

Inventor software lets me put things together to see how it's all going to connect and move. It helps me narrow down the options to finalize a design.

—MaryAnne Haslow-Hall
Student
Sweet Briar College

Sweet success.

Autodesk® Inventor® software helps female students at Sweet Briar College flex their engineering muscles.



Project Summary

An hour south of Charlottesville, Virginia, Sweet Briar College (Sweet Briar) helps women discover what they love to do—and equips them with the skills and education they need to do it well. The women's college makes it easier for its graduates to compete in careers typically dominated by men by offering strong academic programs in areas such as science, math, and medicine. Students in the engineering science program learn a range of skills that prepare them for graduate programs and careers in mechanical and electrical engineering. By focusing on socially conscious projects—such as creating an affordable prosthetic hand—the engineering science program also allows women to experience the real-world impact of innovative engineering. They learn Autodesk® Inventor® software in their first year, and use it to complete several large projects throughout their tenure at the college. For example, one student is using the software to create a robotic arm. Moving beyond 3D to Digital Prototyping, engineering science students have used Autodesk Inventor software to:

- Create a robotic arm for use in research that could lead to electronic paper development
- Design a prosthetic hand for the Open Prosthetics Project
- Develop project portfolios helpful to securing internships and employment
- Help them prepare for successful engineering careers

The Challenge

Part of Sweet Briar's mission is to prepare women to be productive, responsible members of a world community. The school focuses on personal and professional development, instilling students with the leadership skills they need to succeed—particularly in male-dominated fields such as engineering. Scott Pierce, assistant professor in the department of physics and engineering, explains: “We offer our students the chance to grow as engineers without feeling marginalized. To be women engineers in a male-dominated field, they need to be able to stand up and show the world that they also belong.”

The engineering science program works hard to excite students about engineering and provide a broad education that gives them choices after graduation. In part, that's why the program focuses on mechatronics, a springboard for careers in both mechanical and electrical engineering. “There's a huge focus on self-actualization here, more than at most colleges,” says Pierce. “We want our students to have options. For example, one of our graduates is pursuing her doctorate at the University of Virginia in mechanical engineering, one is going to UC Santa Cruz for an electrical engineering doctorate, and another is going to Dartmouth for engineering management.”

Students create life-changing designs using Autodesk Inventor software.

The Solution

Sweet Briar equips students to explore their engineering talents right away by teaching them Autodesk Inventor software in their first year. Because Inventor is so easy to use, students immediately experience the thrill of creating something new.

Recently, Pierce told his freshmen students to design playground equipment for adults and was impressed by the results. “Our students created very interesting models for things like helical slides right away,” he says. “We always worry about retaining students who may not be convinced that engineering is for them. But with Inventor, they quickly get to the point where they can build models—and realize that engineering can be fun and highly creative.”

A Hand Up

One of Pierce’s students, MaryAnne Haslow-Hall, is experiencing firsthand the draw of socially conscious engineering. As part of the Open Prosthetics Project, an open-source design project, she’s designing a functional, simple, and inexpensive prosthetic hand targeted for low-income people all over the world.

Haslow-Hall uses Inventor software to design joints and fingers, and then integrates the parts into a single digital prototype. By applying constraints to all the major parts, she’s able to check for interferences and simulate their motion, allowing her to verify the model. “Inventor software lets me put things together to see how it’s all going to connect and move,” says Haslow-Hall. “It helps me narrow down the options to finalize a design. Visualizing the design from every angle in 3D makes the whole process intuitive.”

In addition to helping design less-expensive prosthetics, the project has stoked Haslow-Hall’s interest in engineering. “I’m thinking about going to graduate school for mechanical engineering and

exploring robotics,” she says. “I like the idea of making things that help people. That would be very rewarding for me.”

Robotic Research

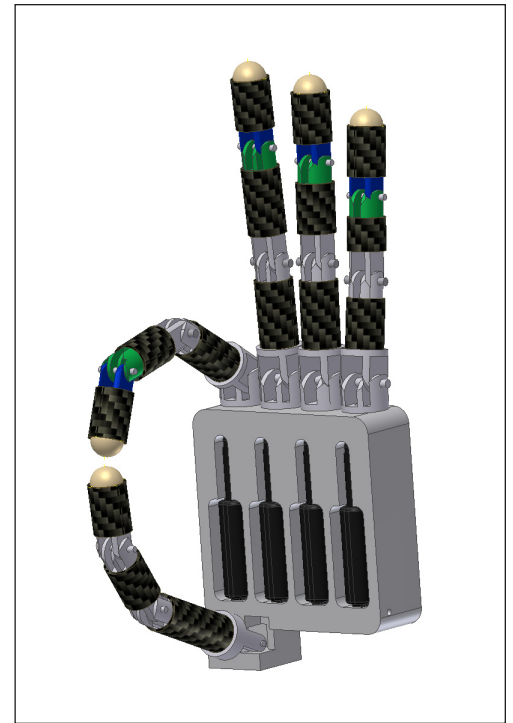
Maxine Emerich, another one of Pierce’s students, is creating a robotic arm in collaboration with a professor researching the possibility of electronic paper. “Dr. Yocum needs to deposit very thin layers of atoms onto slides,” says Pierce. “Then, a student sits for hours swishing slides around in liquids. It’s very boring, and it’s not repeatable because students simply can’t swish the exact same way twice. Maxine is making an articulated robotic arm that will swish the slides in set sequences.”

Maxine has modeled the entire arm in Autodesk Inventor software, using the cable and harness feature to create cables that move the elbow and wrists of the arm. To make the joints as light as possible, she conducted finite element analysis (FEA) on the Inventor digital prototype.

Pierce credits the students’ ability to visualize their designs through Digital Prototyping as critical to the success of projects like these. “Seeing how everything goes together in a 3D solid model is very important,” he says. “I even use Inventor as a teaching tool to explain concepts. If we’re going to discuss how something moves, I model it in Inventor software and show them the motion.”

The Result

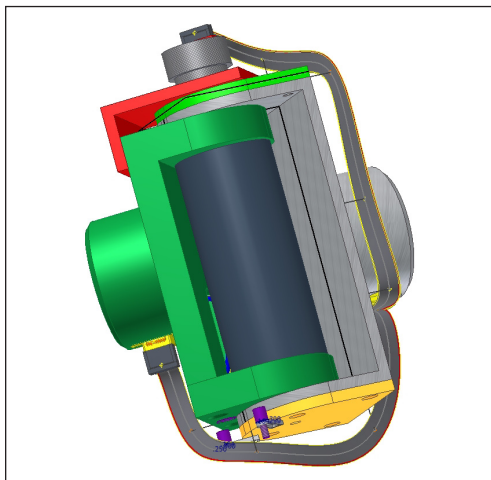
By teaching students to use Inventor software on interesting projects, Pierce and his colleagues in the engineering science department at Sweet Briar are giving them a distinct advantage. “Every one of our students must complete a summer internship,” Pierce explains. “They can take screen shots of their models and show employers that they know how to use CAD solid modelers.”



Pierce concludes: “By the time they graduate, our students complete four significant projects in Inventor and become very proficient with the software. Inventor gets students excited—and gives them an indispensable skill that employers want.”

For More Information

To learn more about how Autodesk Inventor software can empower students at all levels, visit www.autodesk.com/inventor.



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