

## Bio-Diversity

Flexible MTS solutions augment biomedical test lab's ability to pursue very wide array of applications.

### CUSTOMER CHALLENGE

Formed more than 40 years ago, as a consulting firm specializing in failure analysis, Exponent, Inc. today offers an incredibly wide range of consulting services for nearly every sector of industry, ranging from engineering and health care to construction and energy. What makes Exponent unique is its breadth of experience, which few of its competitors can match. The company draws upon this to provide clients with in-depth scientific research and analysis, or very rapid-response evaluations, with the critical information that both day-to-day and strategic decisions can require.

This differentiation is plainly evident in the company's Biomedical Engineering Practice, a dedicated team of 13 scientists and engineers with access to colleagues in over 90 disciplines. At its A2LA ISO 17025-accredited lab in downtown Philadelphia, this team investigates medical devices and device-grade biomaterials at every stage of the product life cycle, including research and development, product recall, litigation support and retrieval analysis. Their clients include manufacturers of medical devices, related products and raw materials, as well as law firms, trade associations, universities and the FDA.

"We don't consider ourselves solely a test lab," said Dr. Marta Villarraga, one of the practice's Principals. "We assist our clients in solving complex problems. Because of our breadth and depth of experience, we are capable of providing sophisticated solutions when unique challenges arise during testing. We are well known for figuring out the 'What' and the 'Why'. We deliver accurate results like other labs in this market, but where we differentiate ourselves is in the interpretation of those results."

This expertise is especially important when pursuing testing in areas that lack standardized protocols. In these instances, which represent more than half of the practice's work load, the team must develop the right test methodology for a specific device or material and formulate correct loading schemes, which is particularly challenging when it involves loads intended to replicate physiological phenomena.

"We're testing materials, devices or tissues by both standard procedures as well as in unique real-world environments," said Ryan Siskey, a Manager within the practice. "To do that effectively, we need equipment we can rely on—equipment that is flexible enough so that we can design test protocols that can be used to span a variety of applications. That's why we consistently choose MTS."



Dr. Marta Villarraga and Ryan Siskey with their lab's Bionix Spine Wear Simulator

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— Ryan Siskey  
 Manager  
 Biomedical Engineering Practice  
 Exponent, Inc.

## MTS SOLUTION

To achieve the reliability and flexibility they require, Exponent's Biomedical Engineering Practice deploys four MTS mechanical testing systems, each for different purposes. These include a Bionix® Spine Wear Simulator and three Bionix servohydraulic load frames — one axial configuration and two axial/torsional configurations. All of these systems are driven by FlexTest® digital controls and MTS TestSuite™ Multipurpose Elite Testing Software.

Together, this array of fully integrated solutions provides the range of capabilities the group needs to serve a diverse mix of clients. The axial load frame is used for biomaterials testing, including polyethylene, bone cements and PEEK materials, as well as soft and calcified tissues, cadaveric specimens and syringes. The axial/torsional load frame allows more extensive cadaveric testing for the spine and hip. The spine wear simulator is used to test both cervical and lumbar replacement discs, nucleus replacement devices (nonfusion dynamic implants), interbody cages and cadaveric specimens.

“The versatility of the sample chambers and flexibility of the testing software of the spine wear simulator lets us be very creative with testing a variety of devices,” said Dr. Villarraga. “The programming is easy to follow and user-friendly, which is a big plus. These tests support an equally wide range of needs for Exponent's clients. The data sets are used to enhance product design verification and validation, regulatory submission, litigation support and the development of novel test techniques that eventually become standardized methods.”



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Setting up a biomaterials test on a Bionix Table Top load frame

## CUSTOMER BENEFITS

Because Exponent thrives by serving as wide a range of customer needs as possible, the overall versatility of MTS hardware and software is critical to solving clients' challenges. In addition, the Biomedical Engineering Practice has found that using MTS test solutions can foster stronger relationships.

“Our clients know the reputation of the MTS brand very well, and some of them even use MTS solutions themselves,” said Mr. Siskey. “If clients are familiar with our test equipment, it's easier for them to develop protocols they know will be implemented in a certain way. By the same token, when we develop novel protocols that our clients will use in their own labs, we are speaking the same language.”

In fact, the practice has purchased and validated MTS equipment for clients, configured the fixtures for specific test protocols, and then installed the solution at the client's facility. This is not uncommon for instances where clients lack the time or expertise required to develop a new protocol.

The flexibility and usability of MTS software also plays into the practice's role as a consulting lab that offers numerous testing applications.

“It is critical for operators to become very proficient with the software in a reasonable amount of time,” Mr. Siskey said. “MTS TestSuite software makes this task very simple and intuitive, and it can be used to design and execute a wide range of tests, from standard ISO and ASTM specifications to newer protocols. When you get into new applications and you're coming up with new data acquisition algorithms, the final test procedure can involve 50 or 60 steps. With MTS software, we know it will run smoothly.”

The nature of the relationship between Exponent and MTS requires a special level of collaboration, one that includes the integration and configuration of the load frames, controllers and software, as well as the test applications themselves.

“Working with MTS has always been a very pleasant experience,” said Dr. Villarraga. “I've found the staff to be very knowledgeable. Since we have stayed with a single platform, it has made our transitions smoother as our lab has grown. The reliability of the equipment is great. And when issues arise at the last minute, they find answers quickly. We're fortunate that MTS is very responsive to our needs.”

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