
Adaptive sail management system

One sail. One button. One person on deck.

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In short: one sail for every wind

- One modular foresail replaces the jib, the Genoa and the Code Zero
- A carriage and furler ride on a curved bow rail
- Sails are changed by furling from the cockpit — no trips forward
- Furl down in strong wind, full sail in light air — any angle
- The rail is at the same time part of the standing rigging
- International patent application PCT/LV2026/050019

The system is meant for multihulls that one person wants to sail. It replaces several separate foresails with a single sail carrying three zones of different sailcloth.

It also moves the tack of that sail along a curved rail across the bow. The pages that follow show how it works and what it gives the owner.

What we will cover

- 01 Why solo sailing is hard
- 02 How the system works
- 03 What it looks like on the water
- 04 What the owner gets

The deck is arranged in four parts: the problem, how the system is built, three points of sail on the water, and what the owner gets.

01

Why solo sailing is hard

The problem this system solves

This is not about racing but about everyday sailing alone or with an inexperienced crew.

Changing sails is the riskiest moment alone

- Wind shifts in direction and strength — the sail no longer fits
- You must go to the foredeck, away from the safe cockpit
- Large sails are heavy and awkward for one person
- Moving from close-hauled to broad reach needs a different sail
- The worse the conditions, the more often it happens

This is the starting point of the patent application. On boats above a certain size the sail area becomes a one-person problem.

Every sail change means leaving the helm and walking forward — exactly when the weather is at its worst.

Headsail automation today is narrow

What is already automated

- Tacking — a self-tacking jib
- Area — roller furling
- Sheeting angle — a narrow range, upwind

Where it stops

- The self-tacking jib is small — no Genoa area
- The tack stays fixed on the centreline
- The sail type changes only by hand on deck

A self-tacking jib crosses to the other side by itself. It is small, though, and its sheet track is short, so the range of angles is narrow and mainly upwind.

Furling reduces the area, but the cloth stays the same. None of it gives one configuration for all conditions.

02

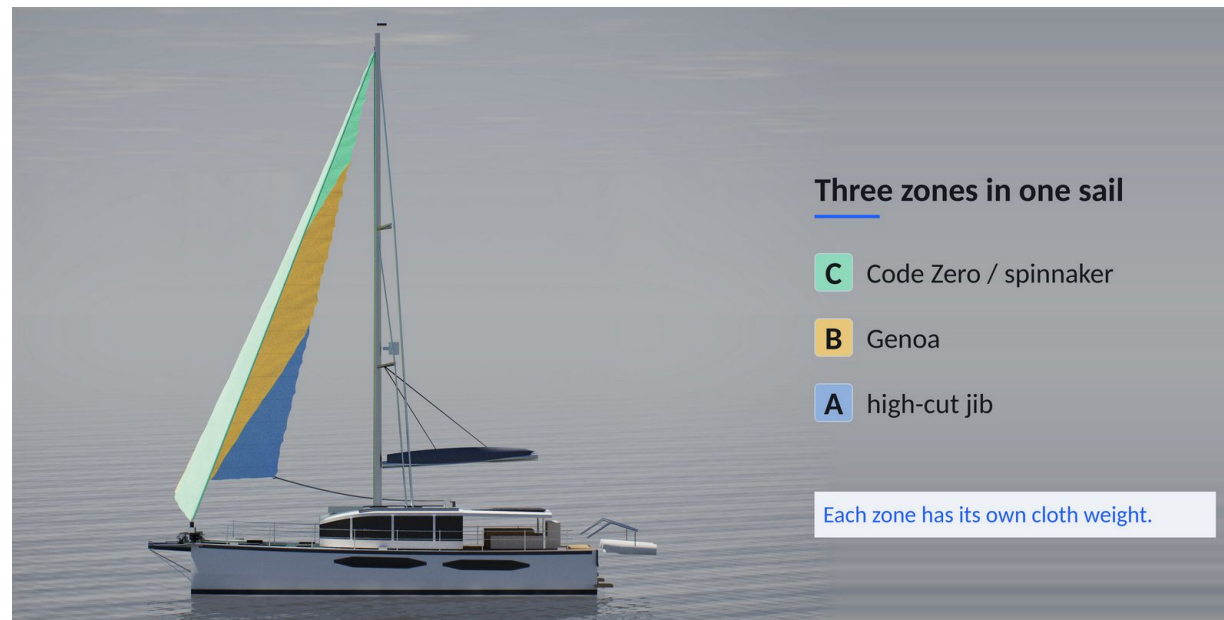
How the system works

Guide rail, carriage and modular sail

Three parts, each familiar on its own, but new in combination.

One sail that replaces three

A modular foresail with three functional zones works from 2 to 35 knots and at any wind angle — without a sail change.

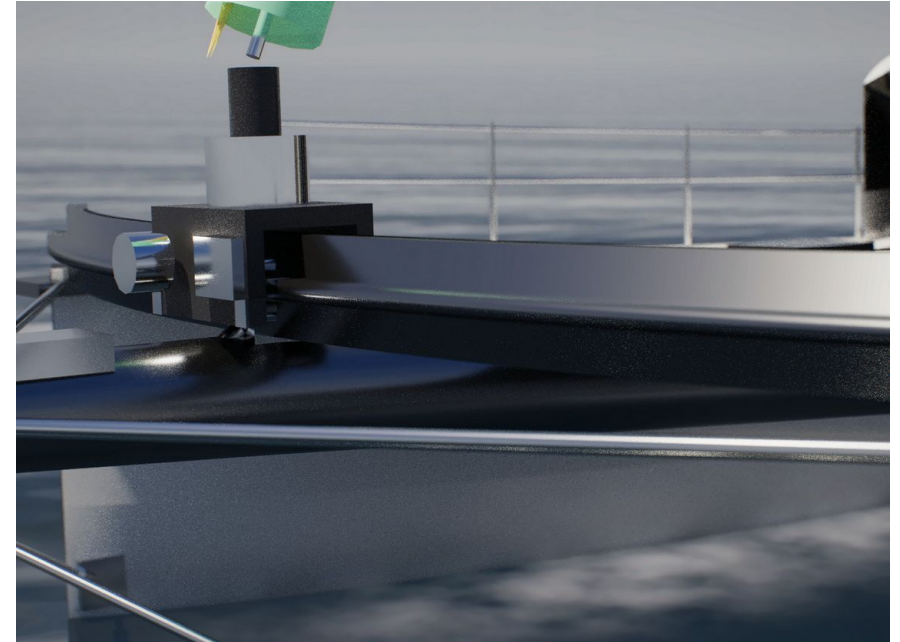


The colours in the sail are not decoration — they are three zones of different sailcloth.

Depending on the wind angle and strength, one, two or all three zones are unfurled; here the sail is fully out.

Three simple parts make up the system

- A curved guide rail across the bow
- A powered, locking carriage with a built-in furler
- A modular foresail with three functional zones
- Control from the cockpit — panel and/or phone app

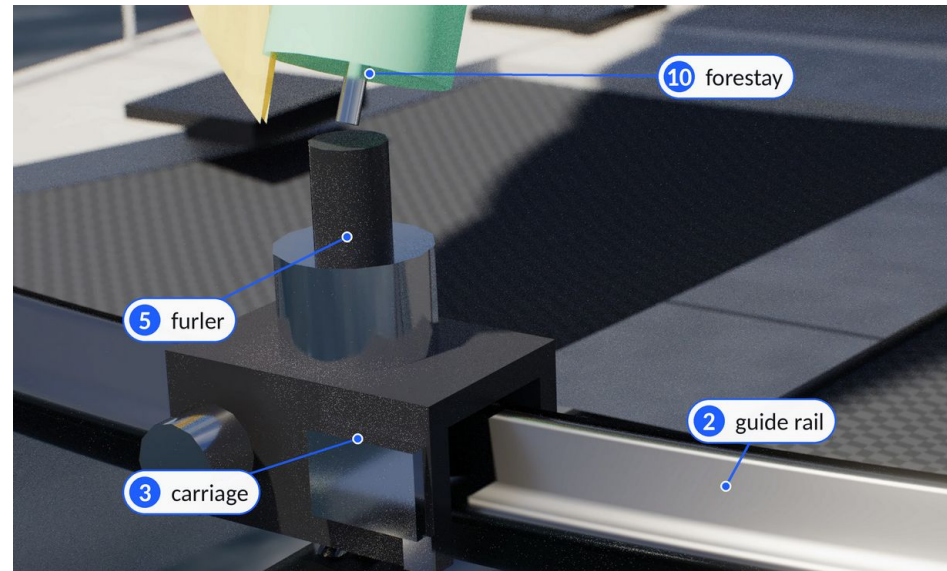


The rail is fixed to the ends of all the hulls — two on a catamaran, three on a trimaran — and additionally supported on the bowsprit.

The carriage travels along it and is locked wherever needed. The furler sits on top of the carriage, so the sail furls regardless of where the carriage is.

A carriage with a furler runs on a curved rail

Cross-shaped rail profile: eight rollers grip the horizontal arms — two above and two below on each side.

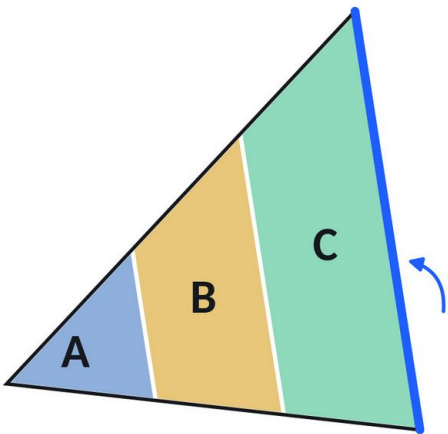


An electric or hydraulic drive moves the carriage. A locking mechanism holds it firmly in the chosen position, so the tack can be set by command.

Rollers above and below the arms stop the carriage from shifting vertically or laterally, even under heavy load. Numbering follows the reference signs of the patent application.

Three sail zones in one piece of cloth

Each zone has its own sailcloth and its own wind range — the sail change happens by furling, not by swapping.



forestay — the sail furls here

Zone	Sail type	Share of area	Wind range
C	Code Zero / spinnaker	45%	2–25 kn
B	Genoa	42%	3–20 kn
A	high-cut jib	13%	5–35 kn

Furling rolls C away first, then B; A + B together are 55% of the area.
The stronger the wind, the more you furl in — only the denser, tougher zones stay.
The three zones together cover 2 to 35 kn — with no sail change.



The zones are ordered by cloth weight: A is the heaviest (strong wind), B the Genoa (medium), C the lightest, for light air. Zone C can be cut as a Code Zero or as a spinnaker.

So the sail is matched to wind strength as well: the stronger the wind, the more you furl in, and only the tougher zones stay. In light air it goes out fully — full sail.

The rail holds even tension in any position

All points on the rail are equidistant from the mast, so forestay tension does not change as the carriage moves.

Carriage mid-rail

0% — on the centreline



Carriage at the rail end

100% — at the end stop

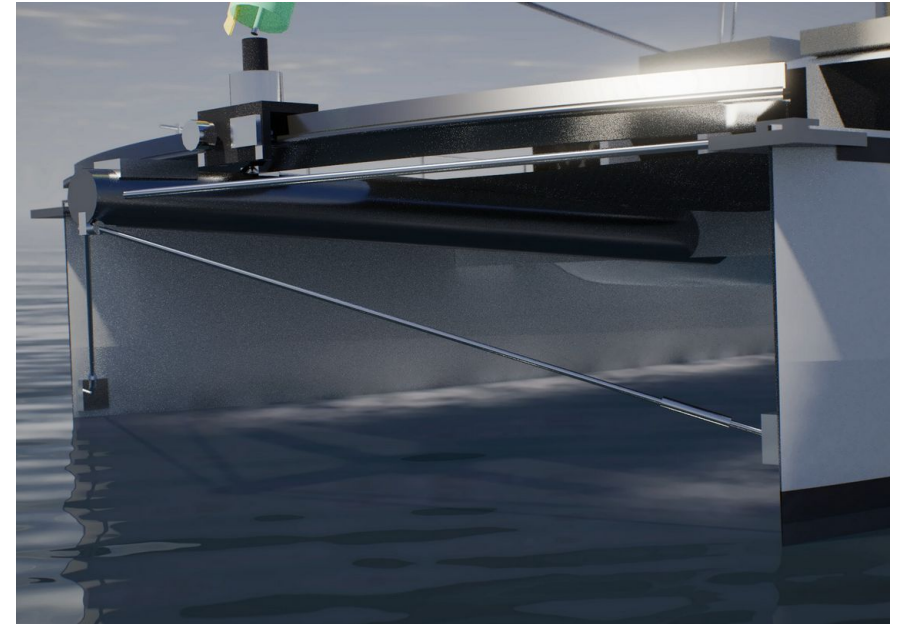


A straight rail would make the forestay alternately longer and shorter, and rig tension would change every time the carriage moved.

The curved rail removes that: in the model the forestay is the same 19.37 m in every carriage position.

The rail is also part of the standing rigging

- An extra structural link between the hulls
- It connects the hulls and, via the forestay, the mast
- Mountings designed for large dynamic loads



Industry practice is to replace stainless standing rigging at around 10 years or around 40,000 nautical miles, whichever comes first. Over that time the wires stretch and go slack.

The rail is an additional, independent structural link between the hulls, and through the forestay it is tied to the mast as well. That matters most where the mast is not rigidly coupled to the hulls.

03

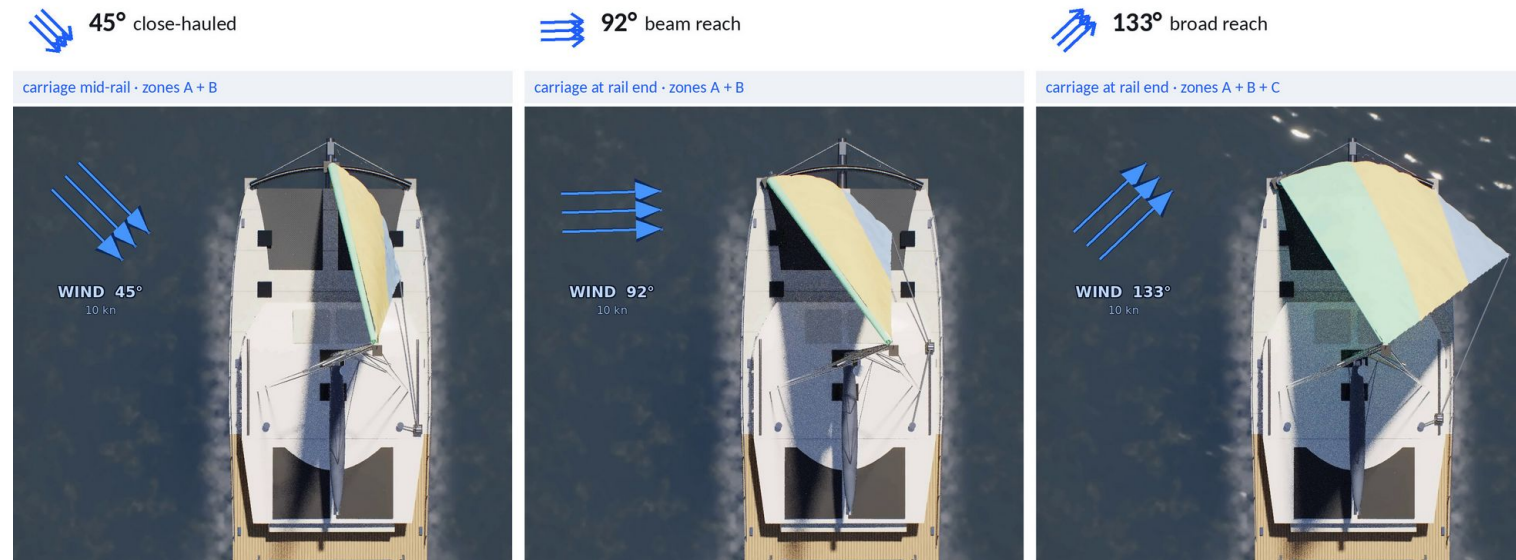
What it looks like on the water

Three points of sail, one sail

The same sail on three completely different courses.

One mechanism, three very different courses

Top view: as the wind changes, the carriage travels along the rail and the sail unfurls by exactly as much as needed.



All angles are apparent wind. Left, close-hauled: the carriage is mid-rail and only zones A and B are unfurled.

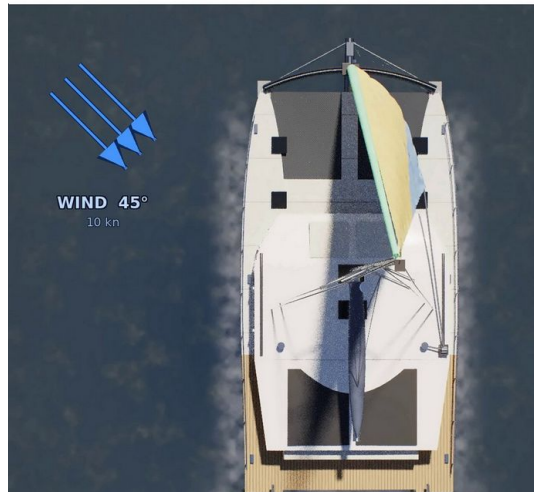
Middle, beam reach: the carriage is already at the rail end, the zones unchanged. Right, broad reach: zone C is out too and the sail works at full area.

Animation: the sail follows the wind

The wind swings from 45° to 180° and back — the sail follows, untouched.

1 45°

carriage mid-rail · zones A + B



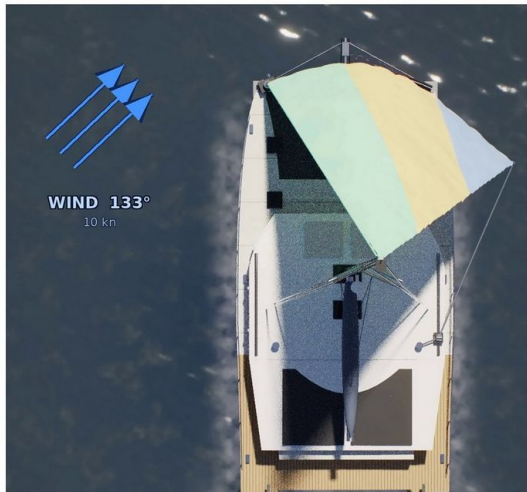
2 92°

carriage at rail end · zones A + B



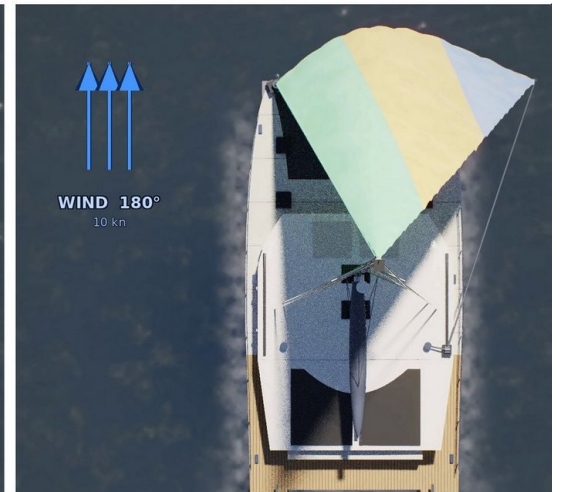
3 133°

carriage at rail end · zones A + B + C



4 180°

carriage at rail end · zones A + B + C



The carriage runs out along the rail first: at 92° it is already at the end stop, but only zones A and B are unfurled.

Only then does zone C unfurl — at 133° all three are working. Meanwhile the angle of attack grows from 15° to 90°. None of it requires leaving the cockpit.

Close-hauled: carriage mid-rail, A and B open

beating to windward, at a sharp angle to the wind

Apparent wind 45°, angle of attack 15°: carriage mid-rail, zone C rolled away on the forestay — heeling force stays low.



Close-hauled • 45°



Apparent wind	45°
Angle of attack	15°
Carriage on rail	mid-rail (0%)
Zones unfurled	A + B (55% of area)
Zone C	furled on the forestay

At a sharp angle only the smaller, denser zones work.

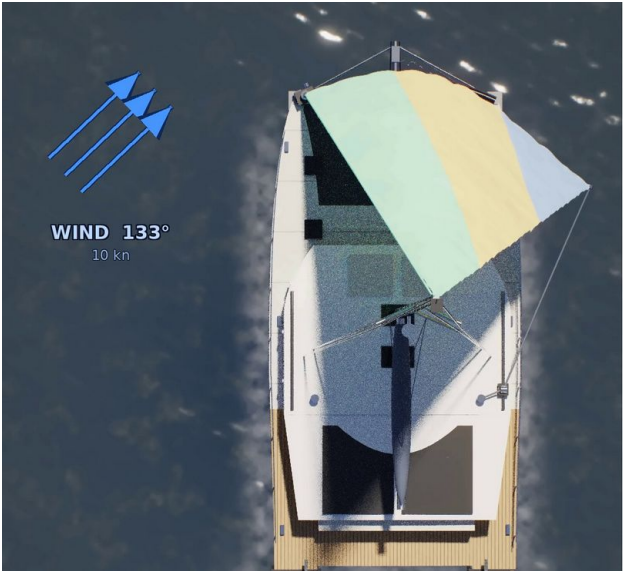
At a narrow angle the sail works as a wing: airflow along its two surfaces creates a pressure difference and lift that pulls the boat forward.

That is why a smaller, denser sail belongs here; zone C is rolled up on the forestay and stays out of the way.

Broad reach: the sail is fully unfurled

the fullest working course, between beam reach and running

Apparent wind 133°, angle of attack 62°: carriage at the end stop, all three zones unfurled — maximum area.



Broad reach • 133°



Apparent wind	133°
Angle of attack	62°
Carriage on rail	at the end stop (100%)
Zones unfurled	A + B + C (100% of area)
Zone C	fully unfurled

On the full course the whole sail area is open.

On the fuller courses the wing principle no longer applies — the boat is pushed by direct wind pressure and by redirection of the airflow.

That is why the whole area is opened. At 180° the angle of attack reaches 90°. For a solo sailor that is one command, not a sail change on the foredeck.

04

What the owner gets

Safety, comfort and simplicity

What this means for the person who uses the boat rather than designs it.

Four numbers that sum up the benefit

2–35 kn

wind range

on one and the same sail

3 → 1

sail types in one sail

jib, Genoa, Code Zero

0

trips to the foredeck

everything from the cockpit

1

person handles it all

no extra crew needed

The system is designed so that sail handling never requires leaving the cockpit.

One and the same sail works from 2 to 35 knots at any wind angle.

Three sail types are folded into one sail, there are zero trips to the foredeck and one person manages everything.

Why it is easy to live with

- Everything from the cockpit — panel and/or phone app
- Connects to autopilot, wind and load sensors
- The sail adapts to the wind gradually, not in jumps
- The rail also helps rig a large downwind sail solo
- Works as an addition or as a stand-alone system

Control is a physical panel in the cockpit, an app on a phone or tablet, or both.

If the boat has an autopilot and sensors, the system can be linked to them and sail trim becomes semi- or fully automatic. The rail ends and the carriage carry eye straps for a separate downwind sail.

How it differs from familiar equipment

	Usual arrangement	This system
Sail change	Physical change on deck	Furling from the cockpit
Number of sails	2-4 separate sails	1 modular sail
Wind strength	A different sail or a partial furl	Furl down to the denser zones
Sail tack	Fixed on the centreline	Movable along a rail
Crew	Wanted or required	One person

The tack is the forward lower corner of the sail. Comparison based on the prior art described in the patent application.

All five differences come from two things: a movable tack running on a curved rail and three zones of different cloth in one sail.

Conventional equipment solves each of them separately, with a separate sail or a separate device.

The one missing piece for full automation

The helm and the sheets are already automated — the choice of sail is not

Already automated

- Course — the autopilot
- Sheet trimming and tacking — powered winches
- Headsail — self-tacking, in a narrow range
- Heel limiting from gust sensors

Never automated until now

- Which foresail is set
- How much sail area for the wind strength
- Where the tack sits for the wind angle

Sail-trim automation and autopilots have been available for years, but neither of them decides which sail is set or how much of it.

This system automates exactly that. Together with an autopilot and trim automation, all three sail-handling actions become automatic: course, sheet load and sail area. Full sail-handling automation has been a long-standing goal in the industry; this was the piece that was missing.

Thank you

Questions and demonstration

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The system can be adapted to a specific hull — write to discuss sizes and integration.

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