

# Focal Point

VOLUME 6, ISSUE 2

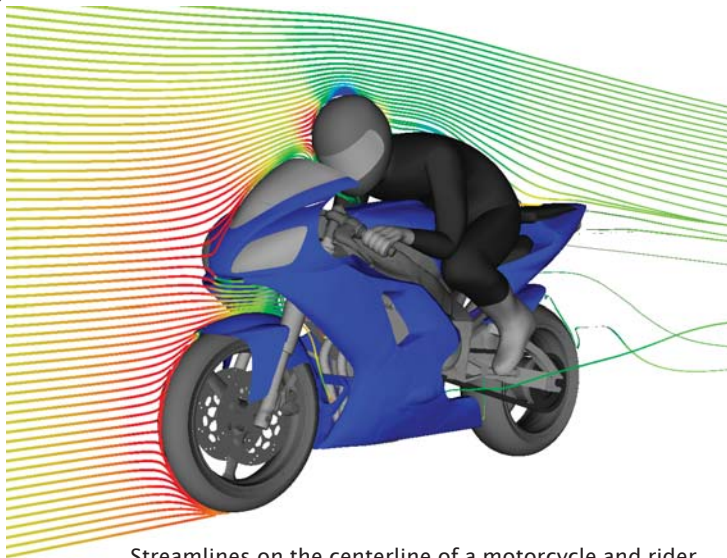
FALL 2002

THE NEWSLETTER FOR GRIDGEN

## Advantage CFD uses Gridgen to Streamline CFD

Article by Philip Postle, Advantage CFD

Advantage CFD is a leading UK computational fluid dynamics consultancy, with a long history in the motorsport and automotive industries. We have extensive experience of racecar design and wind tunnel commissioning in both the US and Europe. In recent years, we have expanded our business to encompass more general CFD applications with clients in industries as varied as pharmaceuticals, food processing and power generation.



Streamlines on the centerline of a motorcycle and rider.

Due to Advantage CFD's involvement in motorsport, it is necessary for us to constantly seek ways to

streamline our procedures in order to meet the tight

timescales demanded by our customers. Inherent in

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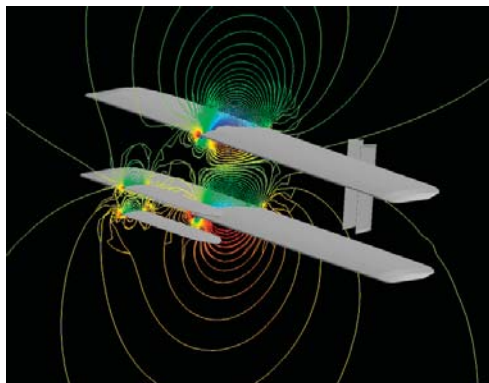


Focal Point is a publication of Pointwise, Inc. It is for Gridgen users and people interested in learning more about Gridgen and numerical grid generation. It includes information about the latest release of Gridgen, future development plans, and tips on how to get the most out of Gridgen while saving time in grid generation.

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## Gridgen Helps Wright Brothers Fly Again

Orville and Wilbur Wright would be amazed! Their Wright Flyer is taking off again. And Gridgen is there to help. By interweaving cutting-edge technology of today and historical data from the brothers' efforts, the Wright Again project hopes to engage the next generation of scientists and engineers in a virtual laboratory on the Internet.



Pressure plots near the center of the 1903 Wright Flyer. Cislunar Aerospace

Performance Computing, Education, and Research Center (HPCERC) at the University

of New Mexico and NASA Ames Research Center's Fluid Mechanics Laboratory, project directors Jani Macari Pallis, Ph.D., who is CEO of Cislunar Aerospace, Inc. and Karen Elinich, Director of Education and Technology at The Franklin Institute hope to reach the next generation of engineers and aviation scientists with an ongoing website as virtual lab.

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Working closely with the High

# Advantage CFD cont.

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the CFD process is the ability to reliably generate high quality meshes that are fed into the Fluent solver used at Advantage CFD.

In order to evaluate the commercially available meshing packages, Advantage CFD used a series of test cases. The results showed that

Pointwise's Gridgen program produced tetrahedral meshes up to ten times faster than some of the other programs considered, as well as being the most robust. Pointwise's rapid response to development requests was another reason

why Advantage CFD chose Gridgen over the other packages evaluated.

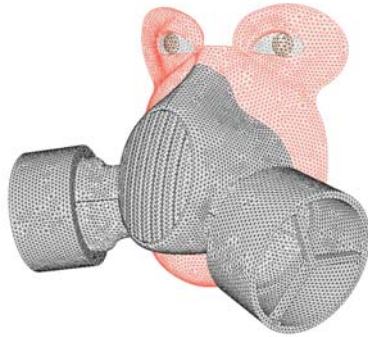
The latest release of Gridgen, which has incorporated the Glyph scripting language, has enabled Advantage CFD to further improve our internal procedures. Our development team has produced in-house programs and scripts which automate the generation of a tetrahedral volume mesh given a triangular surface mesh. This capability

has proven pivotal in reducing the turnaround times required to analyze design modifications and en-

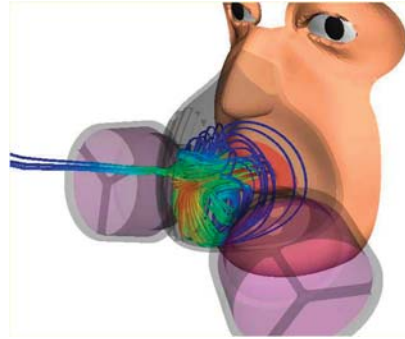
sures consistent meshes throughout a given project. Recent studies that have utilized this automated meshing include an investigation



has also been used for generating near wall prismatic meshes as part of a hybrid mesh, which enables us to produce accurate results without the overhead of a completely structured mesh.



Gridgen unstructured mesh of a person wearing a gas mask



Streamlines show flow through the gas mask.

The major benefit of improving and/or automating the meshing process, is the additional time it allows Advantage CFD engineers to devote to flow visualization and the

analysis of CFD data. Hence increasing the number of models we are able to assess within each project. This would not have been possible or as successful without Gridgen.

of the flow around a Yamaha R1 road bike and also air flow through a gas mask. Gridgen's structured meshing capability has been primarily used at Advantage CFD for generating high quality butterfly meshes for internal flows using the domain extrusion tools. This approach has yielded higher quality meshes in less time than using our previous techniques. The domain extrusion

For more information, please visit [www.advantage-cfd.co.uk](http://www.advantage-cfd.co.uk) or contact Jo Scott at Tel. +44 1280 846 806 or [jo@advantage-cfd.co.uk](mailto:jo@advantage-cfd.co.uk).

**Gridgen Version 14 manuals can now be purchased at On Demand Manuals ([www2.OnDemandManuals.com/pointwise](http://www2.OnDemandManuals.com/pointwise)).**

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**Gridgen Training 2003**  
 Jan 21-23  
 Mar 18-20  
 May 6-8  
 Jul 15-17  
 Sep 16-18  
 Nov 4-6

Additionally there will be a one day on demand Version 14 training class scheduled independently of the regularly scheduled training classes. Please check [www.pointwise.com/support/](http://www.pointwise.com/support/) to register or for more information.

## Wright Again cont.

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Via a web-based curriculum developed by Dr. Pallis and The Franklin Institute, students will follow the course of Wilbur and Orville's travails from their early interests as children, to the early disappointments in 1901 until the successful flight of December 17, 1903. The virtual environment substitutes computer codes for wind tunnel and flight facilities. Students can reproduce the Wright Brothers' wind tunnel test and see flow details the two brothers never imagined.

When Dr. Pallis began the Wright Again project, she knew the tool she needed was Gridgen. "I use it and love it," she stated. "It is the perfect tool to use for this project." Dr. Pallis was able to use the blueprints of the 1903 Wright Flyer from the Smithsonian to create a surface for Gridgen to generate a grid. "We are just beginning the airfoil grids and the Wright Flyer grids," explains Pallis. "Then we'll add the biplane's uprights and the engine."

All together, there are approxi-

mately 50 surviving airfoils of simple shapes from the 1901 wind tunnel tests at the Franklin Insti-



Airfoil #12 - the Wright Brother's original airfoil model from the The Franklin Institute

tute. Differing CFD codes, each with its own grid requirements, could have made the project particularly complex, but Gridgen's versatility made it easy to use a variety of CFD codes.

Wright Again allows children to use very simple mathematics to expose the differences in theory then and now. According to Pallis, the project will provide the concepts and unparalleled educational value in the process. Currently, a dozen

teachers a day are signing up to participate. The Wright Again curriculum is free to everyone. Additional activities include building a replica of the Wrights' toy helicopter and experiencing a history lesson on "Success, Failure, and Perseverance."

Please visit Wright Again online at [www.wrightagain.com](http://www.wrightagain.com) for more information. Dr. Pallis can be contacted at [deke@cislunar.com](mailto:deke@cislunar.com) and Ms. Elrich can be contacted at [kelinich@fi.edu](mailto:kelinich@fi.edu). Wright Again is sponsored by the National Business Aviation Association, Cislunar Aerospace, The Franklin Institute, HPCERC, and NASA Ames Research Center.

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**IF YOU HAVE A GRIDGEN PROJECT AND WOULD LIKE TO SHARE YOUR SUCCESSSES, LET US KNOW. WE WELCOME STORY IDEAS AND ACCEPT ARTICLES. PLEASE SEND YOUR IDEAS TO HEATHER MCCOY AT [HLMCCOY@POINTWISE.COM](mailto:HLMCCOY@POINTWISE.COM)**

## Gridgen Product News

We hope by now you're enjoying the latest Gridgen release, Version 14.04. Since Version 14's initial release in April we've continued to add new features for your meshing pleasure. CFD solver interfaces (Splitflow and PHOENICS) and new graphics features (Zoom to Screen Extents and single increment rotations) have been added, the elliptic PDE solver for structured grids is now up to 5 times faster, more utility scripts have been added to the distribution, and Glyph continues to expand in scope to cover more and more of Gridgen's functionality.

Glyph, Gridgen's Tcl-based scripting language introduced in V14, continues to grow in popularity. You'll continue to see Glyph commands added to each V14 maintenance release until we reach our goal of making Gridgen

100% journalable to a script. There are plenty of Glyph examples in your distribution's `examples/glyph` folder. And you'll find working Glyph utilities in the `utils` folder - be sure to try them. Glyph has already reached an important milestone - a Glyph-based add-on to Gridgen has been released as a commercial product by our partner in Japan. Vinas' Blade Master automatically generates structured grids for turbomachinery geometries.

If you would like to learn more about the new features in Gridgen V14, come to the one day V14 training. Please inquire at [www.pointwise.com](http://www.pointwise.com).

### Pointwise Consulting Services

Whether you are looking for help in generating a particularly difficult grid, need help during peak load periods, are just looking to get a quick start on a project, or want custom software development, Pointwise is ready to give you a hand. With over 30 years experience developing and supporting 3D grid generation software and applying it to demanding industrial applications, we have the expertise to get your job done right.

Call 1-888-GRIDGEN for more information.

**Save a Glyph script that reads in the appropriate database and grid files to archive a project for future reference.**

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## New Faces at Pointwise

Pointwise is excited to announce the addition of two new employees.

Michael Jefferies joined Pointwise in May as a product developer. Mike comes to us from Intel Labs where he was a software engineer for five years. He has bachelor's and a master's degrees in computer science with an emphasis in computer aided design from Arizona State University. Mike has already made his mark on Gridgen with the addition of Glyph scripting commands to Version 14's maintenance releases. His computational geometry background is being put to good use as he implements new database creation commands in Version 15. You can reach Mike by email at [msj@pointwise.com](mailto:msj@pointwise.com).



Pointwise's new faces: Carolyn Dear and Michael Jefferies

Carolyn Dear joined Pointwise also in May as an engineer with the Gridgen technical support team. She came to Pointwise following her tenure as a graduate research assistant at the Engineering Research Center for Computational Field Simulations

in Starkville, MS. Carolyn has a bachelor's degree in aerospace engineering and is in the final stages of completing a master's degree in aerospace engineering as well. For the past 6 years, she has been involved in various CFD research and applications. Her prior focus in CFD research involved investigations of rotating stall inception in axial turbomachinery. Carolyn will be assisting with technical support issues, training, consulting and documentation.

Carolyn can be reached by email at [cdear@pointwise.com](mailto:cdear@pointwise.com). If you have any support questions, please contact us at [support@pointwise.com](mailto:support@pointwise.com) or at 888-GRIDGEN.

**Use Ctrl-V to toggle between orthonormal and perspective viewing.**