



Inline Oil Condition Monitoring
Oil Treatment | Fleet Intelligence

Know Earlier
Decide Better



2026

Driving a new era of proactive and empowered asset monitoring.

Industrial assets have been monitored the same way for decades — shore labs, weeks of waiting, decisions made long after the moment has passed. SENSYN was built to end that.

Industrial assets — vessels, generators, engines, production plant — carry oil systems that govern their entire operating life. The health of that oil determines whether a Main Engine runs for another 10,000 hours or fails mid-ocean.

For decades, the only answer has been the shore lab. A sample, bottled by hand, shipped to a facility, analysed, and reported back in days or weeks. By then, the asset has continued operating and the damage has continued accumulating.

SENSYN was founded on a different premise: the data should come to you, not the other way around. Inline. Continuous. Unadulterated. From sensor to screen with nothing in between.

We design and deploy precision oil condition monitoring hardware, continuous purification systems, and fleet-level intelligence software — purpose-built to work together as a single integrated stack.

“For the first time, an engineering decision about oil can be made without a human in the data chain — from sensor to screen to recommendation, the data is unadulterated.”

ABS CLASSED

LOTUS product line certified for real-time condition monitoring

ONSHORE & OFFSHORE

Active deployments across maritime vessels and industrial plants

MULTI-INDUSTRY

Maritime · Industrial
Manufacturing · Wind
Energy

Proactive. Empowered. Always on.

One integrated system. Every oil stream. Every asset.

Three capability pillars — hardware sensing, oil treatment, and fleet intelligence — engineered to work independently or as a complete monitoring stack.

SENSING SYSTEMS

- Monitoring with inline sensors & portable systems
- Crankcase oil, hydraulic/servo oil, and scrape down oil.
- ABS: MACHINERY HEALTH MONITORING Notation.



lotus



hydra+



iris



OIL TREATMENT

- Multi-stage bypass purification system.
- Treats and returns 100% of processed oil with zero discharge
- Achieving ISO 16/14/11 cleanliness
- ROI : 1 to 1.2-year payback.

orchid



OIL ANALYTICS

- Unifies all sensor streams into one dashboard.
- Trends parameters over time, correlates across assets
- Oil Consultation tool to advise oil management
- Data management of complete LO quality reports
- Models oil economics

ASTER



LOTUS BEACON

OIL CONTAMINATION

Water · Soot
Fuel Dilution · Metallic
Impurities

OIL DEGRADATION

BN Depletion · Oxidation
Trends
Viscosity Shifts

MACHINERY WEAR

Wear Debris
Early Component Stress
Indicators



Compact & Robust

Inline — Zero
Disruption

Configurable Alarms

Modbus RS485
Daisy-Chain

9 Parameters — Continuous Monitoring

Viscosity Degradation & fuel dilution	Density Contamination & fuel leakage	Water Activity Free/emulsified water presence
Moisture Content Dissolved water levels (ppm)	Total Base Number (TBN) Acid neutralisation capacity	Temperature Overheating & film breakdown
Wear Debris (Fe) Iron debris from gear or valve actuations	Wear Debris (Non-Fe) Indicator of bearing metal wear	Dielectric Constant Oxidation & additive depletion



Junction Box with display

- Live display
- Data trend
- Compatible with 4 LOTUS sensors

From measurement to decision without a human in between.

LOTUS BEACON measures. ASTER PRO diagnoses, forecasts, and acts.

INSIGHTS THAT WERE NOT POSSIBLE BEFORE

Multi-parameter correlation · BN decay rate & EOL projection · Oil strategy recommendation · Cross-engine benchmarking · Unadulterated sensor-to-screen data chain



Multi Engine Monitoring



Remaining Usable Life Estimator

TBN

Total Base Number Trendline



Fleet wide monitoring

MACHINERY HEALTH MONITORING

The LOTUS BEACON product line carries ABS Product Design Approval — independently validated for real-time inline oil condition monitoring.

ASTER MODULES

Ships generate lube oil data continuously — through lab reports, onboard test kits, and inline sensors. ASTER is the platform that unifies all of it, turns it into a fleet-wide intelligence layer, and gives shore management visibility they have never had before.

ASTER
LENS

AVAILABLE NOW

Unified lube oil data from every existing source – no hardware required to start

- Ingests lab analysis PDF automatically
- Offline capable onboard entry tool for CE to log test kit results
- Single vessel timeline
- Detects data gaps, missed entries, kit results accuracy versus lab
- Works entirely on what vessel already has

Entry point to platform. Start here

ASTER
PULSE

REQUIRES INLINE SENSOR

Continuous condition monitoring from inline sensors.

- Real-time particle count & oil condition trends
- Anomaly flags against maker and class thresholds
- Trendline analysis of contamination events
- Feeds directly into LENS timeline

For vessels witted with sensors

ASTER
GUARD

INCLUDED

Fleet wide oil health visibility for shore teams – one screen all vessels.

- Fleet health dashboard – all at a glance
- Critical vessels surface immediately
- Vendor benchmarking – lab provider, shore kit provider, lubricant performance
- Exportable LO health records for SIRE2.0, class & PSC audit readiness

Included with any active ASTER module

ASTER
INTEL

PROACTIVE INTELLIGENCE

Predictive oil intelligence built on fleet data

- Forecasting failure signatures identified from multi-source data
- Consultation tool to optimize equipment performance and LO budget
- Pattern recognition across fleet-wide equipment and LO performance.

For vessels witted with sensors

LENS

Unify existing data sources

PULSE

Add continuous inline signal

GUARD

Shore management visibility layer

INTEL

Predictive analysis

Each module works independently. Together they form a complete oil intelligence platform.

HYDRA+

OIL CLEANLINESS

ISO 4406 particle count ·
Soot · Metallic Impurities

OIL CONTAMINATION

Water · Soot
Fuel Dilution ·

OIL DEGRADATION

BN Depletion · Oxidation
Trends
Viscosity Shifts

THE BLIND SPOT

Main Engine hydraulic systems on ME-C/ME-B electronic engines control the critical FIVA/ELVA valve group. Yet these systems are monitored only via shore lab samples every 3–6 months — with results taking 15–21 days to return.

The only onboard alert is a differential pressure alarm — which fires when the damage has already begun.



Robus for Cylinder head platform

Easy maintenance

Inline — Zero Vessel Downtime

2-Axis Vibration Dampened

8 Parameters — Continuous Monitoring

Particle Count - ISO 4406

Metal & Non metal debris contamination in oil.

NAS & ISO standard outputs

Viscosity

Degradation & fuel dilution

Density

Contamination & fuel leakage

Moisture Content

Dissolved water levels (ppm)

Water Activity

Free/emulsified water presence

Total Base Number (TBN)

Acid neutralisation capacity

Temperature

Overheating & film breakdown

Dielectric Constant

Oxidation & additive depletion



Junction Box with display

- Live display
- Data trend
- Compatible with 4 LOTUS sensors

Know Before It Breaks.

ASTER PRO converts HYDRA+ sensor readings into real-time, revenue-protecting decisions — onboard and onshore.

1 HOUR

detection vs. 90–180 days with shore labs · The only system that forecasts filter degradation weeks in advance.

ONBOARD — CHIEF ENGINEER

Live ECR Dashboard

All 9 parameters across the ME hydraulic system, displayed in real time — no need to physically check the sensor.

Filter Efficiency Trending

Upstream vs. downstream comparison across the super fine filter — cleaning efficiency tracked continuously.

Weeks-Ahead Forecast

ASTER projects filter degradation trajectory before failure occurs — plan intervention on your schedule.

Configurable Alarms

Warning / Alarm / Critical thresholds per parameter — escalation to SMS and email via SENTINEL.

EXCLUSIVELY POSSIBLE

Beta Ratio Monitoring

Only system tracking super fine filter cleaning efficiency in real time — invisible without upstream + downstream sensors.

Weeks-Ahead Degradation

Filter degradation is forecast weeks before the differential pressure alarm would fire — a capability unique to SENSYN.

9-Parameter Correlation

FIVA risk assessed from multi-stream data: particle count, TBN, water, wear debris — no single sensor gives this picture.

Dual Sensor Architecture

Installed upstream AND downstream of the super fine filter simultaneously — a first-of-kind configuration.

ONSHORE — SENTINEL TEAM

Daily Monitoring

SENTINEL shore team reviews all vessel data daily — Technical Superintendent informed without lifting a finger.

Immediate Alerts

Critical parameter breach triggers SMS and email to the Technical Superintendent — response in minutes, not weeks.

Weekly Intelligence Reports

Trend analysis, predictive maintenance recommendations, and condition summaries delivered to the management team.

Full Audit Trail

Complete timestamped record of all oil parameters — supports class surveys, CDI/OCIMF vetting, and insurance.

REVENUE PROTECTION

One prevented FIVA failure pays for the full year of HYDRA+ monitoring. \$10K-\$50K / day off-hire exposure eliminated. 15-30 min / week crew commitment — SENTINEL handles the rest.

IRIS

LAB TEST ONBOARD

Ferrous wear particle testing for Main Engine scrape down oil — results in 1 second, onboard, with zero lab dependency.



THE LAB BOTTLENECK

Scrape down sampling is Class-required — it is already happening onboard.

But the bottleneck is the lab: samples are bottled and sent ashore, results take days to weeks, and by the time abnormal wear is flagged, the damage is already accumulating.

Feed rate decisions are made on guesswork between lab reports. IRIS closes that gap instantly.

1 SECOND

RESULT TIME

vs. days or weeks with shore labs — the answer is ready before you leave the engine room

2 mL

SAMPLE NEEDED

taken from existing scrape down collection points — no prep, no equipment change

Iron (Fe) Concentration — Wear Severity Scale

NORMAL	RUN-IN	ALARM
≤ 220 ppm	220–500 ppm	≥ 1,080 ppm
<i>Liner in good condition; normal wear rate</i>	<i>New liner run-in period; elevated but expected</i>	<i>Abnormal wear; immediate investigation</i>

Full measurement range: 0 – 5,500 ppm · Minimum detection: 1 ppm · Standard: ASTM D8120

1 ppm Detection Limit

Sensitive enough to catch early-stage wear before levels reach the alarm threshold

4-Point Calibration

220 / 500 / 1,080 ppm reference points — lab-grade accuracy across the full Fe range

ASTM D8120 Standard

The same method certified shore labs use — now available inline, onboard, in 1 second

Data Logger per Liner

Results stored per cylinder — compare all liners, spot the weakest link instantly

The only portable field device for scrape down oil that meets ASTM D8120 — lab-grade accuracy at field speed, no lab required.

Stores 10,000+ test results per liner — trend over months, not just snapshots.

2.7 kg
Field Portable

5+ Hour
Battery Life

0-5,500 ppm
Full Range

ISO 9001 · CE
RoHS · UL/CSA

Know Before the Liner Goes.

ASTER PRO layers intelligence onto IRIS readings — tracking Fe trends per cylinder, detecting wear patterns, and alerting the SENTINEL team before damage escalates.

DAILY

Fe readings vs. lab intervals of 1–4 weeks · Liner wear trends visible in days, not months · CLO optimisation from data, not guesswork.

ONBOARD — CHIEF ENGINEER	EXCLUSIVELY POSSIBLE	SENTINEL — ONSHORE TEAM
Per-Liner Fe Tracking ASTER logs every IRIS result per cylinder — all liners compared side by side on the ECR dashboard.	Cross-Cylinder Comparison Identify the single worst-performing liner in the engine — target maintenance precisely, not fleet-wide.	Daily Fleet Fe Review SENTINEL monitors Fe readings across the full fleet daily — Technical Superintendent informed without lifting a finger.
Run-In Period Monitoring 500 ppm run-in threshold tracked per liner; ASTER flags early deviation before it becomes a problem.	Cold Corrosion Detection Elevated Fe at low engine loads flagged as cold corrosion pattern — separated from mechanical ring wear.	Abnormal Wear Alerts Critical Fe threshold breach triggers immediate SMS and email to the Technical Superintendent.
Lubrication Optimisation Align CLO feed rate to actual Fe response — detect over-lubrication waste and under-lubrication wear risk.	CLO Response Correlation ASTER links feed rate changes directly to Fe trend response — closes the optimisation loop with data.	CLO Recommendations Shore-side analysis translates Fe trends into specific cylinder oil feed rate adjustment guidance.
Historical Wear Trending Months of Fe readings per liner — spot gradual wear accumulation before it reaches failure threshold.	ASTM-Aligned Trend Bands Normal / Run-in / Alarm thresholds overlaid on trending charts — clear visual for any crew member.	Full Cylinder Audit Trail Timestamped Fe record per liner — supports class surveys, insurance claims, and PMS integration.

REVENUE PROTECTION

One prevented liner overhaul recovers multiples of the full IRIS monitoring investment. One CLO optimisation pays for the first year.

ORCHID

AUX ENGINE OIL TREATMENT SYSTEM

Continuous bypass oil treatment — treats and returns 100% of processed oil. Zero discharge. Zero waste.

Oil Resolution through Continuous Hygienic Inline Decontamination

THE AE OIL DILEMMA

Every 4-stroke auxiliary engine is silently losing oil through a process no one challenges: the centrifugal purifier. Every discharge cycle throws away good oil along with the contaminants — 600 litres per engine, every year.

Contamination sources: Fuel dilution · Soot buildup · Water ingress · Wear particles

1,800 L

OIL LOST ANNUALLY

per vessel via purifier discharge — 3 aux engines × 600 L per engine per year

8-12 HRS

PER ENGINE / MONTH

in purifier bowl cleaning — returned to the engine room with ORCHID

Plus: 5–15 L discharged as slops waste per purifier cycle, every cycle.

**ISO 16/14/11
Achieved**

**Continuous
24/7 Bypass**

**150-200 L/hr
Flow Rate**

**Reusable
SS Filters**



3-Stage Continuous Bypass Treatment

STAGE 01 — MULTI-STAGE FILTRATION

80 µm → 20 µm → 5 µm cascade filtration

Removes soot, carbon, and metallic wear debris. Reusable stainless-steel filters — no disposable cartridge costs. Achieves ISO 16/14/11 — better than most centrifugal purifiers.

STAGE 02 — VACUUM DEHYDRATION

Free + Emulsified + Dissolved water removed

Reduces moisture to < 50 ppm (0.05% aw) — beyond the reach of centrifugal purifiers. Dual pump redundancy for uninterrupted continuous operation.

STAGE 03 — THERMAL CONDITIONING

18 kW thermostatic electric heater

Optimises oil temperature for peak treatment efficiency. Extends oil service life and preserves additive performance.

★ 100% of processed oil treated and returned — zero discharge losses, zero waste.

Stop Losing Oil to Your Purifier.

Centrifugal purifiers perform one job — and waste 600 litres of lube oil per engine doing it. ORCHID outperforms across all 7 operational factors that drive cost.

1,800 L

of lube oil reclaimed per vessel per year · 1.2-year investment payback on an MR tanker · 8–12 crew-hours per month returned to the engine room.

Factor	Centrifugal Purifier	ORCHID System
Oil Losses	600 L / engine / year	Zero — 0 L / year
Water Removal	Free water only	Free + Emulsified + Dissolved
Particle Removal	> 10–15 µm	> 5 µm (ISO 16/14/11)
Discharge Waste	5–15 L per cycle	Zero discharge
Crew Intervention	8–12 hrs / month bowl clean	Annual filter inspection only
Operating Mode	Batch / Intermittent	Continuous 24/7 bypass
Footprint	Large (purifier + heater + separator)	Compact 1.2m × 0.8m × 1.5m

Flow Rate
150-200 L/hr

Filtration
80→20→5 µm

Moisture
< 50 ppm

Temp Range
0 - 85 °C

SUPPORTED OIL TYPES
Hydraulic Oil · Gear Oil · System Oil · Lube Oil

1.2 YEARS

INVESTMENT PAYBACK

MR tanker · 3 aux engines · lube oil at market rate

Footprint: 1.2m × 0.8m × 1.5m · Weight: ≤ 500 kg · Power: 380V / 3ph / 50Hz

3 STAGE

Filtration

Pre-Filter · Vacuum Dehydration · Fine Filter



SAVINGS BREAKDOWN

Purifier discharge losses eliminated (3 engines × 600 L/yr) · Reduced sump changeout volume · Purifier spare parts eliminated · Crew hours reclaimed — annual filter inspection only.

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