

Academic

Oregon Tech

University uses Simcenter STAR-CCM+ software to teach undergraduates valuable engineering skills

Product

Simcenter

Business challenges

Create CFD engineers
Optimize designs using CFD

Keys to success

Direct import of CAD designs to Simcenter STAR-CCM+
Real-time results provide immediate feedback in learning
Extensive help features
Accessible e-learning modules for support

Results

Solved real-world CFD problems
Gained proficiency using Simcenter STAR-CCM+
Applied CFD to design and testing
Made design decisions with engineering outcomes
Established continuing education with help tutorials and e-learning modules

Oregon Tech adds CFD to curriculum through use of Siemens PLM Software solutions

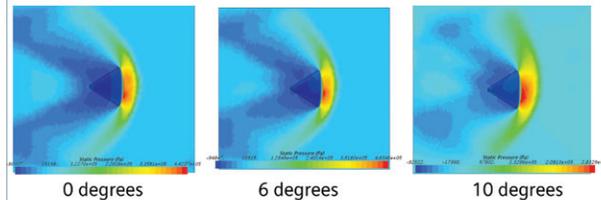
Taking CFD to the classroom

The Oregon Institute of Technology (Oregon Tech) in Klamath Falls, Oregon, is a hands-on college with an engineering-centric faculty and produces engineers with a problem-solving and experimentation mindset. The school's students are driven to attain the best solutions in a reasonable time frame and budget. When computational fluid dynamics (CFD) was introduced as a technology elective in 2012, half of the 30 graduating seniors in mechanical engineering took the class. Their reviews showed the pride they took in creating solutions that could be used to evaluate designs. Since that time, CFD became a permanent technology elective.

Creating a CFD engineer

Students taking the CFD elective typically had 30 weeks of computer-aided design (CAD) background, 10 weeks of numerical methods, 10 weeks of geometric tolerancing and dimensioning and 10 to 20 weeks of fluid mechanics. Only the Fluids I class is a prerequisite for the course. Oregon Tech had two students from renewable energy take the course, but their lack of CAD experience made meshing difficult, because at least 10 weeks of CAD background is recommended for the CFD

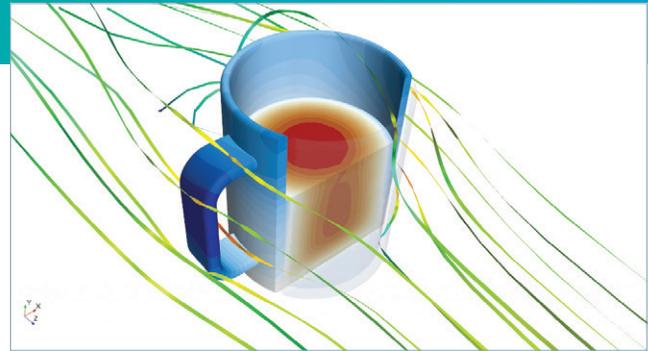
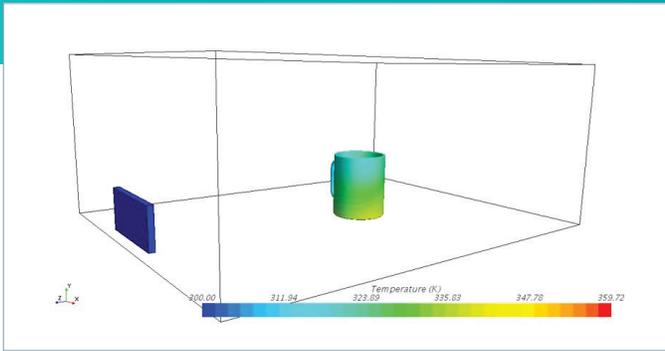
Static pressure



(Note: actual AoA is 0.5 degrees to avoid instabilities)

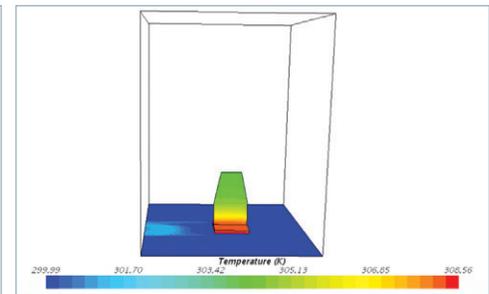
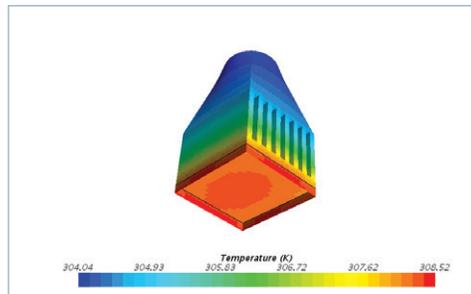
course. The renewable energy students created models with fluid flow, but their classmates with extensive CAD backgrounds enjoyed more immediate success.

Creating a CFD engineer from a CAD technician is best done by having them walk through their own problems. Simcenter™ STAR-CCM+™ software from Siemens PLM Software is a toolset that takes care of the details and allows students to focus on how they want to shape their model's mesh and physics. The supplemental materials are extensive and helpful. With Simcenter STAR-CCM+, students can gain a thorough knowledge of CFD in 10 weeks, which can create an engineer who not only can solve a CFD problem, but one who can teach himself or herself how to solve the next CFD problem. Applied CFD learning has shown to be the best way to teach the basics.



“Without the support of Siemens PLM Software, I could not do this elective. They have been very available to both me and my students in working through individual problems such as how to choose a laptop for CFD. CFD is now truly publicly available, with no doctorate required.”

Sean Sloan
Associate Professor
Oregon Tech



“Simcenter STAR-CCM+ allows my undergraduates to do what used to take a doctorate,” says Sean Sloan, associate professor, Oregon Tech. “Simcenter STAR-CCM+ is a powerful tool that beautifully shows how fluids behave.”

Of course, no one begins with the knowledge on how to create a CFD model. Before students begin modeling, they participate in four weeks of tutorials. The main teaching points are a review of previous lessons, such as setting minimum mesh size smaller to capture fine geometry, or increasing the growth rate to get geometry defined without breaking the number of mesh nodes, or decreasing the growth rate to help with stability. There is no one correct way to get a model to work, but understanding which knobs to twist

and what they do helps the students work their way into a solution.

“The useful tutorials in Simcenter STAR-CCM+ walk you through many aspects of CFD,” says Sloan. “Simcenter STAR-CCM+ features the best help of any ‘help’ files I have seen in any program.”

Bringing CFD teaching to life

Sloan says that without Simcenter STAR-CCM+, Oregon Tech would not have a CFD technology elective. Having students create their own program with meshing and convergence mechanisms is cumbersome and unnecessary in today’s world. This CFD class allows students to link their testing knowledge to modeling, which makes them more well-rounded engineers. The main obstacle for students

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Solutions/Services

Simcenter STAR-CCM+
www.plm.automation.siemens.com/global/en/products/simcenter/STAR-CCM.html

Customer's primary business

Located in south-central Oregon with 5,500 students split mostly between medical and engineering majors, the Oregon Institute of Technology delivers technology education and partners with industry leaders to ensure that its programs and classes adapt to new technology to prepare its students for workforce demands.
www.oit.edu

Customer location

Klamath Falls, Oregon
United States

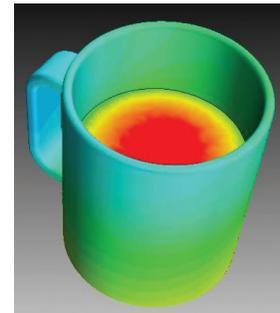
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is understanding internal procedures as well as coding, but through this course they experience a broader range of CFD in a shorter time frame.

"I don't have a lot of time to devote to prepping specific coursework," says Sloan. "I am very pleased with the tutorials that allow me to teach them the basics, and I find being able to slow it down over a four-week time period allows me to fill in the blanks of why they are pushing each button. My guidance, combined with articles, videos, and additional tutorials from Siemens PLM Software, allows my students to really run with the software, motivates them to investigate their set up and learn the logic behind the steps.

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Siemens PLM Software

Americas +1 314 264 8499
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3308

www.siemens.com/plm

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