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Materials Testing Needs*

ADMET resurrects Baldwin 200k universal testing machine

The University of Miami College of Engineering's Civil, Architectural, and Environmental department has several state-of-the-art measurement and testing tools that are used in education and research. Until recently, one of its largest testing units was also the least useful. A 200,000 lb. Baldwin screw gear universal testing machine was not functioning. Installed in 1959, the analog machine fell into disrepair after many years of service. Repairs were considered, but the company had long since disappeared. As with many older universal machines, the test frame itself was fine, it was the motor, controllers and, in this case, an old, analog, vacuum tube console, that had failed. Professor Ronald F. Zollo sought to make the machine operable in as cost effective manner as possible. A few years ago, working with ADMET on an unrelated project, he found his opportunity.

The University of Miami College of Engineering's Civil, Architectural and Environmental Engineering department in Coral Gables, Florida, prepares students for careers in building structures, highway, pipeline, bridge and other infrastructure design and construction.

For many students, lab work is an integral part of their education. The University makes a range of engineering and testing equipment available to students for course and project work. In addition, advanced degree students and faculty conduct innovative research into highway, bridge, building, infrastructure and other systems.

The lab performs American Society for Testing and Materials (ASTM) testing on numerous materials and structures, including beams, pipes and reinforced concrete. Funded research helps support faculty as well as graduate and undergraduate laboratory activities.

In today's world, student laboratory experience is often an adjunct to computer modeling. Students conduct tests to verify computer results to see how the data correlates with actual physical tests.

Baldwin dominates lab

The centerpiece of the lab is a large Baldwin universal testing machine. The machine, installed around 1959, is a 200,000 lb. four-column, screw-type test frame. It is mounted into the floor with sub-floor works and is surrounded by a structural floor system.

Although state of the art at time of installation – the times have changed. In its original configuration, a vacuum tube-equipped console controlled the crosshead position and collected some rudimentary readings. The 30-cubic-foot refrigerator-sized analog control console occupied valuable laboratory space.

Remarkably, the machine continued to operate until the mid '90s. Commented Professor Zollo, "I've been working to restore the lab to fully operational condition so I was quite disturbed that this machine, which is a centerpiece in the laboratory, was not functional when I knew that we could use it."

Over the years it had become impossible to find replacement parts for the console as technology

SOLUTION OVERVIEW

Industry: Education/research

Application: Testing structural materials

ADMET Product: MTESTWindows with Precise Digital Controller retrofit of a Baldwin frame

Customer: University of Miami

evolved to digital controls and computer-based programs.

“The machine was essentially inoperative. We could move the crosshead up and down and use it in a very limited sense, but it wasn’t really functional,” commented Zollo.

In addition to limiting their ability to test large structures, the students were denied the opportunity to work with equipment that they would encounter in an industrial setting after completing their education.

Finding a solution

At \$250,000 a new machine was out of the question. So, the Baldwin sat unused for many years until Prof. Zollo found the solution.

He discovered ADMET as a result of his own research activities. For years he has been studying fiber reinforced concrete.

Through his association with others in the American Concrete Institute he became aware of a company in Tennessee which had used ADMET equipment.

When he visited their plant he noticed an older universal testing machine that had been retrofitted by ADMET. Not sure if the same type of upgrade could be performed on the Baldwin, Zollo invited an ADMET engineer to visit the University.

The engineer evaluated the machine and determined that it could be retrofitted with digital controls. The estimate was \$18,000 for a full retrofit that included installing a new ADMET MTESTWindows personal computer-based digital testing software system and replacing the motor. The machine had to be entirely rewired and a new

connector/controller box added under the floor level.

Digital revival

Now, an ADMET Precise Digital Controller measuring 10”x12”x6” has made the machine fully operational. In fact, it’s better than new since the

Precise Digital not only controls the crosshead speed and position, it acquires data on speed, displacement, peak load, etc., and feeds that back into the MTESTWindows program.

Lab technicians can attach separate load cells, as well as strain gauges and Linear Variable Differential Transformers (LVDTs), to the ADMET system. “Anything that can create an analog signal can be converted to digital on the ADMET system and then put into the computer for plotting,” said Zollo.

Student test data is collected on the PC and made available over the University’s Internet network. Although the ADMET systems will perform many of the calculations, the students are expected to use

a spreadsheet or other program to calculate and interpret the data. “We want them to see what is done so they can understand how a program can be written to do the calculations,” explained Zollo.

“It’s great that we were able to bring this machine back to life so inexpensively. It shows the progress that’s been made when a cubic foot box with state-of-the-art electronics can replace a refrigerator-sized console,” concluded Zollo.



Baldwin 200K universal test frame with ADMET digital retrofit (blue unit on post at right).