

# MULTISTACK<sup>®</sup>

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## BUILDING FOR THE FUTURE—THE US MISSION TO GENEVA GOES GREEN

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The term “high-profile building” is used much too freely these days. Everything from a retail location with a famous merchandiser in it to an office building with unique architecture gets called a “high-profile building”. While the term has suffered from mass use dilution, a true high-profile building—The United States Mission to the United Nations in Geneva—was selected by the Department of State’s Bureau of Overseas Buildings Operations (OBO) senior general services officer Earl Graves to become an example of environmental consciousness that could be viewed as a test bed for future government building designs. The building would be renovated to showcase sustainability, energy efficiency and the technology that makes achieving these goals possible—in essence a flagship building that would really earn the “high-profile” name was the challenge—and having it ready to go for Earth Day 2009 was the deadline.

Environmental issues are on the forefront of everyone’s mind finally. What we do today, tomorrow and next week will affect the world our children, and our children’s children, live in. Consulting Engineers have to focus on sustainable designs, innovative energy reduction and providing an elegant solution to a building’s requirements with a favorable pay-back rate. The challenge to deliver these requirements for the Geneva project was greatly increased because if the teams involved could make it work, the baseline for all OBO facilities world-wide would be established.

Hankins and Anderson (H&A) is the consulting engineer firm that was selected to guide the work being done in Geneva. It started with a complete analysis of the building, looking for improvements relating to energy use, efficiency and sustainability. The H&A team scrutinized the building structurally and assessed its energy consumption. A program to replace all of the lighting with high efficiency fixtures set the program in motion. Next, the entire building was given a solar panel conversion—a huge step in the going green process. The types of photovoltaic panels installed vary and include window sunshades, vertical panels, two sets of flat roof arrays and a large scope array. The installed sunshade panels decrease solar gain on the building, thereby decreasing the air conditioning load. They help protect the façade and prevent further deterioration as they generate clean electricity and lower energy costs.

**Ben Lilly P.E., Vice President, Hankins and Anderson** – “We recognize that the focus on sustainable design is not a “fad”, nor something that is going to fade away or become less important for our clients moving forward. It is critical to our current and future success to stay abreast of the challenges we face as a global community, with respect to issues such as climate change and greenhouse gas emissions, and to take an aggressive approach to

reducing our carbon footprint as we build and renovate. While right now in the U.S. it seems that LEED is a goal, we strive to move towards seeing LEED as a tool to help us towards greater goals – more aggressive reductions in energy with a greater focus on improving the energy efficiency in our existing building stock through renovation projects. Our work with the Department of State demonstrates Hankins and Anderson’s ability to apply new technologies while improving overall system reliability, and shows how everybody can benefit when green design is done right.”

The U.S. Mission sends the electricity it produces directly into Geneva’s electricity grid (106 Megawatt hours) and the utility purchases it at a preferential rate established to encourage renewable energy production. With a step this focused on sustainability, the U.S. Mission was on its way to that coveted high-profile term.

The solar project was a good start for the Geneva project, but the conversion to a role model building for all government installations was nowhere near done. Mike Christensen, a senior member at OBO pointed out that the old building chiller was incredibly inefficient and counterproductive to the great strides already made towards sustainability.

Conventional chillers are typically powered by compressors capable of producing a high volume of chilled air to satisfy the peak demands of the facility. However, most facilities do not have 100% demand 24-hours a day, so when those massive compressors run, they draw full-capacity power and waste the excess energy used.

Mike Christensen and Hankins and Anderson (H&A) have worked with Multistack, based in Sparta, Wisconsin, a company that specializes in manufacturing modular chillers. With 20 years of experience in the modular world, Multistack modular units allow an engineer to specify an assembly of chillers to create enough capacity to meet maximum building demands, and turn units off as demand goes down creating energy savings, promote a green building attitude and save installation costs. Another feature of Multistack modular chillers is the redundancy offered. With multiple units and multiple compressors to do the work of a big, single unit, a designer can eliminate the need for a second full size unit as a backup. Clearly a step in the right direction for efficiency, and expense reduction, but going a step further was needed. The team turned to Multistack MagLev™ technology to add the level of efficiency they were after.

Multistack MagLev compressors use magnetic-levitation bearings to support the two-stage impeller shaft in each unit. By “floating” the shaft, there is no need for oil that can degenerate the compressor refrigerant charge, eliminating excess refrigerant changes and since there is no contact, there is no friction to cause additional energy use in starting the shaft moving. Next on the important features in the Multistack unit is the ability to run a MagLev compressor at varied speeds that meet the demands of the facility. As Christensen said, “why would we want an air-chiller system that is efficient 3.65 days a year when we can have peak efficiency all 365 days of the year?” MagLev chillers were showcased in the American Embassy in Tokyo, Japan and the Energy saving technology reduced carbon-dioxide emissions.

Building the modules for Geneva was nothing out of the ordinary, other than designing the two-piece lifting frame. In fact, one of the things that Multistack has built a reputation on is being able to build product to meet customer needs. Knowing that the system needed to ship in two containers, the chiller modules were completely assembled for the Witness Test at Multistack, and then separated and prepared for their journey.

**Mark Platt President, Multistack-** “Multistack is fully committed to producing the most environmentally friendly air conditioning systems on the planet. We are honored to have been selected for this US Department of State

Energy Demonstration Project. For us, it is a further endorsement that the significant efforts we continue to put into innovation in the areas of sustainability and our environmental focus are right on track!"

Installation of this new system required a team that has done OBO work prior, allowing for sensitivity to the functions of the facility. Hankins and Anderson turned to Martinez International, a Colorado based company that understood the mission critical approach to the project. Martinez brought plenty of OBO experience having set up over 20 projects for the OBO—most recently an installation in the US Embassy in Santiago, Chile. By installing a Multistack Dedicated Heat Recovery Chiller (DHRC™) that uses the heat generated while cooling the computer and telephone room to supply the radiator hot water system—effectively eliminating the use of oil to run the boilers.-the set up worked so well the embassy used no fuel oil in the winter of 2008.

**Vern Martinez, President Martinez International-** "Martinez International is proud to have played an integral role in making the U.S. Mission to the United Nations in Geneva a showcase for greening State Department operations around the world. As one of OBO's flagship projects, the U.S. Mission provides an ideal platform to highlight cutting-edge U.S. green technology and demonstrate the commitment to making U.S. Embassies worldwide greener and more self-sufficient. We are proud to have made a contribution to this effort."

Recognizing the critical significance of the Geneva project, Martinez staff, Patrick Grzanka the facilities manager in Geneva and Mike Christensen from the OBO visited at Multistack for a Witness Test of the system before it would ship out of the United States. For the Martinez team it was a chance to see the unit run with Multistack engineers there and to answer questions they had before installing it. This provided Grzanka the opportunity to receive Multistack technical training while in the country.

The Witness Test of the system went smoothly, all three of the 75-ton units easily created their rated output. Additional equipment used in this project called for a glycol feeder, a pair of strainers and tanks and a pump to move the chilled water through the air-cooled machines. The entire system was assembled and installed on a two-piece 42' lifting frame specified by Hankins and Anderson to fit the installation space in Geneva perfectly. The pieces would be separated for shipping in containers and then reassembled once at the US Mission to Geneva.

Multistack shipped the pieces in containers to Maryland where Martinez had coordinated the shipment to Geneva. Once there, the Martinez team went right to work on the installation in preparation for the official start-up on Earth Day, April 22, 2009. Multistack will have a factory start-up technician in Geneva so once the Martinez International team completes the installation, the start-up will commence with the Maglev powered modules.

When the units is up and running, expect it to cut energy costs, improve the building cooling system and reduce the carbon footprint in Geneva even more. The plan is to provide three-, six- and 12-month energy comparisons from the year past to show just how much of a savings this system will offer. Clearly Earth Day--04/22/2009--marks the addition of a true *high profile* building that is a role model for all US buildings around the world. (608) 366-2400 [www.multistack.com](http://www.multistack.com)

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