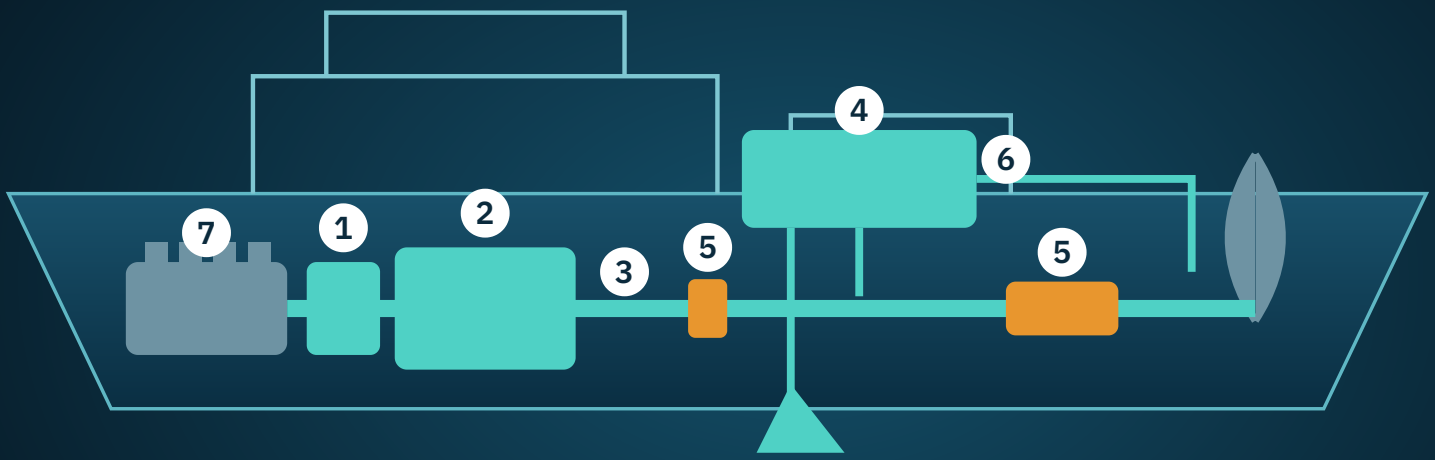
DRAFT 2026-11-18



1 Clutch
2 Reversing gear
3 Gearbox sensors
4 Hydraulics
5 Shaft life
6 Power unit
7 Engine coolers

ANNEXE

CARI-Navi everything it does

The full capability list in plain words: what each area takes in and what it gives you, with app pictures alongside the capability tables.

Tested on our own simulated vessels, built to industry practice.

CARIMO Technologies, Mumbai

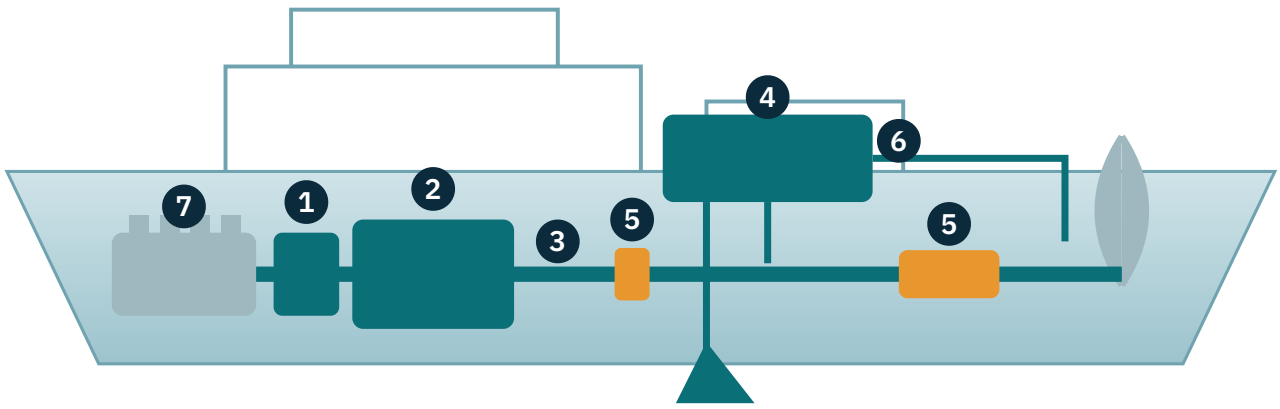
HOW TO READ THIS ANNEXE

Twelve screens. One propulsion train.

The input tables come first; each capability page that follows shows an area's table with its app screen below it.

Set-up · Data in · Baseline · Clutch · Reversing · Gearbox sensors · Hydraulics · Power unit · Engine coolers · Shaft life · Findings · Report

STAGE	WHAT IT IS	WHERE
Inputs and outputs at a glance		
Goes in	Your own files and forms: clutch and reversing-gear logs, the gear monitoring logs, gearbox sensor log, servo, fin stabiliser and propeller pitch logs, the power unit minute and load-cycle logs, cooler logs, the shaft line and coupling survey, and the stern-tube survey form.	Your logger exports and surveys
Comes out	A card for each judged day and machine; one list per vessel and date, named faults first; bands of years left; a printed report with a page for each machine.	Screens and printed report
Always	Plain words on every screen. Tested on our own simulated vessels, built to industry practice.	Every screen



1 Clutch · 2 Reversing gear · 3 Gearbox sensors · 4 Hydraulics · 5 Shaft life · 6 Power unit · 7 Engine coolers

WHAT GOES IN, WHAT COMES OUT

Every machine takes your own files.

The file or form each screen takes, how often the readings are taken, the columns, and what comes out.

WHAT IS CHECKED	FILE	RATE	COLUMNS	COMES OUT
Clutch	CSV engagement log	About 50 readings a second	day, eng, t_s, cmd, pressure_bar, engine_rad_s, shaft_rad_s, shaft_torque_n_m	A card for each judged day
Reversing gear	CSV of both packs, two gear ratios	About 50 readings a second	day, eng, pack, t_s, cmd, pressure_bar, engine_rad_s, output_rad_s	The pack and the fault, for each judged day
Gearbox sensors	CSV of slow readings, a range for each channel	About 1 reading a second	t_s and any of oil_temp_c, oil_pressure_bar, bearing_in_c, bearing_out_c	A verdict for each channel, with the time
Hydraulics, servo	CSV of repeated test moves	A reading every 10 ms for the 2.6 s move	move, t_s, setpoint_mm, position_signal_v, oil_temperature_c, coil_current_ma, supply_pressure_bar, pressure_a_bar, pressure_b_bar, motor_electrical_power_kw	The fault named, for the moves loaded
Hydraulics, propeller pitch	CSV, one pitch test	A reading every 0.01 s for 12 s	14 columns: set point, position, pressures in bar, pump power in kW, oil temperature in degrees C	The fault named: side lands, centre land or pump
Hydraulics, fin stabiliser	CSV with a healthy baseline record and a later record	A reading every 0.05 s for 60 s	record, t_s and the 13 fin channels (positions, currents, pressures, pump and motor power, oil temperature)	The fault named: internal leak, silted valve, weak supply or hot oil

WHAT GOES IN, WHAT COMES OUT

The engine room and the shaft.

WHAT IS CHECKED	FILE	RATE	COLUMNS	COMES OUT
Reversing gear, monitoring log	Engagement log and running log	One row per engagement; running log by day and pack	day, hour, pack, engage time, slip energy, control-oil pressure; day, pack, engine load, slip, control-oil pressure, gear oil temperature	The pack and the fault named
Power unit	Minute log and load-cycle log, pump and oil figures	One row a minute; one row per load cycle	Pressures, oil and cooling-water temperatures, filter pressure drop, pump case drain, pump loaded, stabiliser on; charge and discharge times	A bar for each of five parts, the fault named
Engine coolers	One log per cooler, type and nameplate figures, days to the planned stop	One row an hour or one a watch	Hours, engine load, temperatures in and out on both sides; cleaned, dose_changed	Enough at the planned stop, may fall short, or falls short
Shaft life, stern tube	Survey form	One wear-down reading per survey	Date new, as-new clearance, shaft diameter, wear-down (mm) per survey date, optional limit	Years left as a range and a best guess
Flexible coupling	Shaft line (masses, stiffnesses), coupling catalogue stiffness and its place in the list, and a survey CSV	One reading per survey	survey_date, mode, frequency_hz	Softened or stiffer; years left as a range
Findings and report	The results above, with the vessel's name and the date	Per vessel and date	(from the screens)	One list; a printed report, a page per machine

WHAT GOES IN

Your logger exports, the survey sheet, and the vessel's name and date.

WHAT COMES OUT

Findings per vessel and a printed report.

SET-UP, DATA AND BASELINE

Your ship, your readings, your normal.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Set-up, data and baseline		
Drive-line set-up	Pick clutch or reversing gear, the propeller type, power unit. The line diagram follows.	Drive-line choices
Readings table	What each reading lets a screen say; present, needed or optional.	Logger channel list
What could run	Names the screens that can run from the readings supplied.	Logger channel list
Own normal	The file screens take the vessel's own healthy days, or healthy hours, from the start of your file.	First days or hours of the file
Plain answers	Every screen says in plain words what it needs from your file.	Your file

Vessel set-up

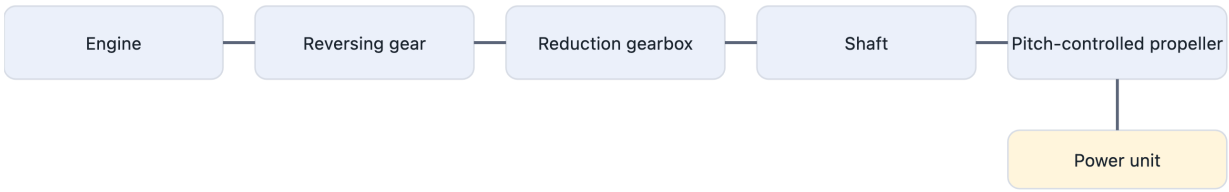
Pick the parts of a drive line. The line diagram follows. Twin-shaft ships are described one shaft line at a time.

Choose the drive line

Gear between engine and gearbox: Reversing gear (ahead and astern) ⌄ Propeller: Pitch-controlled ⌄

☑ Power unit (hydraulic)

Your drive line

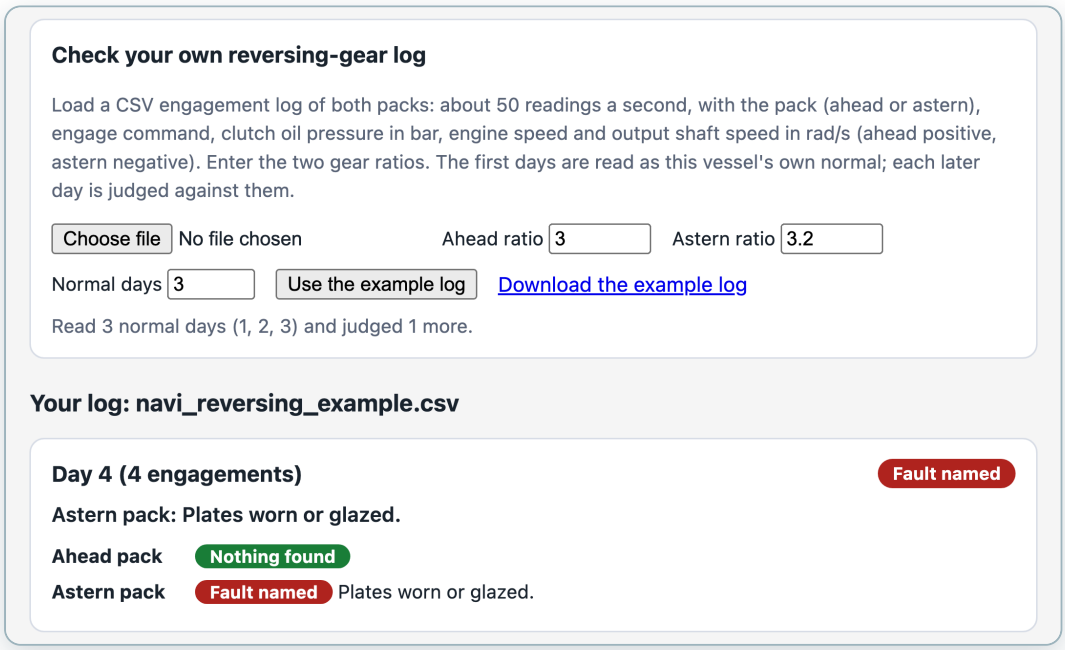


Every size in this example carries a tag: here SIMULATED. Sizes from a vessel's own documents would carry their own tag.

CLUTCH AND REVERSING GEAR

Which clutch, which fault.

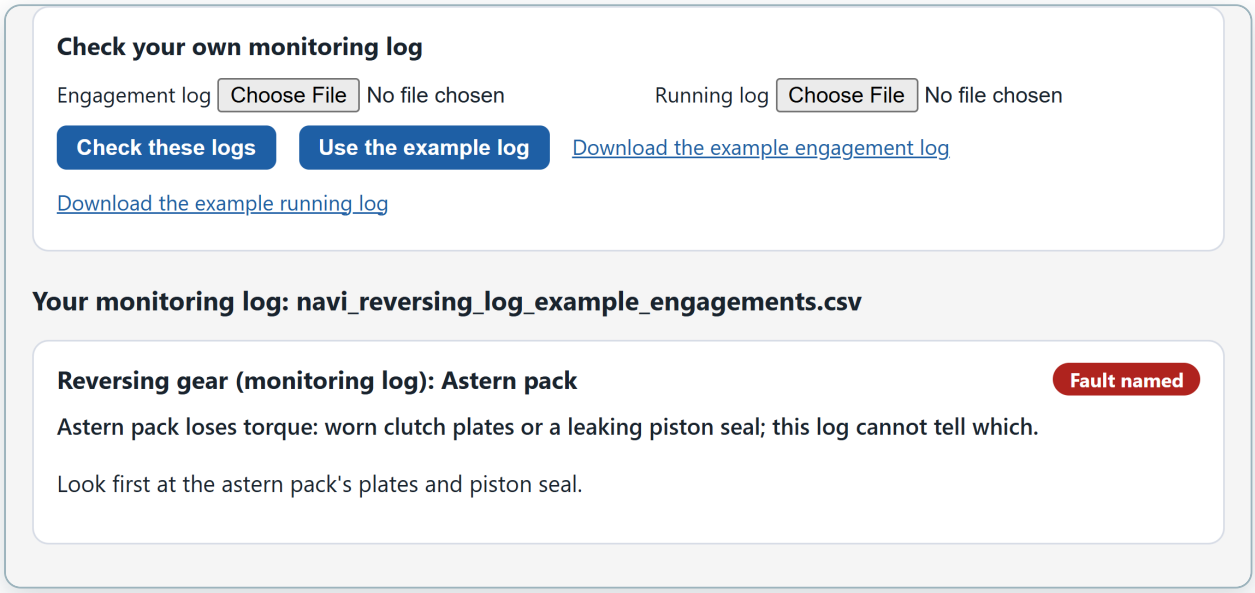
CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Clutch and reversing gear		
Your own clutch log	Pick a CSV engagement log: each later day is judged against the vessel's own normal days. A card per day.	CSV, about 50 readings a second: day, eng, t_s, cmd, pressure_bar, engine_rad_s, shaft_rad_s, shaft_torque_n_m
Worn plates	Worn or glazed plates told apart from low oil pressure and a heavier propeller.	Speeds, clutch pressure, torque meter
Low oil pressure	Clutch oil pressure low against the vessel's own normal.	Clutch oil pressure
Slow fill	Clutch fills slowly: look at the valve and orifice.	Clutch pressure, engage command
Drag and release	Drag when released, or the shaft stays with the engine.	Engine and shaft speed
Six bars	Grip, oil pressure, fill time, creep in neutral and slip after release, each labelled with its fault direction, plus propeller load for information.	Every engagement
Ahead and astern packs	Your own log of both packs: each read on its own; the pack and the fault named together. A fouled propeller is named as what it is.	CSV, about 50 readings a second: day, eng, pack, t_s, cmd, pressure_bar, engine_rad_s, output_rad_s; two gear ratios



REVERSING GEAR, MONITORING LOG

The pack and the fault, without a torque meter.

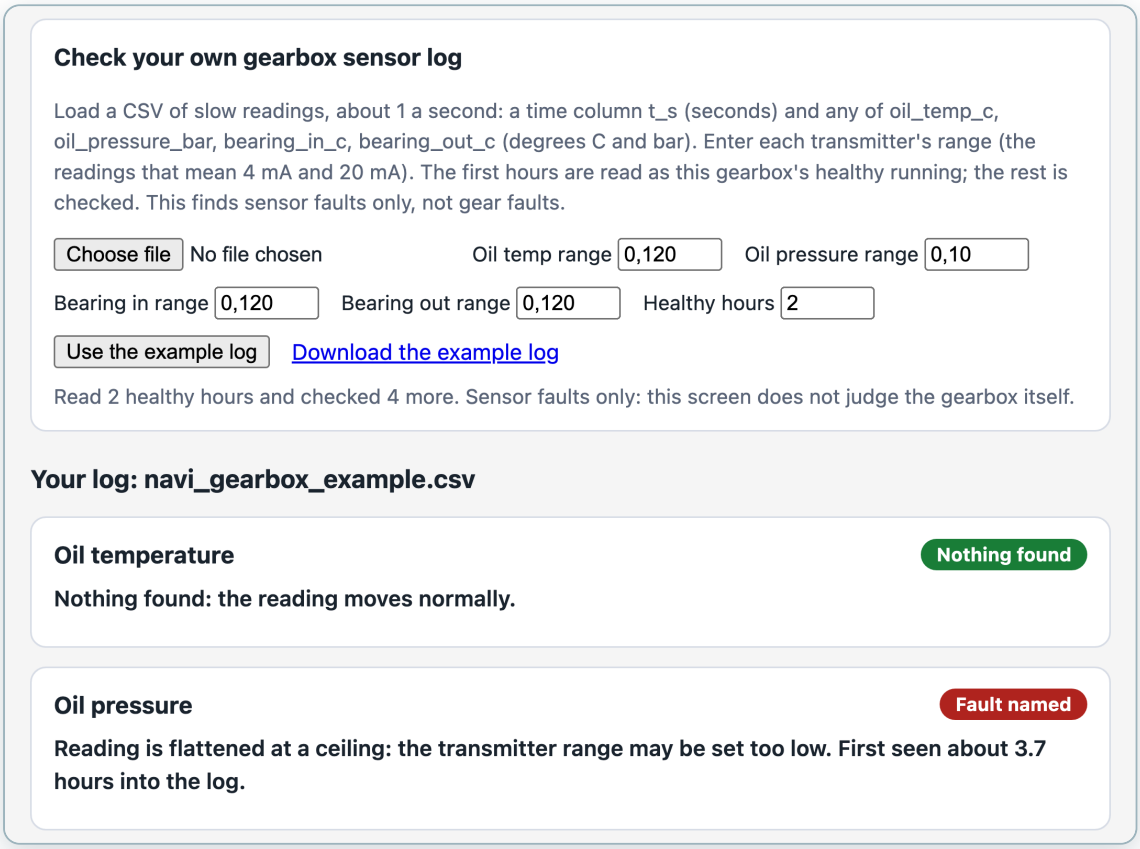
CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Reversing gear, monitoring log		
Monitoring log	From the alarm and monitoring system: control-oil pump worn, a pack engaging late, losing torque or failing to engage, with that pack named; a worn control-oil pump is named for both packs. No torque meter needed.	Engagement log (day, hour, pack, engage time, slip energy, control-oil pressure) and running log (day, pack, engine load, slip, control-oil pressure, gear oil temperature)



GEARBOX SENSORS

A sensor problem named as a sensor problem.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Gearbox sensors		
Your own sensor log	Pick a CSV of slow readings; the first healthy hours set the normal; each channel is judged on its own.	CSV, about 1 reading a second: t_s and any of oil_temp_c, oil_pressure_bar, bearing_in_c, bearing_out_c
Transmitter ranges	You give the range of each transmitter; nothing is guessed.	Range of each channel
Stuck or flattened reading	The value has stopped changing, or is held at a ceiling: check the sensor, its cable and its range.	Same readings
Failed transmitter	Failed low or high: check the transmitter and its wiring. The time it was first seen is given.	Same readings
No false blame	A reading held at a limit by the process is left alone; a sensor problem is named as a sensor problem.	Same readings



HYDRAULICS

Servo and propeller pitch.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Hydraulics		
Servo test moves	Pick a CSV of repeated test moves: weak pump, cylinder friction, worn valve lands, changed hold current.	CSV, a reading every 10 ms for the 2.6 s move: move, t_s, setpoint_mm, position_signal_v, oil_temperature_c, coil_current_ma, supply_pressure_bar, pressure_a_bar, pressure_b_bar, motor_electrical_power_kw
Propeller pitch log	Pick one pitch test log, 12 s, a reading every 0.01 s: worn oil-box side lands, a worn centre land or a weak pump, named.	CSV, 14 columns (set point, position, pressures in bar, pump power in kW, oil temperature in degrees C)

Check your own servo test-move log

Servo only. Load a CSV of repeated test moves, a reading every 10 ms for the 2.6 s move (set point steps at 0.2 s and 1.0 s): move, t_s, setpoint_mm, position_signal_v, oil_temperature_c, coil_current_ma, supply_pressure_bar, pressure_a_bar, pressure_b_bar, motor_electrical_power_kw (bar and degrees C). The first moves are read as this machine's own healthy moves; at least 8 are needed, then at least 3 test moves.

Choose file No file chosen Healthy moves 20 Use the example log

Download the example log

Your log: navi_servo_example.csv

Servo test moves — Change found

Weak pump: the supply pressure sags in a move and the rod moves slower.

HYDRAULICS

The fin stabiliser screen.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Fin stabiliser		
Fin stabiliser log	Pick one CSV with a healthy baseline record and a later record of the same actuator: an internal leak, a silted valve, a weak supply or hot oil, named.	CSV, 60 s per record, a reading every 0.05 s: record, t_s and the 13 fin channels (positions, currents, pressures, pump and motor power, oil temperature)

Check your own fin actuator log

Fin stabiliser actuator. Load one CSV holding two records of the same actuator from the fin roll test: a healthy baseline, then a later record. Each record is 60 s with a reading every 0.05 s. Columns: record (baseline or later), t_s, position_signal_v, controller_output_v, coil_current_ma, supply_pressure_bar, pressure_a_bar, pressure_b_bar, pump_hydraulic_power_kw, pump_shaft_power_kw, motor_electrical_power_kw, oil_temperature_c, reservoir_level_mm, pressure_b_peak_bar, gyro_roll_deg (bar, kW and degrees C). The later record is read as a change against the baseline.

Choose file | No file chosen | Use the example log | Download the example log

Your log: navi_fin_example.csv

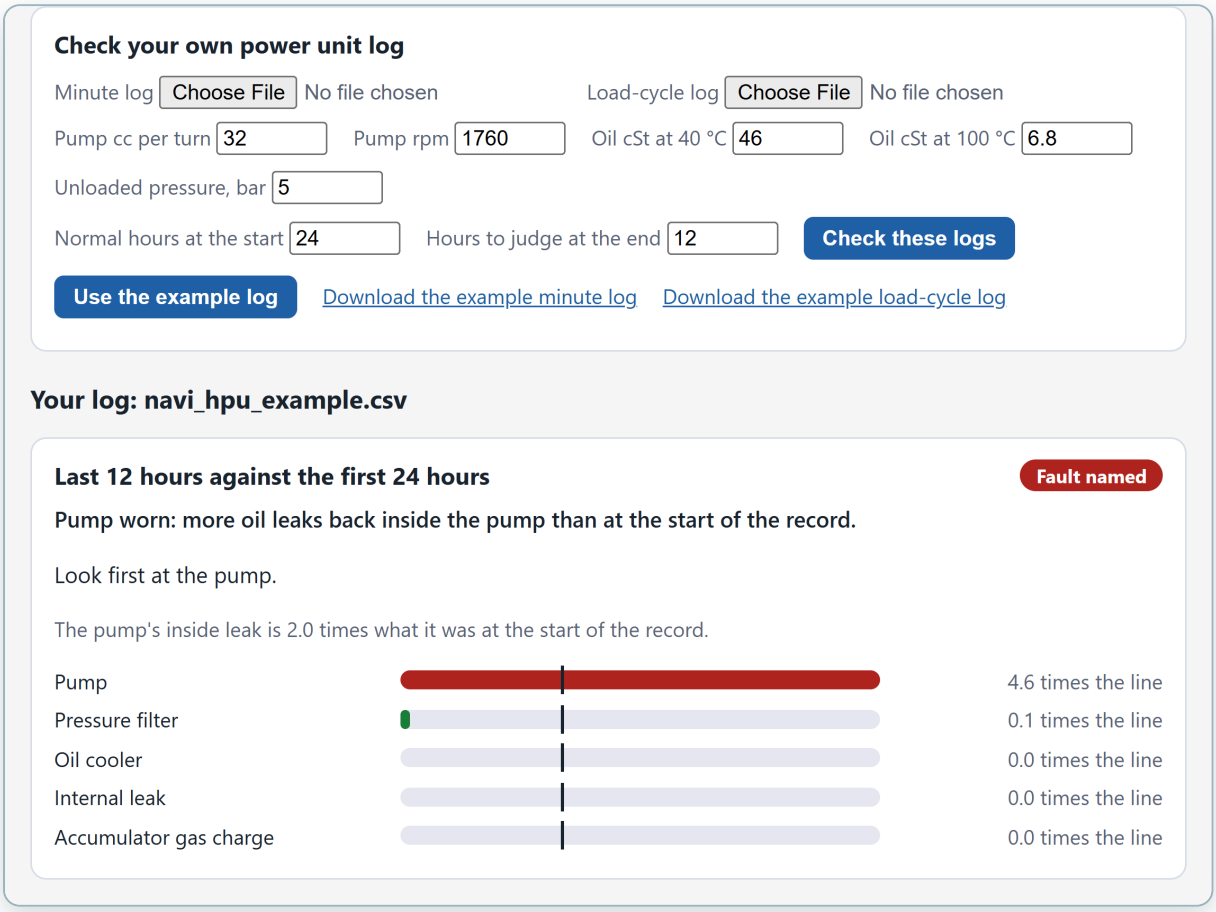
Fin actuator — Change found

Internal leak: oil is leaking past a seat or seal inside the fin actuator.

HYDRAULIC POWER UNIT

Five parts, one screen.

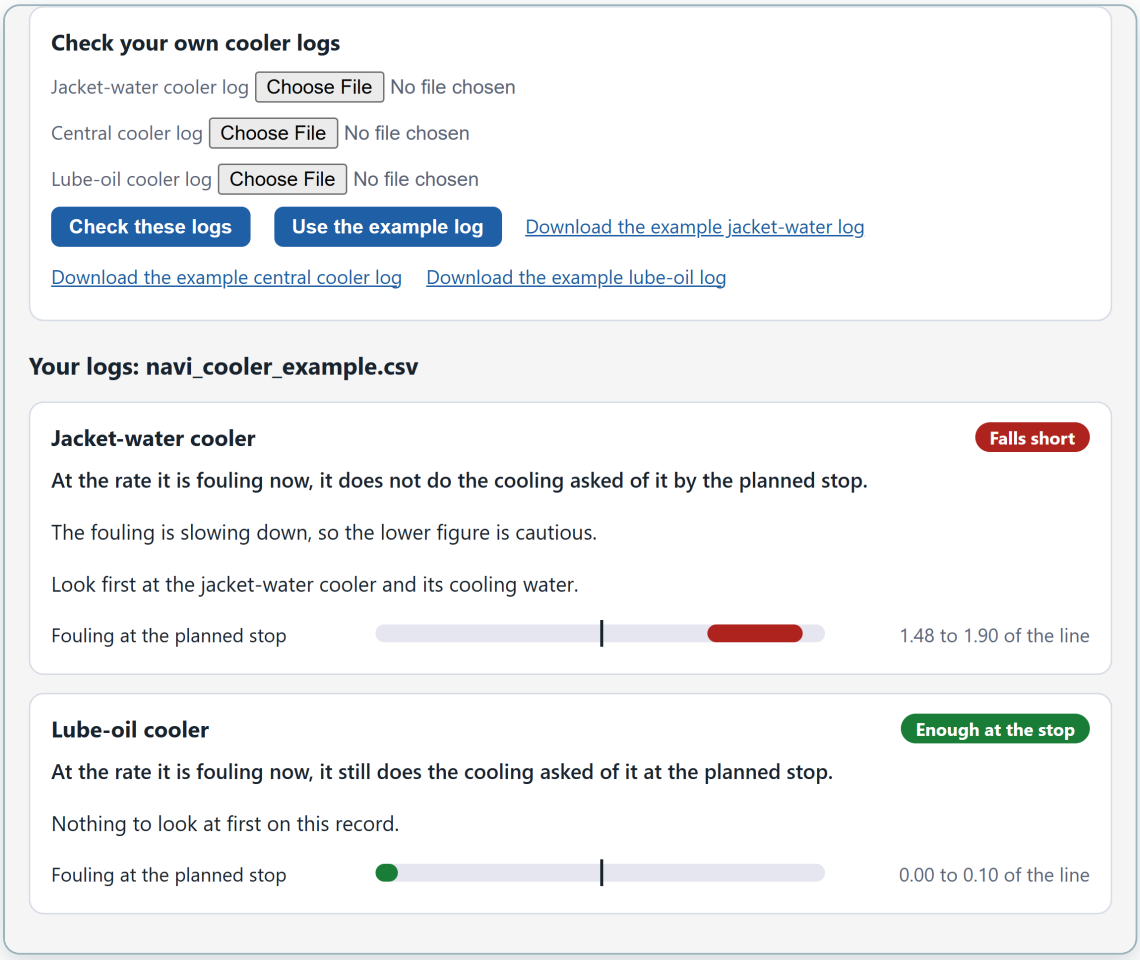
CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Hydraulic power unit		
Hydraulic power unit	Pump worn, pressure filter clogging, oil cooler fouled, internal leak, accumulator gas charge low: a bar for each, the fault named, where to look first.	Minute log (pressures, oil and cooling-water temperatures, filter pressure drop, pump case drain, pump loaded, stabiliser on), load-cycle log, pump and oil figures



ENGINE COOLERS

Each cooler at the planned stop.

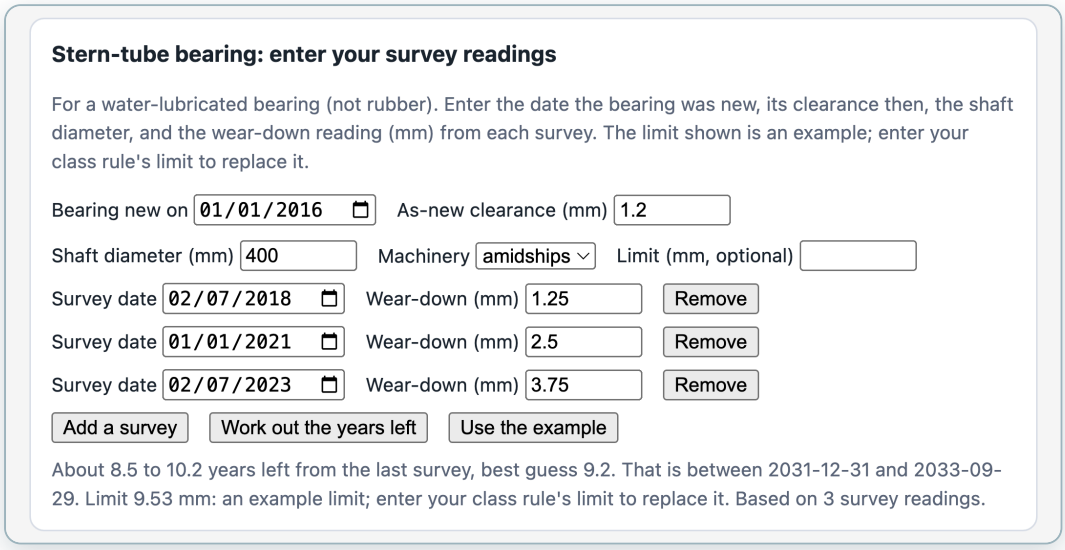
CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Engine coolers		
Three coolers	Jacket-water, central (seawater) and lube-oil cooler, each read against its own first days.	One log per cooler, one row an hour or one a watch
At the planned stop	Enough at the stop, may fall short, or falls short: the fouling carried forward to the planned stop, against the most the cooler can carry.	Days to the planned stop; the cooler's type and nameplate figures
Cleaning and dosing	A cleaning marked in the log restarts the reading; a change of water-treatment dose is read for its effect on fouling.	"cleaned" and "dose_changed" columns



SHAFT LIFE

Years left on the stern-tube bearing.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Stern-tube bearing		
Stern-tube survey form	Years left as a range and a best guess, to your class-rule clearance. More surveys narrow the range.	Date new, as-new clearance, shaft diameter, one wear-down reading (mm) per survey date; your limit, if any



FLEXIBLE COUPLING

Load the coupling surveys.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Flexible coupling		
Flexible coupling survey	Softened or stiffer since its first survey; years until the edge of the maker's stiffness band, as a range.	Shaft line (masses, stiffnesses), coupling catalogue stiffness and its place in the list, CSV of survey_date, mode, frequency_hz

Flexible coupling

Flexible coupling: needs your twisting-vibration survey readings. Shows whether the coupling has softened since its first survey.

Your shaft line, from the engine end to the propeller: masses and stiffnesses, separated by commas.

Masses (kg m2) 1200, 600, 300, 4000 Shaft stiffnesses (N m/rad) 50000000, 1, 20000000

Coupling stiffness (N m/rad) 250000 Which stiffness is the coupling (its place in the list) 1

Choose File No file chosen Use the example survey Download the example survey

Read 13 surveys from navi_coupling_example.csv.

Flexible coupling Fault named

Softened since its first survey.

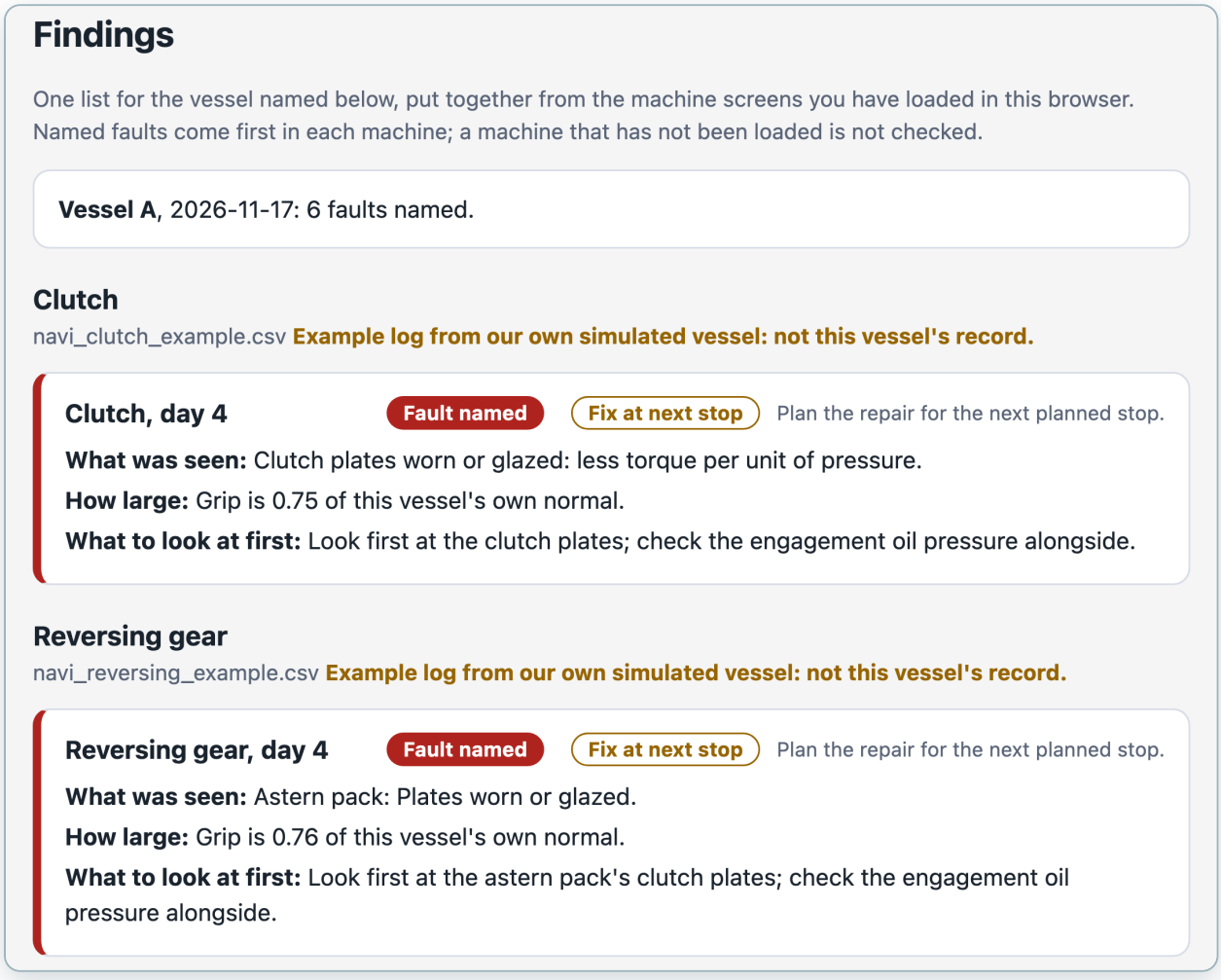
Stiffness is now 89 % of the first survey, from 13 surveys. Years until it reaches the edge of the maker's band: 1.5 to 3.2.

FINDINGS AND REPORT

One list per vessel. One page per machine.

Name the vessel and the date: the results of the machine screens come together in one list, and print as a report.

CAPABILITY	WHAT IT GIVES YOU	WHAT IT TAKES IN
Findings and report		
Findings per vessel	One list for the vessel and date you name: a block for each machine, named faults first, what was seen, how large, what to look at first. Every machine you loaded has its own block.	The results of the machine screens
Printed report	One page per machine, headed with the vessel and date. Printed from the browser.	The same results



WHAT GOES IN

The results of the clutch, reversing gear (fast log or monitoring logs), gearbox sensor, servo, fin, propeller pitch, power unit, engine cooler, coupling and stern-tube screens; the vessel's name and the date.

WHAT COMES OUT

A list with a block for each machine, named faults first. A report with a page for each machine.