

RigEdge



The unique and fully integrated **rig analysis and optimisation** system

RIG AND SAIL GEOMETRY

SAIL LOADS CALCULATION

RIG ANALYSIS

The robust analysis tools quickly evaluate the **rig deformation** and **relative tensions** under tuning and sailing loads.

MAIN BENEFITS

- » speed up rig design
- » explore alternative designs performance
- » communicate easily
- » sizeable savings through faster development

RigEdge capabilities

RigEdge accurately **simulates the structural behaviour** of the defined rig configuration under the sails loads in up-wind sailing conditions, allowing the design of optimal rigs.

THE ANALYSIS METHOD

The RigEdge integrated analysis method includes:

- » Comprehensive aerodynamic and structural analysis of sails to evaluate the sail loads on the rig.
- » Cutting-edge structural analysis methods to calculate the mast bend, luff sag and rig loads.
- » User-friendly interface enabling rig designers to modify the initial design and setting tuning and sailing load cases.
- » Graphical plots to make it easy to review the rig performance and compare alternative solutions.

Rig & Sail Design

SPARS

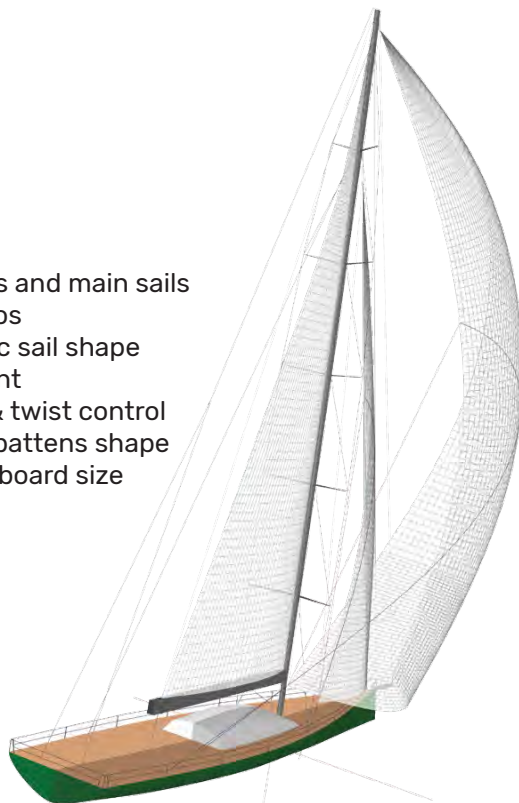
- » Mast
- » Crane
- » Spreaders
- » Boom
- » Bowsprit

SAIL PLAN

- » Head sails and main sails
- » Code Zeros
- » Automatic sail shape development
- » Camber & twist control
- » Roach & battens shape
- » Any headboard size

RIGGING

- » Shrouds
- » Forestay
- » Runners
- » Checkstays
- » Main Sheet
- » Vang



Sail Loads Calculation

INPUT

- » Sheeting angle
- » AWA / TWA
- » AWS / TWS / BS
- » Righting moment

RESULTS

CFD

- » Pressure distribution
- » Sail coefficients
- » Heeling moment

FEA

- » Corner loads

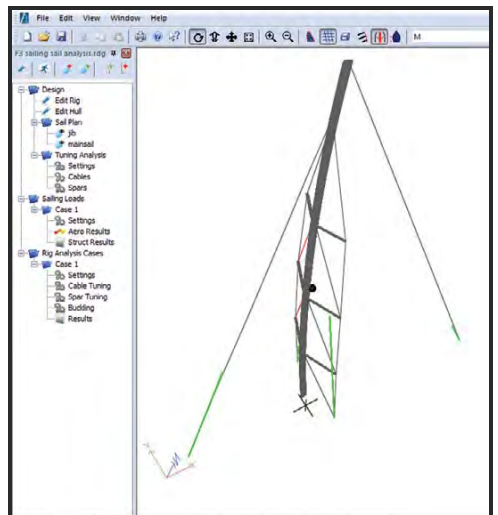
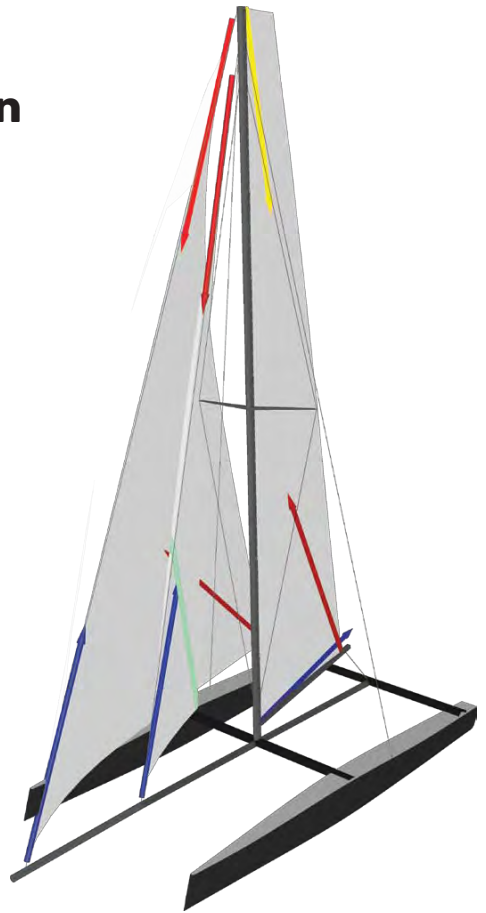
Rig Analysis

INPUT

- » Rig structural properties
- » Conventional and composite material
- » Tuning loads
- » Sailing loads

RESULTS

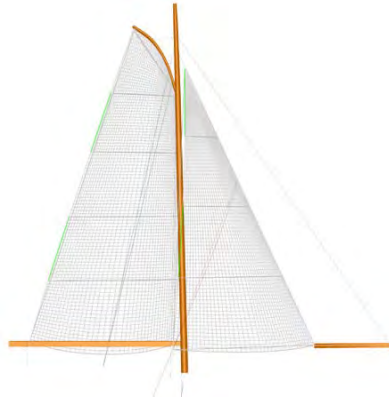
- » Mast and spreaders compression
- » Mast step and collar reactions
- » Mast bend and forestay sag
- » Boom analysis
- » Cables tension load
- » Chainplates load
- » Centre of mass, rig weight
- » Roll static moment
- » Buckling
- » Internal forces and moments
- » Export rig for CAD use as .dxf, .stl, CATIA® step file



Add-ons

Gaff Rig

- » Rapidly define the dimensions for high and low aspect ratio gaff rigs.
- » Aerodynamic and structural analyses are performed on the gaff sailplan.
- » Sailing loads are transferred to the rig, including the gaff spar.



INPUT

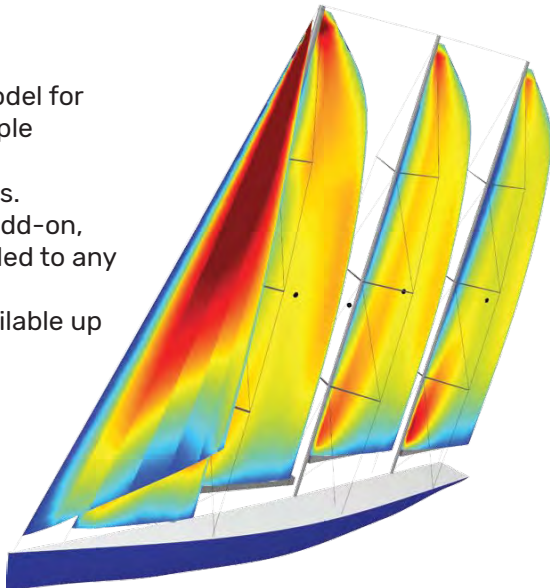
- » Gaff spar geometry, section shape and structural properties.
- » Gaff mainsail and headsail.
- » Multiple halyards connecting the gaff spar to the mast.

RESULTS

- » Gaff rig loads.
- » Mast and gaff spar bend.
- » Spars and rigging loads.

Multi-Mast

- » Create a full rig model for all yachts with multiple masts.
- » Design mizzen sails.
- » With the Gaff Rig add-on, gaff sails can be added to any mast.
- » Sail analysis is available up to five sails.



Add-ons

Advanced Aerodynamic Analysis

- » Allows the user to evaluate the sailing loads, by setting the range of sailing conditions, and running the analysis in batch mode.
- » The result is a matrix of the sail's coefficients, ready to be used by commercial and custom velocity prediction programs (VPP).
- » The available results include the forces and aerodynamic coefficients, sail by sail and on the entire sail plan.

FRANK BLAAS, RONDAL B.V.

"I've spent days on deck with the computer monitoring every step [...] The results from the calculations were spot on and RigEdge was running without hiccups. We achieved a full trim of the main mast (five spreaders) in one day!"

Dynamic Module

in collaboration with RINA Services S.p.A. Italy

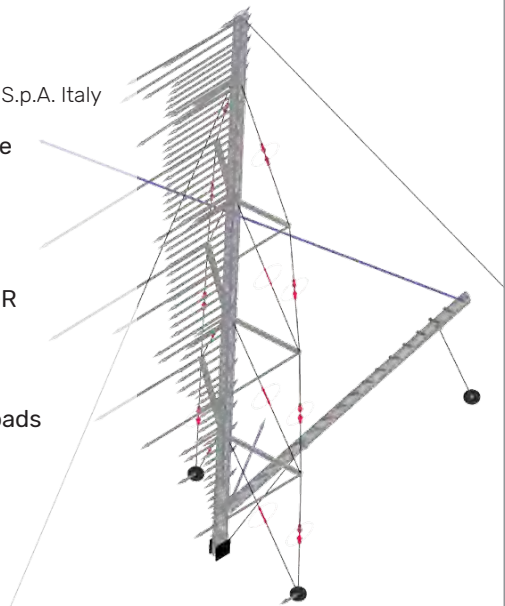
» The RigEdge Dynamic Module evaluates the impact of the pitching motion on the rig.

INPUT

- » Vertical Acceleration
- » Angular Accelerations OR
- » Angle and period(s) of the vessel oscillation

RESULTS

- » Distribution of inertial loads along the mast
- » Mast bend
- » Luff sag
- » Spar compression
- » Rigging tension



Why RigEdge

- » RigEdge is a simple, light and intuitive rig analysis and optimisation software.
- » RigEdge guides the users to effectively conduct the entire process of analysis and evaluation of results, through a series of steps: from generating rig and sail plans using the design interface, to analysing sail-sets in various load cases and generating an automatic report.

Solutions & Interoperability

- » RigEdge provides automatic meshing for sails and rigs, which are used for analysis purposes.
- » The ability to create load cases for sails and rig loads lets the user evaluate the rig behaviour in a variety of circumstances and hold all the results in one place.
- » RigEdge not only imports hull files as Rhino and Catia® step files, but also exports rig and sail plans as .dxf and step files, making them easy to share.

SOME OF OUR CUSTOMERS INCLUDE:



Lloyd's Register
Marine



MARTIJN VAN SCHAIK, HOEK DESIGN

"With RigEdge I am able to calculate the rigging loads and the load on the chainplates myself, and make informed choices regarding the construction from the start of the process."

FLAVIO FALOCI, ITALY YACHTING PLAN APPROVAL, RINA SERVICES S.p.A.

"The training course was very useful, and allowed me to clarify a lot of doubts and actually discover many features of the software! Absolutely it was worth doing it. The knowledge and expertise of the SMAR Azure support team is outstanding and they are very efficient in the communication."

REFERENCES

- » Malpede, S., D'Angelli, F., Bouzaid, R. (2013), Advanced Structural Analysis method for aeroelastic simulation of sails, Proceedings of the Third International Conference on Innovation in High Performance Sailing Yachts, Lorient.
- » Malpede, S., Nasato, F. (2011), A Fully Integrated Sail-Rig Analysis Method, Trans Rina, Vol 153, Part B2, International Journal of Small Craft Technology, p. 117-125

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- » Market leader in design and analytical software for the marine industry.
- » Used by over 200 users in 30 countries.
- » Lloyd's Register and RINA use RigEdge for certifying sailing yacht rigs.
- » Team is formed of highly experienced engineers in sail design, rig design as well as software development.