



## Educational Project: 3D Scanning a Catamaran

### ÉCOLE CENTRALE DE NANTES

École Centrale de Nantes (ÉCN) is a top-notch science and technology school. Over the years, it has acquired a solid reputation and has become a grande École for general engineering, as demonstrated by its 11,000 graduates' current positions and by their esteemed credentials in the business world.

Centrale Nantes offers engineer training and boasts a center for research and industrial studies. At a company's request, the school can conduct industrial studies on special topics offered. These studies are carried out by student-engineers in research laboratories under the tutelage of research directors.

Our research units include nearly 2,000 researchers with experimental facilities. Unique fields of study, such as naval hydrodynamics, are open to Europe for research as well as industry. The École has three advanced laboratories: the Fluid Mechanics Laboratory, Institut de recherche en génie civil et mécanique, and Institut de Recherche en Communications et Cybernétique de Nantes.

### RAPID MANUFACTURING AT ÉCOLE CENTRALE DE NANTES

The handheld laser scanner Handyscan 3D™ has been used for two years as part of the *RAPid Manufacturing* course for the Product Design and Industrial Systems Development (DPSI) in the third year of the engineering curriculum at Centrale Nantes.

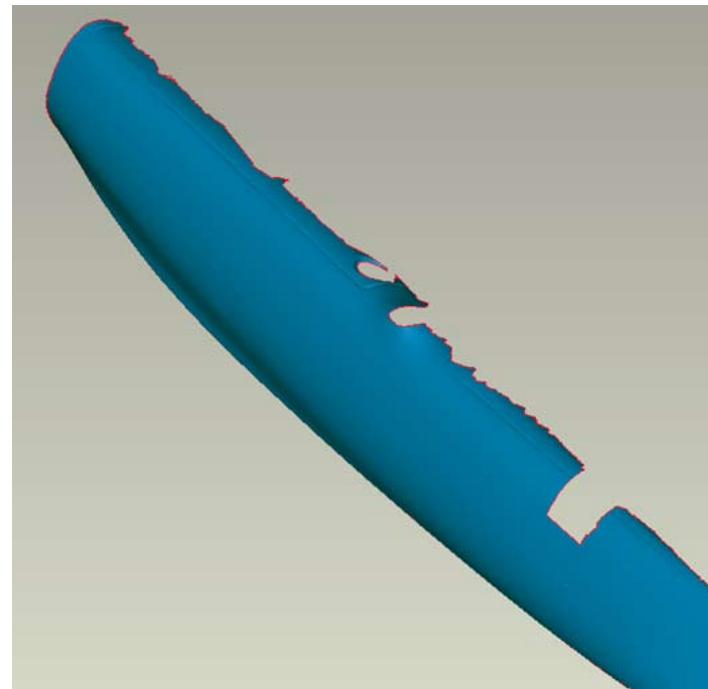
The goal of this course is to give to the students a practical approach and solutions to design, improve, and develop products for which they control the design or produc-

tion chain. Throughout the course, students discover different techniques for recovering shapes using the 3D digital technology of the self-positioning Handyscan 3D scanner.

### A LARGE SCALE PROJECT

The RAPid MANufacturing class at ÉCN was delighted to receive a catamaran raft for hydrodynamic testing in a tension tank. This acquisition gave students a perfect opportunity to test the digital capabilities of Handyscan 3D technology on a large object.

The raft, the prototype of a new series, is approximately 4.5 m long and had to be measured with great precision for three principal purposes. First, to verify the mold measurements in order to ensure that it conforms to the plan supplied by the naval architect (the mold maker having created the shape from about twenty frames on a paper plan); next, to create a digital model that would be the subject of computational fluid dynamics (CFD) for preliminary validation of progress resistance and water performance. Finally, the third purpose was to



generate a file in order to fabricate a small-scale model for testing at high speeds.

## LARGE-SCALE DIGITIZING

The option of using only one reference system to compile the data acquired over several digitization sessions is a characteristic unique to the Handyscan 3D technology that has proven to be particularly useful in the case of this large scale digitization. The research team could have chosen to divide the surface to be digitized into approximately fifteen “slices.” Once the reference system was recognized by VxScan™, Creaform’s exclusive data acquisition software, the data could be acquired and calculated according to this same common referential frame. The shape could then easily be reconstructed during post-processing using basic geometry.

## RESULTS

The final file delivered to the research team illustrates excellent grid density and superb measurement accuracy. The measurement analysis produced highly satisfactory results.