary purposes on the property.

With a little TLC, a building that played a role in creating our nation's icons once again is contributing to our economy. 