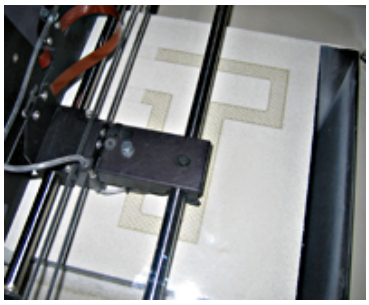
Rensselaer Students Help Give Local Landmark a High-Tech Facelift

Troy, N.Y. — A symbol of the Capital Region's 19th-century industrial heritage is getting a facelift, courtesy of a decidedly 21st-century technology. Using a state-of-the-art "rapid prototyping" system, undergraduate engineers from Rensselaer Polytechnic Institute are partnering with local industry and preservationists to restore the long-lost letters to the façade of the Burden Iron Works Museum in South Troy, once home to an industrial complex that could produce 51 million horseshoes per year.

Burdon Iron Works missing letters

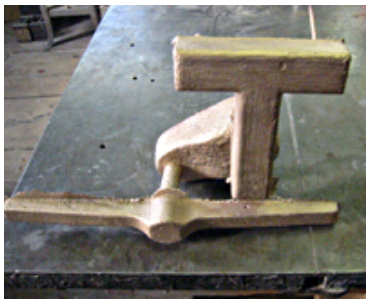
As part of a class project, two mechanical engineering seniors are using a high-tech rapid prototyping machine that allows them to create a solid ceramic mold of each letter directly from a computer drawing, eliminating the highly involved process of making an intermediate wooden pattern. The system operates much like an inkjet printer, laying down granular ceramic material in extremely fine layers and selectively spraying binder with an inkjet print head until a three-dimensional model emerges. The model is then fired in an oven for curing. Once the mold is fired, it is taken to Ross Valve Manufacturing Co. Inc., a local company that is sand-casting the letters from molten bronze into the ceramic molds.


Z Corp 3D Printer building ZCast mold

"This is a perfect marriage of an old foundry and casting technology with a new, emerging process to help restore an important local landmark," says Sam Chiappone, manager of fabrication and prototyping for Rensselaer's School of Engineering. Chiappone is advising the two students — Ryan DeMuth of Berne, N.Y., and Cramer Silkworth of Schodack, N.Y. — as part of a senior concentration class in rapid prototyping, which is being taught by Daniel Walczyk, associate professor of mechanical, aerospace, and nuclear engineering.


ZCast mold ready for metal

The Burden Iron Works Museum is listed on the National Register of Historic Places and recently was recognized by ASM International, the Materials Information Society, as one of 115 historic landmarks around the world for its contribution to metal manufacturing history. Henry Burden designed and built what was once the most powerful waterwheel in the world to run his sprawling facility, which was capable of powerful waterwheel in the world to run his sprawling facility, which was capable of producing 51 million horseshoes per year. (This waterwheel, incidentally, is suspected of being the model for the first Ferris wheel — a 264-foot-tall structure designed by Rensselaer alum George Washington Gale Ferris Jr., Class of 1881.)


Metal letter with gating still attached

"We don't know exactly when the letters came off," says P. Thomas Carroll, executive director of the Hudson Mohawk Industrial Gateway, the not-for-profit organization that owns the museum, and formerly a professor of history at Rensselaer.

"We do know that they were long gone when the Hudson Mohawk Industrial Gateway acquired the building from Republic Steel in 1974. We also know that they were still on circa 1920, because we have a copy of a little sales catalog

that the Burden Iron Company issued about that time that shows the letters on the building in photographs of the façade that are included."

The front of the building still shows outlines where the letters used to be, and these outlines were traced to provide dimensions for the casting process. To date, the students have made casts of the letters "T" and "B," leaving 13 letters to go to complete the phrase, "THE BURDEN IRON CO." They chose to make the "T" first because it seemed fairly simple, and then the "B" because it would be the most challenging, DeMuth says.

To make the ceramic molds, the students, assisted by systems engineer Larry Ruff and student rapid prototyping technician Lindsey McKeen, are using one of two rapid prototyping machines available in Rensselaer's Advanced Manufacturing Laboratory (AML). The machines are generally used in a two-part, year-long AML overview course about operating manufacturing equipment and systems. In the first semester, student teams come up with a project and a manufacturing plan, and then they present to a panel of judges. The judges select two plans for manufacturing in the second semester, when students are faced with the many challenges involved with manufacturing on a budget.

Carroll says he hopes to have the letters mounted by the end of 2006, but a number of steps must first be completed. For example, the State Historic Preservation Office has stipulated that the letters have to be covered with gold leaf, because the newspaper accounts from 1882 — when the building was new — described them as "gilt."

The Hudson Mohawk Industrial Gateway was founded by a group convened by Thomas Phelan, the late, longtime member of the Rensselaer community who most recently was the Institute Dean, Institute Historian, and Professor Emeritus. The Gateway is helping to pay the costs of this project through a gift from the Barnes Family Trust, a philanthropy started by Robert T. Barnes '44, a Rensselaer alum and successful aerospace engineer, to add signs and other permanent elements to the exterior of the museum.

About Rensselaer

Rensselaer Polytechnic Institute, founded in 1824, is the nation's oldest technological university. The university offers bachelor's, master's, and doctoral degrees in engineering, the sciences, information technology, architecture, management, and the humanities and social sciences. Institute programs serve undergraduates, graduate students, and working professionals around the world. Rensselaer faculty are known for pre-eminence in research conducted in a wide range of fields, with particular emphasis in biotechnology, nanotechnology, information technology, and the media arts and technology. The Institute is well known for its success in the transfer of technology from the laboratory to the marketplace so that new discoveries and inventions benefit human life, protect the environment, and strengthen economic development.