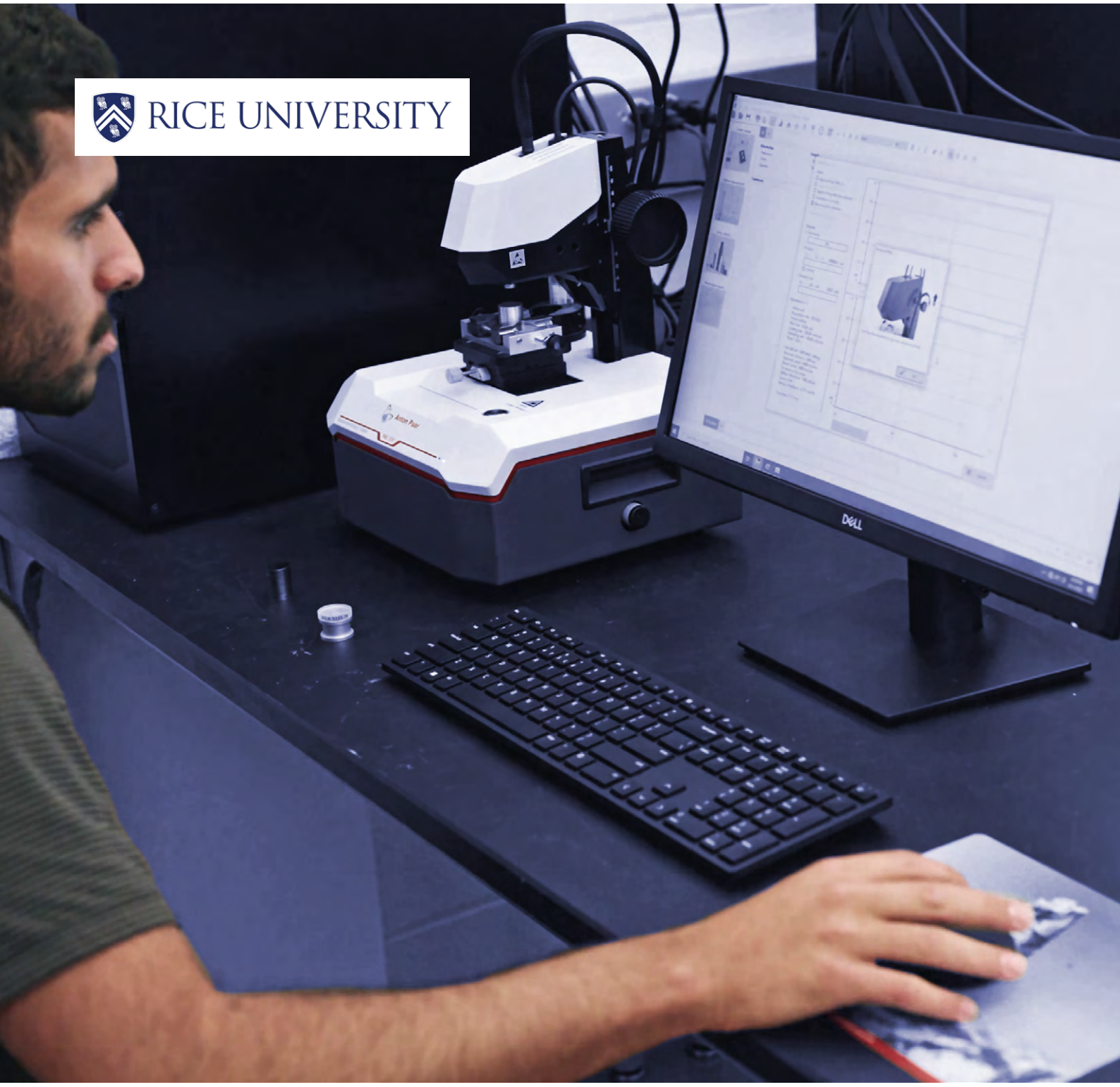
Anton Paar



Bridging Theory and Practice:

Rice University Optimizes Mechanical Engineering Education with Anton Paar's Hit 300

Customer Success Story

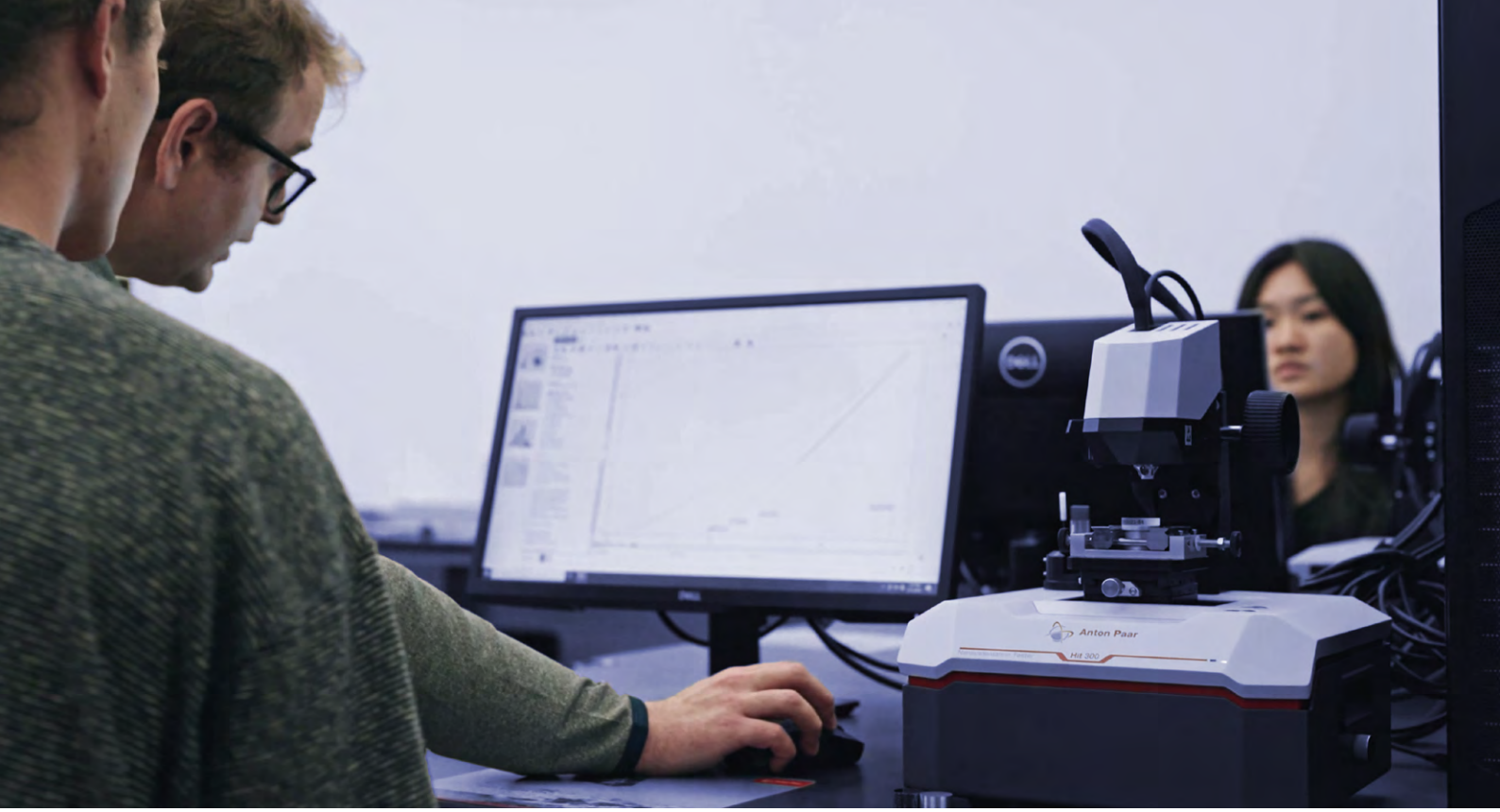
→ Matthew Brake, Associate Professor Mechanical Engineering, Rice University, explains how Hit 300 helps students advance their careers.

At Rice University, mechanical engineering students are gaining real-world experience like never before. Thanks to the integration of six Anton Paar Hit 300 nanoindentation instruments, undergraduates now operate industry-standard tools themselves – connecting classroom theory to hands-on experimentation. Professors Matthew Brake and Denizhan Yavas describe how this shift has transformed the lab experience, deepened student understanding, and given future engineers a clear edge in both academic and professional arenas.

Q: Can you introduce yourself please?
A: Matthew Brake: I'm Matthew Brake, Associate Professor of Mechanical Engineering at Rice University.

Denizhan Yavas: My name is Denizhan Yavas, and I'm a Teaching Professor in the Mechanical Engineering Department at Rice.

Q: Could you please tell us a little about the mechanical engineering undergraduate lab at Rice University?
A: We have about 70 undergraduate mechanical engineering students per year. The lab is designed to give students hands-on exposure to solid mechanics and stress analysis, complementing the theory they learn in class.



→ Denizhan Yavas, Assistant Teaching Professor, School of Engineering, Rice University, uses Anton Paar's Hit 300 instrument.

Q: Which Anton Paar instrument do you use, and what exactly do you use it for?
A: We use six Anton Paar Hit 300 instruments to help students measure mechanical properties at the microscale through nanoindentation testing.

Q: How exactly are the students using the six Hit 300s during their university coursework in the lab?
A: Students operate the instruments themselves—placing the samples, adjusting parameters like load time and hold time, and running their own tests. Each student gets individual hands-on experience, making direct connections between classroom theory and real-world application.

Q: Which specific challenges has the instrument allowed you / the students to overcome in the lab?
A: Previously, our experiments didn't reflect what students would actually do in industry. The Hit 300 has closed that gap. It allows students to work with relevant, industry-standard tools and explore complex materials in a way that theory alone cannot provide.

Q: What are the benefits of this usage in terms of active student involvement and experimentation, especially in terms of satisfying the requirements, the goals, and the learning experience for mechanical engineering students at a top-tier university like Rice?
A: Students are no longer just passive recipients of information—they're actively involved in running experiments, tweaking parameters, and interpreting results. This makes their learning far more immersive and prepares them to apply what they've learned in real-world settings.

Q: What, specifically, can the students do now, that they could not do before?
A: They can conduct complex nanoindentation tests and evaluate how varying parameters impact results. This kind of experimentation wasn't possible with our old equipment.

“The Hit 300 has bridged the gap between theory and practice in our curriculum”

Matthew Brake, Associate Professor Mechanical Engineering, / Denizhan Yavas, Assistant Teaching Professor, Rice University, School of Engineering

Q: How exactly has students’ learning experience improved?
A: Students now experience theory and application in real time. One day they learn a concept in class, and the next they see it come to life in the lab. It makes their understanding deeper and more practical.

Q: Why is this so important for a mechanical engineering lab at a top-tier university?
A: It positions our students for success in highly competitive fields. By training with the same types of tools they’ll encounter in industry, they’re developing real-world skills from day one.

Q: What are the benefits for the students in terms of the paths they may pursue after completion of the undergraduate degree in mechanical engineering?
A: They’re more employable and industry-ready. Experience with advanced, automated testing tools like the Hit 300 gives them a significant edge in both job markets and graduate studies.

Q: Can you please provide qualitative and quantitative examples of achievements that are due to the instrument?
A: Quantitatively, 70 students a year can now run their own tests. Qualitatively, students report a stronger grasp of material behavior, and faculty observe improved lab performance and comprehension.

Q: Generally speaking, what do you and the students like best about the instrument?
A: It’s robust, easy to use, and designed for educational settings. Students can experiment without fear of breaking the equipment, which encourages exploration.

Q: Which features are most helpful?
A: The automated functions, adjustable parameters (load, unload, hold times), and durability stand out. It allows detailed testing without a steep learning curve.

Q: How did you hear about Anton Paar and why did you decide to purchase the Hit 300?
A: Anton Paar has a strong reputation and had previously been engaged with our department through events and conferences. That made it an easy decision when we were ready to upgrade our lab.

Q: What part will the instrument play in your future strategic vision for the lab, also with regard to future collaboration with Anton Paar?
A: It’s central to our lab’s future. We plan to keep integrating high-quality, industry-relevant tools and look forward to further collaboration with Anton Paar to enrich student learning.

Q: Please sum up in a couple of sentences how the instrument has taken your work forward and how that makes you feel.
A: The Hit 300 has bridged the gap between theory and practice in our curriculum. It’s made our teaching more impactful and our students more prepared. That’s incredibly satisfying.

Q: How would you describe the support and service offered by Anton Paar?
A: Anton Paar has been proactive and helpful throughout the process, from consultation to implementation. Their support continues to make a real difference in the success of our lab.

Q: What would you say to someone considering buying the Hit 300?
A: It’s a robust, intuitive, and highly effective tool for student labs. If you’re looking to enhance experiential learning and align with industry practices, it’s an excellent investment.

→ A student at the School of Engineering, Rice University, uses an Anton Paar Hit 300 instrument.

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Matthew Brake, Associate Professor Mechanical Engineering, /
Denizhan Yavas, Assistant Teaching Professor, Rice University, School of Engineering

FIND OUT MORE

www.anton-paar.com/apcss-hit-300

Instrument: Hit 300

Measured parameters: Indentation hardness, indentation modulus, creep, elastic recovery, maximum indentation depth, residual depth, applied load, load-displacement curve, work of indentation

Samples: Thin films, coatings, polymers, metals, ceramics, composites, biomaterials, microelectronics components, glass, optical materials, small-scale or precision-engineered surfaces

Depth resolution: 0.01 nm