SMAR Azure Ltd

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.
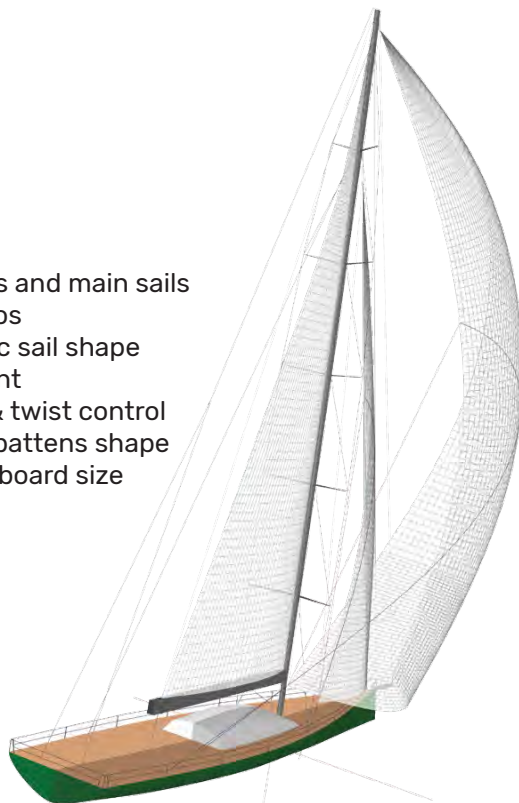
Rig & Sail Design

SPARS
» Mast
» Crane
» Spreaders
» Boom
» Bowsprit

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

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

Sail Loads Calculation

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

CFD
» Pressure distribution
» Sail coefficients
» Heeling moment

FEA
» Corner loads

Rig Analysis

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

» 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
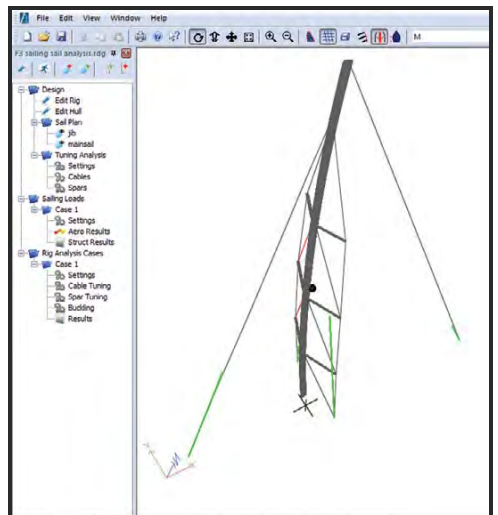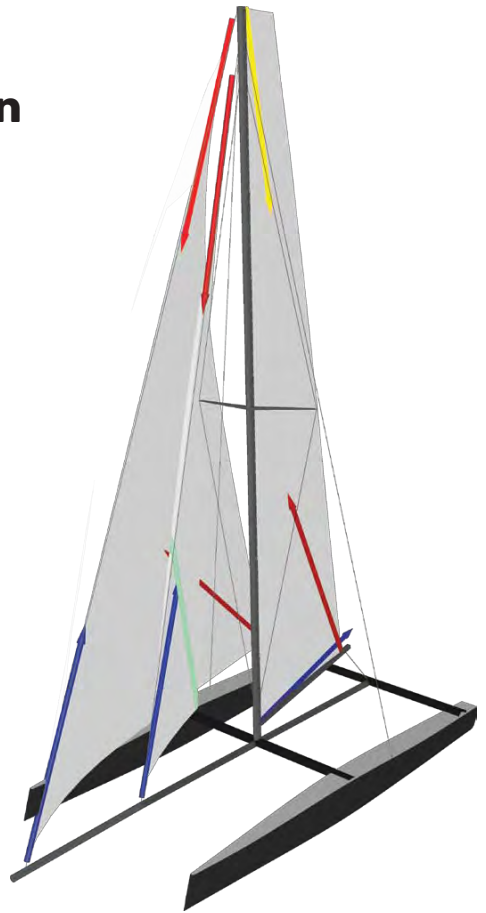
Add-ons

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.
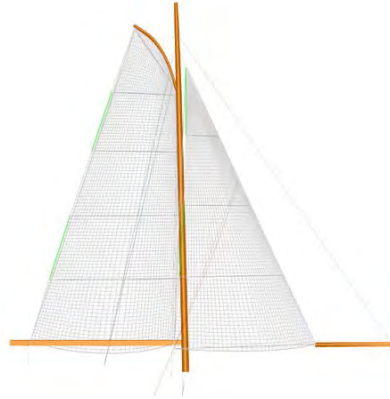
INPUT

» 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.
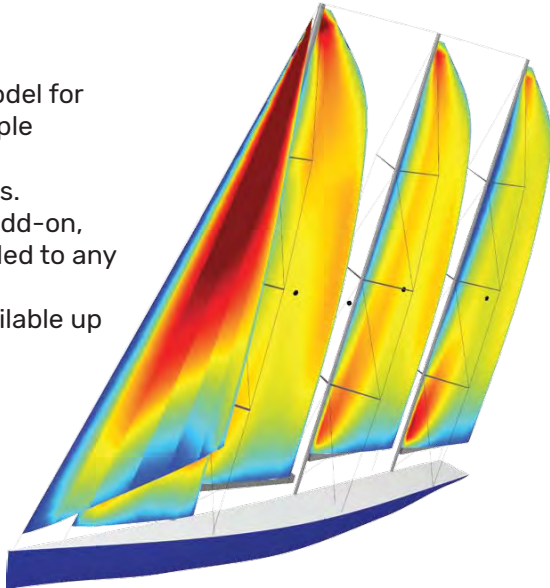
Add-ons

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 hickups. **We achieved a full trim of the main mast (five spreaders) in one day!**"*

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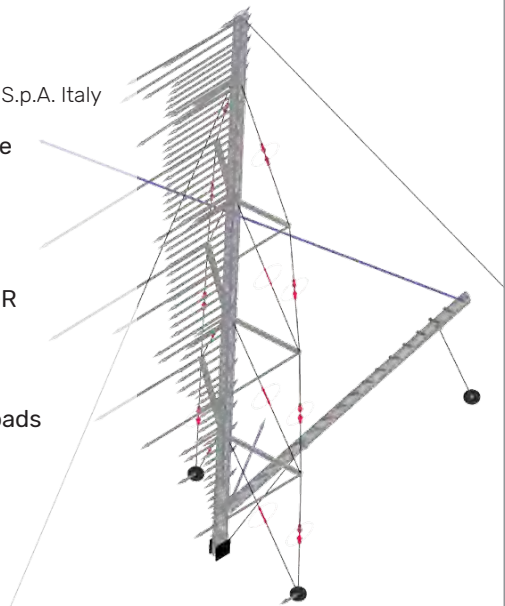in collaboration with RINA Services S.p.A. Italy

» 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:

HOEK DESIGN
NAVAL ARCHITECTS

TUNED
RIGS & ROPES

RONDAL

Lloyd's Register Marine

RINA

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.