

Waterpark Lagoon Façade Replication

Accurate as-built plans and models help replace existing structure

Scope	140' L x 35' H x 6' D sculpture; produce 3D models, 2D plans, fabrication instructions and digital files to drive a CNC rebar bending machine
Owner	Theme park company in Central Florida
Date	2000



"The entire project team acknowledges that the job could not have been done under these constraints without the laser scanning. We are getting more and more projects of this nature as our clients come to understand the value of comprehensive three-dimensional information in the field."

Amy Wilkinson, Owner, Continuum Digital, Orlando, FL

Background: A themed waterpark in Central Florida used a large stucco and plaster façade to cover wavemaking equipment at the end of a large pool. The wavepool façade simulated a complex structure of boulders and wood timber weirs that appeared to be leaking; the structure measured 140 feet in length, 35 feet high and 6 feet deep. After 10 years of continuous exposure to a swimming pool environment, the façade needed to be repaired or replaced. It was more economical to replace the entire façade with an exact replica, rather than trying to reinforce the weakened structural members that supported it. The owner required that demolition and construction take place within a scheduled 6-week routine maintenance period.

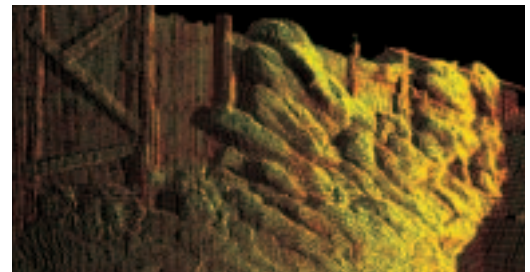
Continuum Digital, an Orlando, Florida firm specializing in 3D information and computer modeling for the specialty construction industry, was hired to capture accurate geometry of the existing façade in the field, create an accurate 3D computer model of it, and prepare detailed construction plans to meet the project's time schedule for recreating the structure. The key to meeting the tight schedule was to develop a complete construction information package and prefabricate rebar 'cages' to accurately define the shape of the replica façade — prior to starting demolition.

Project Workflow: Continuum Digital used a Cyrax® 3D Laser Scanning system to safely capture detailed surface geometry of the façade sculpture with an accuracy of 6mm or better. Six scans were registered to produce an accurate point cloud of the entire façade. The registered point cloud was processed to convert it into a full digital model with a machinable (NURBS) surface. Continuum Digital processed this digital model into a toolpath for their five-axis router. A ½" = 1'-0" scale model of the façade was carved in high-density foam to serve as a reference model for the project. The point clouds were also used to generate structural engineering take-off's; this was done by meshing the point clouds and creating contour lines in Cyra software.

The full digital model was then subdivided into smaller sections. These section lines were processed with Continuum Digital's proprietary software to stream digital files to the contractor's CNC bending machine that preformed the individual rebar segments. These segments would later be assembled as "rebar cages" which served as the frame for the façade. By subdividing the structure into rebar cages, construction

could proceed independently in sections. Before the park closed for its maintenance shutdown, the construction crew prefabricated the rebar cages from the preformed segments, guided by printed instruction booklets and model sections.

After the park was closed for maintenance, demolition and construction proceeded in sections from right to left down the façade. As each section was demolished, stainless steel structural elements were installed to support the prefabricated rebar cages. The cages were installed and completely encapsulated by a shotcrete structural shell, followed by a stucco plaster carving coat and scenic paint finishes. When construction was completed, the site was cleared and the park reopened on schedule ... with an exact, longer-lasting replica of the original façade.



Project Facts

Field: 5 hours; 2-person crew, 6 scans

Office: 5 weeks

Deliverables: 3D models, 2D plans, fabrication instructions

Customer Benefits

- Complete, accurate scans allowed exact replication of façade
- Completion of complex construction project during short maintenance shutdown
- On schedule, within budget

CYRA

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