



# CASE STUDY

## Winterthur Museum



**Project Type:**  
**Service & Maintenance**



**Completion Date:**  
**Ongoing Service**



**Owner:**  
**Winterthur**



**Sector:**  
**Commercial**



**Scope:**  
**Mechanical & Controls**



# BEAUTY INSIDE & OUT: WINTERTHUR MUSEUM SERVICE



Originally the family home of Henry Francis DuPont, renowned American Art collector and horticulturist, the Winterthur Museum has been an iconic landmark on the Eastern seaboard since the early 1950s.

Three-interconnected buildings spotlight 90,000 valuable objects and architectural features in addition to the intricate, 1,000 acre garden and full library frequented by historians and students as well as tourists. The well-preserved exterior and 175, early 1900s-styled rooms immerse the visitor in a 20th century vision of life.

But in 2010, the 96,582 square foot public institution required a mechanical face-lift to mirror the outer beauty of this historic museum.

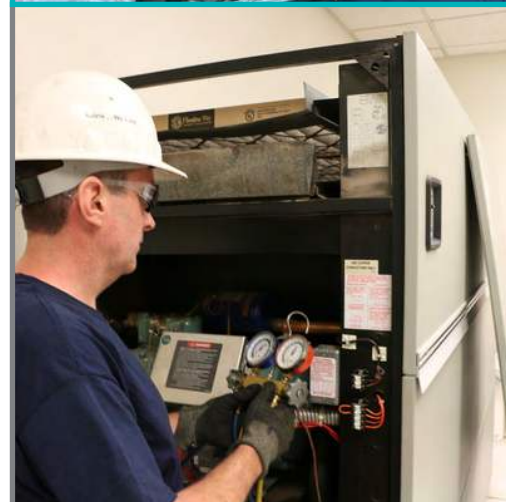
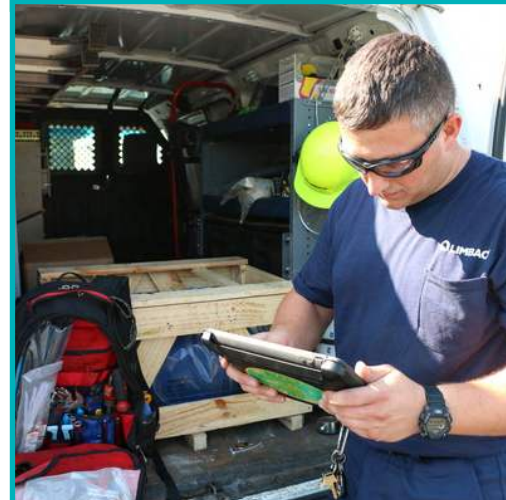
Limbach had been providing building maintenance since the early 2000s (with water treatment services starting in the 1990s), and in 2011, the Eastern PA Limbach team and in-house engineering firm, Limbach Engineering & Design Services (LEDS), were hired by Winterthur's Garden & Library Facilities Director, John Castle, to audit the museum's most pressing need.

## THE CHALLENGE

The museum's mechanical infrastructure included a central steam plant, two central chilled-water plants, multiple high and low-pressure AHUs, hundreds of induction units, multiple fan coils, and multiple pumps. These systems were all tied together through a network of pipe chases, tunnels and hidden mechanical alcoves - previously controlled by three obsolete pneumatic control systems that could not communicate with one another. The system was complex, and many undocumented and often counterproductive changes and adjustments had been made over the decades. This assessment confirmed that upgrades needed to be made and documented by a single entity - ensuring continuity and simplicity for continued operation of the institution. But beyond the dire situation of the mechanical infrastructure was the chief worry held by the facilities director: the many collection spaces needed environmental stabilization to ensure the protection of the museum's priceless artifacts and artwork.

## THE SOLUTION

With this challenge in mind and a timely \$350,000 grant from National Endowment of Humanities (NEH) matched 100% by Winterthur, Winterthur and Limbach implemented 33 facility improvements, reducing energy consumption by 20% in 2 years. To get to this point, however, Limbach and Winterthur had to address the museum's previous attempts to monitor their control systems. Limbach's pivotal recommendation, therefore, was the installation of a unified, web-based system that monitored and controlled the entire mechanical system—every fan, valve, motor, damper, air handler, boiler, and chiller—allowing for accurate, real-time observation and adjustment from anywhere in the world (with internet access). The Limbach team installed the control system under the direction of Limbach Service & Project Manager, Jeff Storer. Storer explained the process and impact of the system's design and install saying, "The biggest challenge was making numerous mechanical upgrades as well as the controls system replacement while maintaining the museum's necessary environmental conditions. This was truly a coordinated effort between our service technicians, pipe fitters, electricians, programmers, engineers and the Winterthur staff."





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## THE RESULT

Beyond reduced energy consumption, the Winterthur team now boasts complete control over their collection spaces. Using software interfaced by Tridium and eClimateNotebook, the museum staff can quantify the response of artifacts to different conditions and balance that data with the numbers from reduced energy consumption in order to generate accurate records for their collection preservation database. Put simply, the ability to monitor and adjust every piece of equipment wirelessly has resulted in a faster and far more effective response to problems.

Since performing the audit, Limbach staff have been called in multiple times to adjust equipment and make repairs as needed. In fact, in November 2014, Winterthur and Limbach began a program of continuous commissioning. Though a relatively new concept to the industry, continuous commissioning means that Limbach staff are in the field on a regular basis to resolve operating issues, improve environmental control and optimize energy use. As equipment ages and space and mechanical conditions change, the response required by the control system is affected. Therefore, on a regular basis, system and “loop tuning” are required to optimize the response of the control system. The Limbach team then must monitor and adjust the timing of dampers, control valves and pneumatic transducers to the input signals from humidity and static pressure transmitters and temperature sensors to the present environmental controls. Part of this commissioning effort includes Limbach carrying out intermittent field tests to identify any system shortcomings and unnecessary energy usage.

Tom Sherwood, Service Sales Manager with Limbach, indicated the importance of this project to both Winterthur and Limbach. “We have a 20+ year history with Winterthur and were eager to work with them once more on this larger scale project. Because of our combined team’s efforts to produce systems that work in a timely fashion, that relationship has just been solidified all the more. We look forward to more projects with Winterthur in the future,” commented Sherwood.

The established relationship between Winterthur and Limbach has determined a set course for the museum - the stable preservation of the beauty of both natural wonders and man-made. Limbach is honored to be part of that preservation - ensuring that man-made mechanical systems can be just as integral to a museum’s beauty as the encased artifacts featured at this beloved Delaware institution.

