

SIMULATION EDITION

CIO APPLICATIONS

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Top 10 Simulation Solution Providers - 2019

Company:

MicroCFD

Key Person:

Axel Rohde
Founder & Owner

Description:

Delivers comprehensive
2D and 3D wind tunnel
simulation software

Website:

microcfd.com

When asked about success amidst failure, American inventor and businessman, Thomas Edison said, "I've not failed. I've just found 10,000 ways that won't work." Edison is one of the very few people whose endurance can keep up with this physical and mental undertaking. Today, with the advances in technology, a new breed of innovators are outsourcing this undertaking to computer simulations, changing the way leaders thought about business strategy. For long, design prototypes were physical objects; however, with the latest simulation technology, designs can be developed in CAD software, followed by which a 3D printer or a CDC router can create a replica in minutes. From the meals we eat and the decisions about energy efficiency in buildings to the military design missions to reduce traffic jams or managing personnel, the designs can be simulated.

Digital twins technology is being increasingly adopted by data scientists and IT professionals to run simulations before building and deploying actual devices. Moving beyond the scope of manufacturing, digital twins are merging technologies such as the Internet of Things, artificial intelligence and data analytics. With the demands of IoT and AI and the advent of digital twins, simulation solutions optimize their design process by linking with programs like CAD, CAE, and CAM, helping possibilities become even greater for operational efficiency. In healthcare, simulation-based medical training is gaining traction, whereby students and interns can learn through items or machines—instead of the patient. However, such increasingly sophisticated simulators and training aids are not just limited to healthcare—the entertainment, education and the corporate world are leveraging augmented reality and virtual reality-based simulations to develop immersive gaming and learning experiences.

To aid organizations on their mission to choose the right simulation solution provider, our illustrious selection panel comprising CEOs, CIOs, VCs, industry analysts, and the CIO Applications' editorial board have thoroughly analyzed the industry and recognized the key players.

We present to you, CIO Applications' "Top 10 Simulation Solution Providers - 2019".

Comprehensive 2D and 3D Wind Tunnel Simulations

Simulation has helped eliminate the burden associated with trialling physical prototypes of designs which allows organizations and researchers to minimize overall development time, while reducing cost and errors during production. Design engineers can fine-tune product designs through simulations, build model prototypes, validate manufacturing processes, and improve performance outputs.



AXEL ROHDE

When he was pursuing his PhD in aerospace engineering in the mid-90s, Axel Rohde, founder and owner of what today is known as MicroCFD, developed flow solvers as part of his dissertation research, for 1D, 2D, and 3D aerodynamic simulations. In 2000, realizing the potential of his academic work, he registered MicroCFD for trademark protection and started selling one of his computational fluid dynamics (CFD) applications on MicroCFD.com. Today, in addition to offering a free STL (Stereolithography) file viewer and 2D and axisymmetric virtual wind tunnel, the company broadened its portfolio by also offering a full blown 3D virtual wind tunnel.

In an interview with CIOApplications, Dr. Rohde sheds more light on his organization's capabilities and the unique value proposition of its products.

Can you give us a brief overview of your company?

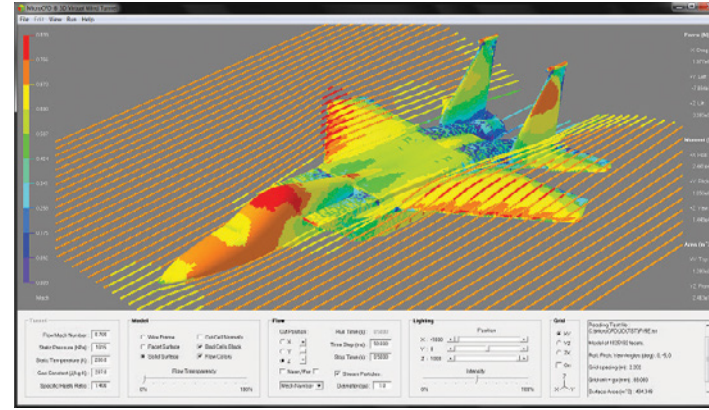
We provide a variety of CFD consulting services while also selling our own software suite, known as the MicroCFD Virtual Wind Tunnel (VWT). As a PhD student, I developed a solver specifically designed for 2D aerodynamic flow, an application, which surprisingly, a lot of the big companies didn't offer. This offering only allowed clients to run planar sections of their 3D aerodynamic simulation, but with a very fast solver that was optimized for this task. After creating my own STL file viewer, the development of a 3D virtual wind tunnel was straightforward. This allowed our software clients to simulate any aerodynamic problem. My colleagues and I also consult clients on CFD simulations that do not fit our own software, such as internal or hydrodynamic flow problems with possible heat transfer. For those simulations we either use in-house research code or open source CFD applications.

What are the unique features that differentiate your company from the other solution providers in the space?

The key feature of our products is that they can run the flow solver either on CPU or GPU, which sets it apart from other larger commercial packages. Any modern GPU can be used for graphics and highly parallel computations, and with its 100+ cores its processing speed is faster than any quad-core or hexa-core CPU that we have ever tested on our software. Another feature that gives our software the edge over many other CFD packages is its fully automated and fault tolerant meshing algorithm. Creating a 30 million volume cell mesh manually can take anywhere from a few hours to a week depending on the complexity of the CAD model and any necessary geometry cleanup. The MicroCFD 3D VWT creates such a mesh within seconds and its robust flow solver rarely diverges due to typical CAD geometry problems.

Apart from its technical superiority, the smooth learning curve of MicroCFD's products enables clients to easily go up and running with simulations, allowing them to achieve results with just a few mouse clicks. Furthermore, we offer comprehensive video tutorials.

Considering the numerous applications scenarios of simulation, from academic and hobby users to small and



medium size companies, which may not have dedicated CFD engineers, we deploy tailored software editions that yield quick results with fairly good accuracy.

Could you elaborate more on your licensing model?

MicroCFD decided several years ago to license its products on a time limited basis only, similar to subscriptions but without automatic renewals. Except for our freeware, all software licensing is provided to the user for durations of three, six, and twelve months at a very reasonable fee. When the license time runs out, the program redirects to the company website to renew the same.

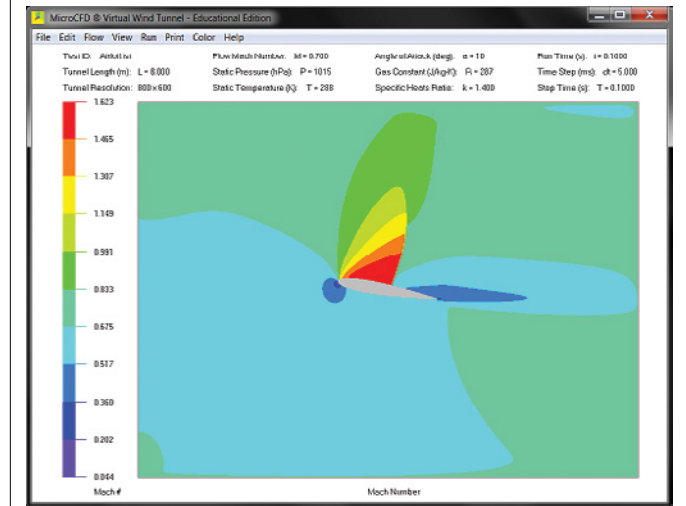
The key feature of our products is that they can run the flow solver either on CPU or GPU, which sets it apart from other larger commercial packages

This model allows the client to pay only for the time he or she actually uses our software and it reduces our technical support, since we never have to deal with an obsolete version. When we transitioned from perpetual to time limited licensing in 2012, there was some opposition from existing clients, but they have all embraced it since then. With rapidly evolving hardware and frequent software updates, nobody wants to make a ten-year commitment any more when investing in new software. And although we still offer multi-year discounted licensing upon customer inquiry, we have yet to sell one such license.

Can you provide a few customer success stories to demonstrate the capabilities and efficacy of your solutions?

We have hundreds of active users around the world who benefit from our simulation stack. Recollecting a few, an

architectural firm in Sri Lanka was interested in calculating the wind speeds and pressures around their high-rise buildings. Actual wind tunnel tests with physical models run in the tens of thousands of dollars and take time to build, setup, and run. Using our virtual wind tunnel, all the desired results were computed and visualized within hours. An insurance investigator from Australia was trying to find out if a tropical cyclone impacting coastal terrain was sufficiently strong to damage a home. After running his Lidar terrain scan through our virtual wind tunnel, it became evident that the local winds were simply not strong enough and construction defects were mostly to blame for the structural damage to the house. One of our Florida customers has been using our VWT software for over a year to evaluate different drone designs to be used for disaster relief. We've helped numerous such users across various domains to gain the design upper hand through simulation.



How has the recent track record been for MicroCFD? Looking ahead, what does the company's roadmap look like?

We have always strived to offer features in our CFD software that other companies have never even considered. These may be simple, yet very effective in enhancing the user experience. For example, many of our licensees have problems visualizing the aerodynamic forces and moments acting on their model. For that matter we will add a force or wrench line to the flow and model rendering in the next release of our 3D VWT, which is a feature we have had in our 2D VWT for more than a decade. This feature is unique and not available in any other commercial CFD package that we know of, but it allows users to instantly understand the net aerodynamic effect upon their model. We also intend to offer cloud based simulations by the end of 2020 with up to one-billion cell computations. CA