

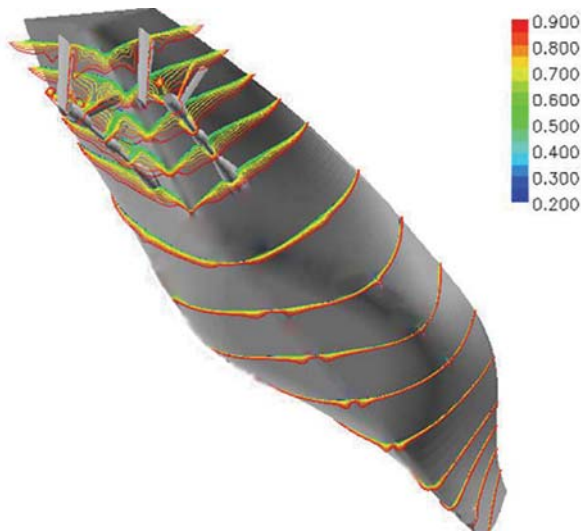
GridgenApp

A Unique Gridgen® Application



Mesh Automation at QinetiQ

Article Courtesy of Dr. Ben Raylor, QinetiQ Haslar



Flow around a surface ship hull with appendages

QinetiQ Haslar has become heavily involved in using the GridgenGlyph scripting language (based on Tcl) to automate some of their mesh generation processes. This can be a big time-saver, particularly for parametric studies where many variations of geometry must be gridded and flow-solved.

One example of this is a parametric study of the effect of ducted rotor tip gap clearance performed last year. A script was developed that automatically generates grids for different tip gap clearances. It is able to generate a new grid in about 10 minutes, compared to the 2-3 days it takes to generate a grid by hand.

QinetiQ engineers have found their Glyph scripting can be classified as one of three techniques, which they call novice, experienced, and brilliant.

In the novice approach, engineers create scripts using Gridgen's journaling feature to capture a script as the engineer generates the grid by hand. This approach has the advantage that it is very easy to create the initial script. The drawbacks to this approach are that it does not allow much flexibility in the types of variations that can be made on a grid, and more importantly, it produces scripts that can be sensitive to the geometry, meshing parameters, or even the Gridgen version.

In the experienced approach, the topology for the grid is designed in advance and the script is written manually by an engineer in a more structured fashion. The disadvantage of this approach is it takes a bit longer to develop the initial script and the script writer has to be more familiar with Glyph. The advantage of this approach is it produces more robust and concise scripts. Repetitive tasks can be encapsulated in procedures that are more efficient and easier to debug. As a result, the script is easier to maintain and can be made to function for a wider variety of geometries and grids.

The brilliant approach is similar to the experienced approach, but uses Tcl's graphical interface toolkit, Tk, to add a graphical interface to the script. This makes it easier for engineers not involved in development of the original script to make use of it without expert assistance. Using the brilliant approach, the effort and knowledge that went into developing the script are disseminated and preserved for others in the organization to use.

QinetiQ engineers also take advantage of Glyph scripting to collaborate with engineers in other organizations, even when they are located an ocean away. They have an ongoing project with Defence Research & Development Canada – Atlantic and the University of New Brunswick to study fundamental flow physics associated with maneuvering submarines. By trading Glyph scripts with each other they are able to divide up the work of grid generation and ensure they are using consistent grids.

In a short time, QinetiQ has used Glyph to integrate Gridgen into their design process, save mesh generation time, and collaborate with others. Who knows what the future holds.