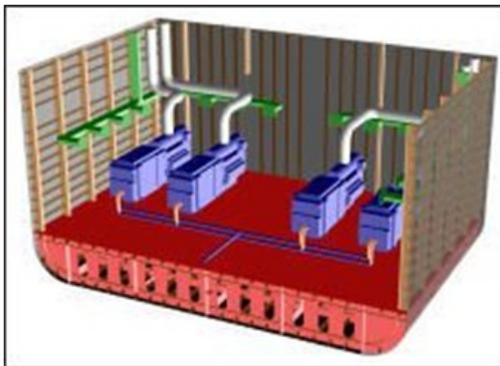


Functions from the NAG Library underpin leading application for marine design from QinetiQ GRC

The longstanding relationship between the Numerical Algorithms Group (NAG) and QinetiQ GRC has resulted in the use of several NAG library functions in Paramarine™, the QinetiQ GRC Integrated naval architecture application for ships and submarines.

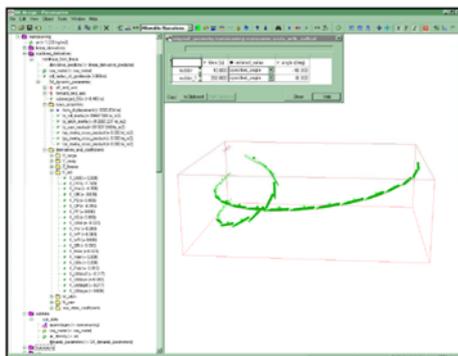
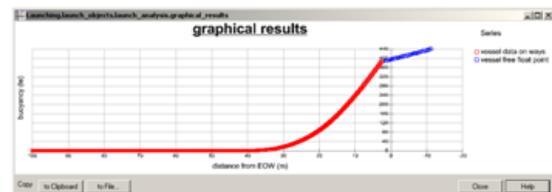


“Without the NAG functions we could still be working on some of the most important parts of Paramarine. Our developers know they can rely on NAG functions for reliability, the NAG documentation and examples for all the detail that is required and, if needed, an unrivalled level of support in the form of NAG’s expertise in numerical mathematics and computer science. We don’t have to work on the lower level at all; instead, we spend our time developing Paramarine to be one of the most useful tools in the marine industry” Vittorio Vagliani, Managing Director of QinetiQ GRC

Background

Paramarine is an integrated computer aided design and engineering tool for commercial ship, warship and submarine design. It is one of the main tools used by the Royal Navy to model its ships and submarines, and is the only UK Ministry of Defence endorsed tool for ship and submarine stability analysis. Paramarine is used by governments, shipbuilders, ship designers and academic institutions in many countries, including Australia, Japan, USA, Canada and Sweden.

The system features a unique and integrated set of tools which address concept design, performance prediction, strength and structures, radar cross section, powering, manoeuvring, endurance, sea keeping, vulnerability and design for production. Paramarine is used by naval architects in a number of different organisations for overall concept design, detailed stress and load design and surface optimisations.



Paramarine screenshot of a simulation run

The NAG Library in Paramarine

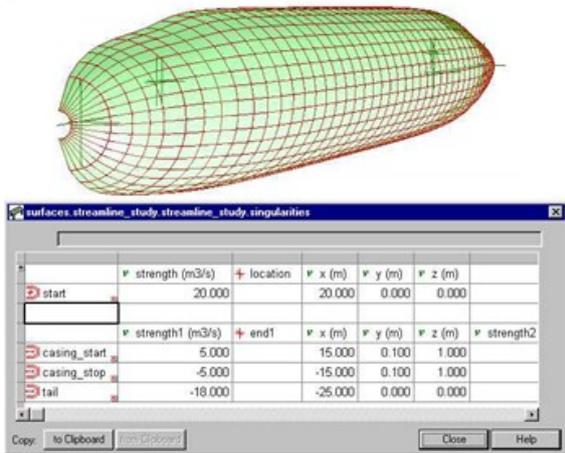
Paramarine is largely written in C++ by a team of developers with specialist knowledge of marine structure, stability and vessel surface design techniques. The application is developed in a modular fashion and NAG functions are integrated into many of these modules, including those for manoeuvring, seakeeping, structural analysis, powering and surface modelling.

More specifically, the NAG functions used include those that:

- determine the cubic spline of a data set,
- carry out surface interpolation,
- deliver weighted least-squares approximations,
- evaluate bivariate polynomials from double Chebyshev series representations,
- optimize multivariate functions,
- calculate eigenvalues and eigenvectors,
- return probability distributions and perform regression analysis.

Paramarine users

All the underlying numerical algorithms are integrated into the Paramarine modules by QinetiQ GRC. Users of Paramarine do not need a copy of the NAG library.



NAG and Software Vendors

The Numerical Algorithms Group embodies a highly collaborative culture driven by skilled domain specialists who work efficiently with developers in many client software companies to help them to make the best use of NAG functions.

The image shows a collage of overlapping technical documents from the NAG Library Routine Document. The documents contain various sections, including:

- '4 Decision Trees' with a flowchart.
- '1.6.6 Minimization subject to bounds on the objective function' with mathematical text and a small plot.
- '2.1.7 Multidimensional optimization' with mathematical text and a plot showing optimization paths.
- 'NAG Library Routine Document G22AF'.
- 'NAG Library Routine Document S22AF'.

Companies can have total confidence when doing business with NAG because they have over 40 years experience of working productively with many types of partners, ranging from leading scientific academics to the world's largest and most successful software and financial firms.