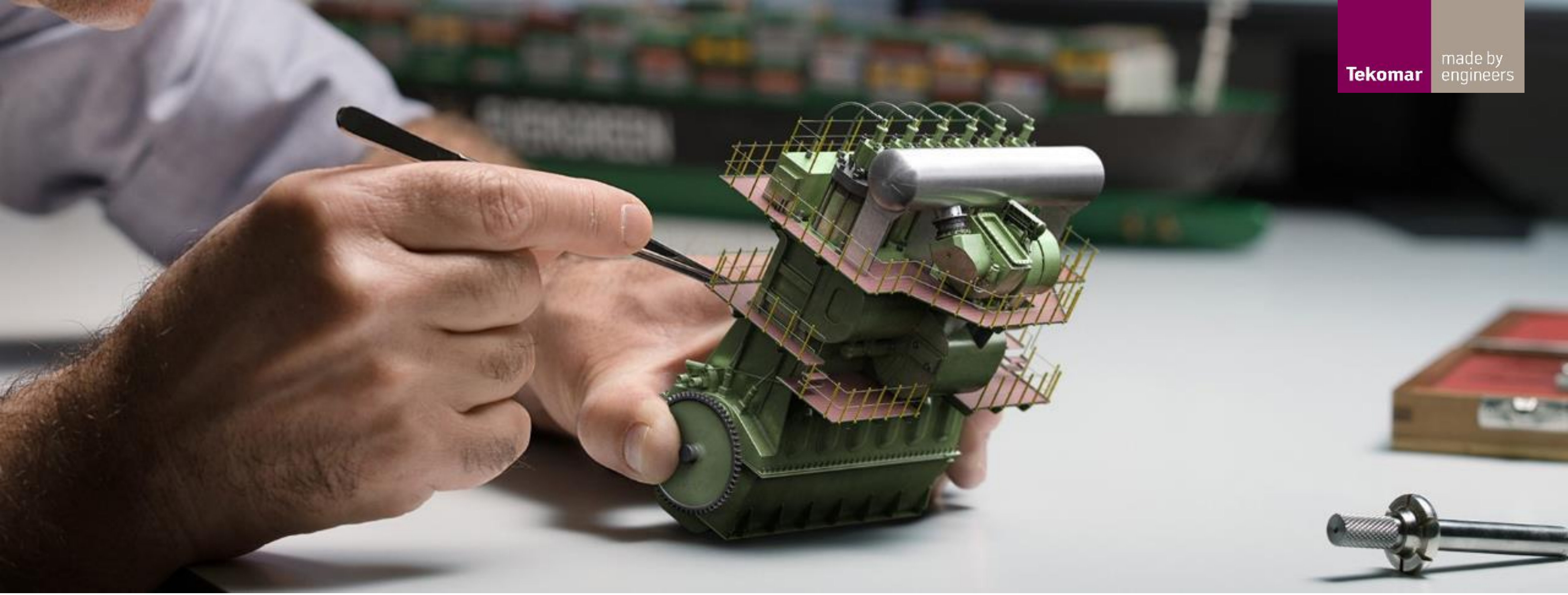

ABB TURBOCHARGING

Knowing Engine Performance

Beat Güttinger, Head of Tekomar

Naples Shipping Week 2018

Performance optimisations on Ships

Engine optimisation options

Retrofit Modifications

Design changes of hull
Modification of propeller
Re-tuning of main engine

Dynamic Propulsion / Routing Optimisation

Slow steaming
Weather routing
Dynamic trim optimization
Berth availability

Operational Propulsion Efficiency

Hull cleaning
Propeller polishing
Main engine adjustments and maintenance

Ancillary System Efficiency

Auxiliary engine adjustments and maintenance
Auxiliary consumer optimisation

ABB

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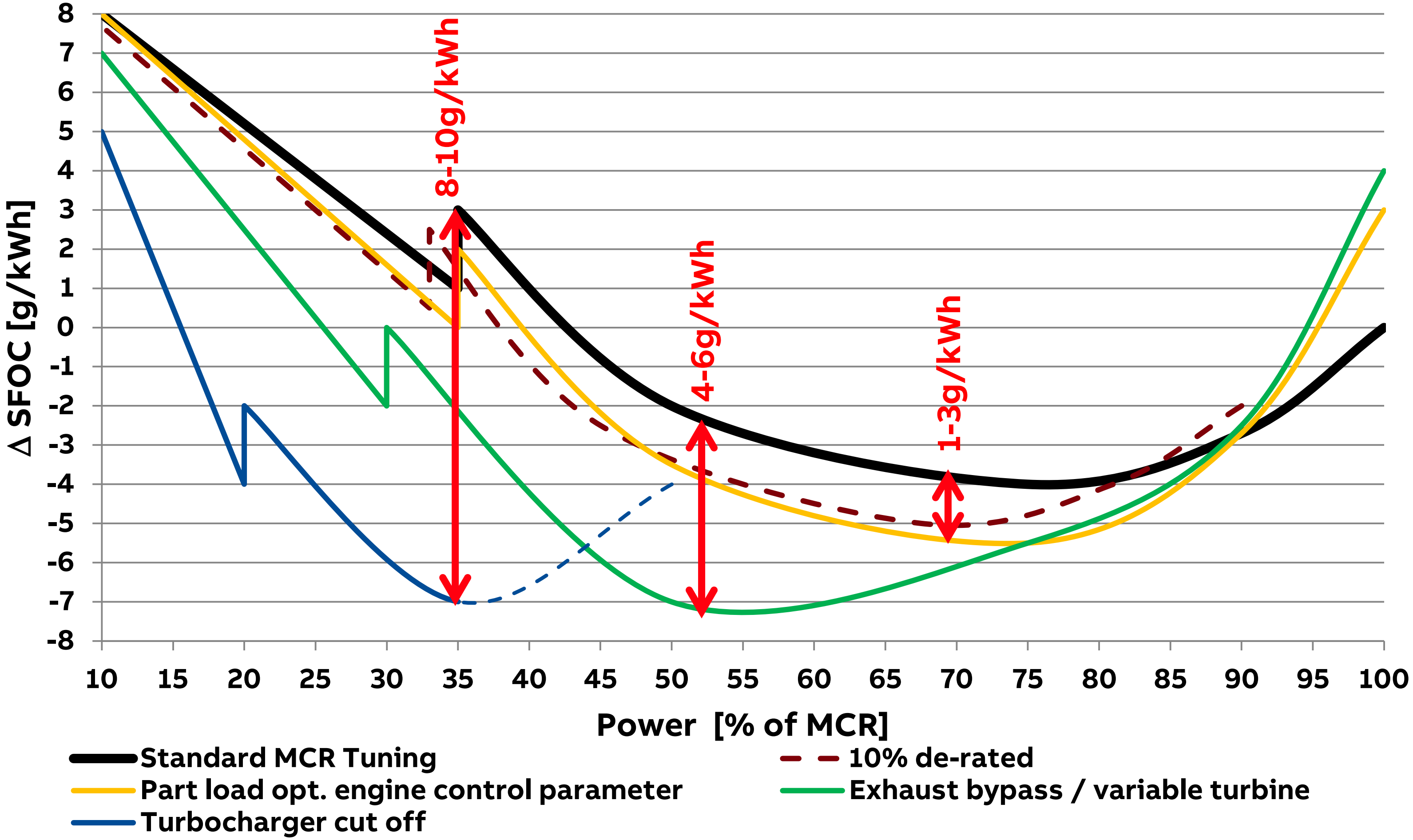
Engine re-tuning



Engine adjustments and maintenance

Examples of conditions that increase fuel consumptions

- Injection timing, injection equipment → low firing pressure
- Clogged filters on TC air intake → low scavenge air pressure
- High SAC water temp or SAC condition → high scavenge air temperature
- Clogged air side of SAC → pressure drop across SAC / low scavenge pressure
- Inefficient or damaged engine room fans → Low engine room pressure
- Worn nozzle rings → Low TC efficiency
- Clogged economizers → high exhaust gas backpressure
- ….

Optimization potential

	Potential saving	
Influenced by	Fuel oil	Proposed actions to achieve the
Injection timing	1.8 g/kWh	Advance injection begin (see be
ENGINE ROOM ventilation		
Suction press. air TC in	0.4 g/kWh	Remove or clean air filter at TC s
Press. drop accross SAC		
Scav. air : water temp. SAC in	0.4 g/kWh	Reduce SAC cooling water intlet
Scav. air : temp. RECEIVER		
Press. drop accross ENGINE		
Exh. gas press. TC out		
TC efficiency	0.7 g/kWh	Check TC condition. (Indication
Light running		
Fuel oil visc. ENGINE in		

*At recorded ENGINE load and ambient conditions.

Engine adjustments and maintenance

Keeping engine adjustments and maintenance in order

- Saves significant amounts of fuel
- Assures optimum of engine performance
- Stretches maintenance intervals and consequently additionally reduces cost

Fuel savings.

Up to 3 tons per vessel, per day.

Cost savings.

Up to $1000 per vessel, per day.

Efficiency gains.

Up to 2-3 hours analysis time.

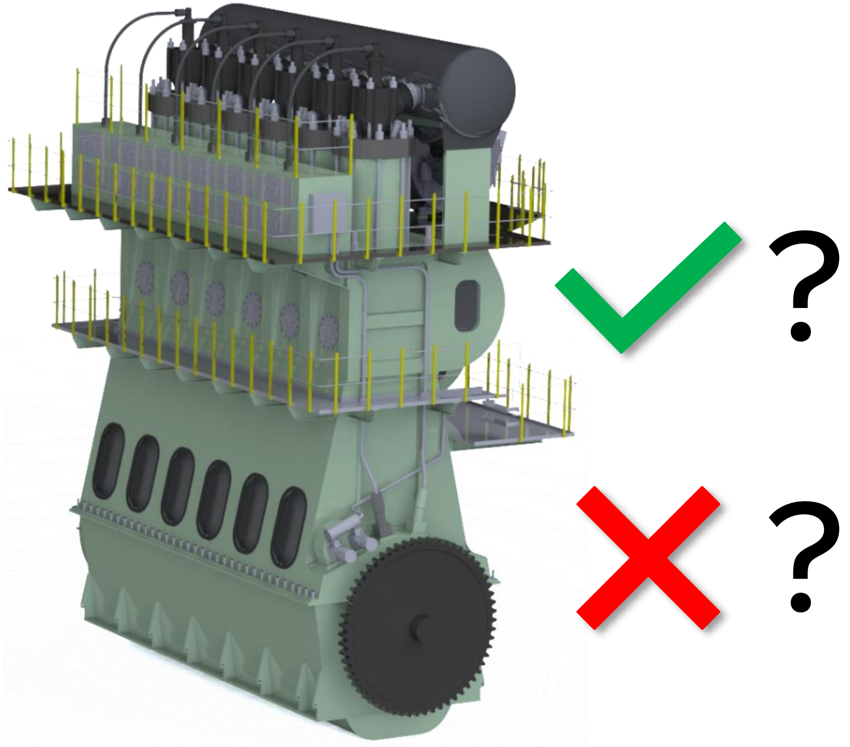
Competitive pricing.

Payback time is typically less than 3 days.

But what is the condition of my main and auxiliary engines?

Typical means of judging (main-) engine performance

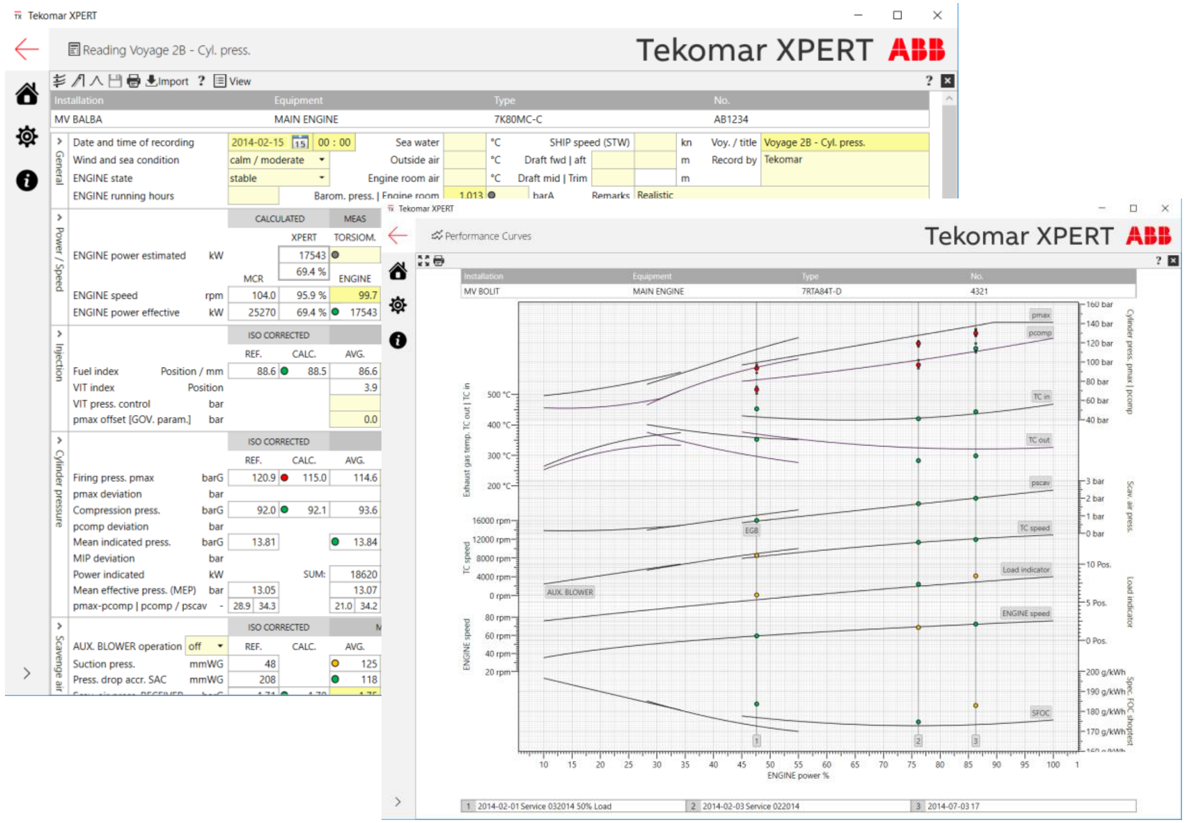
- Fuel consumption per day / per voyage – statistical judgment
- Comparing some (all relevant?) parameters with shop trial – C/E judgment
- Performance run under defined condition and compare it with shop trial reference – both ISO corrected – thermodynamic analysis



Requirements to make a correct thermodynamic analysis

- Sensors in good order
- Accurate performance data (taken under performance run condition)
- Comprehensive data collection – all performance relevant data

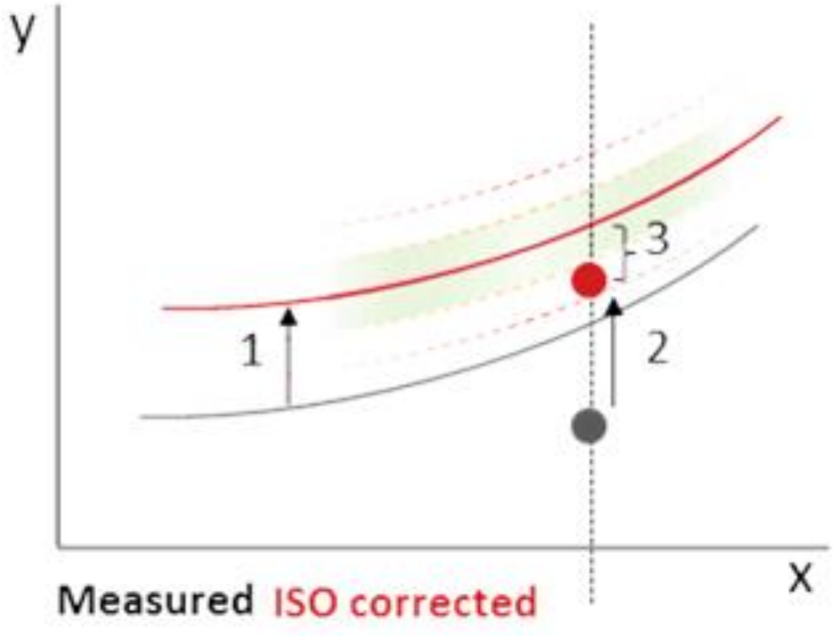
- Normalized data for reference and actual measurement
- Reference for every load in entire load range → 10-100% engine load



Thermodynamic approach…

- Deviation of a thermodynamic parameter from reference can be quantified…
- … calculated into potential fuel oil savings
- For deviations a quantified advice can be given

- Power can be estimated accurately



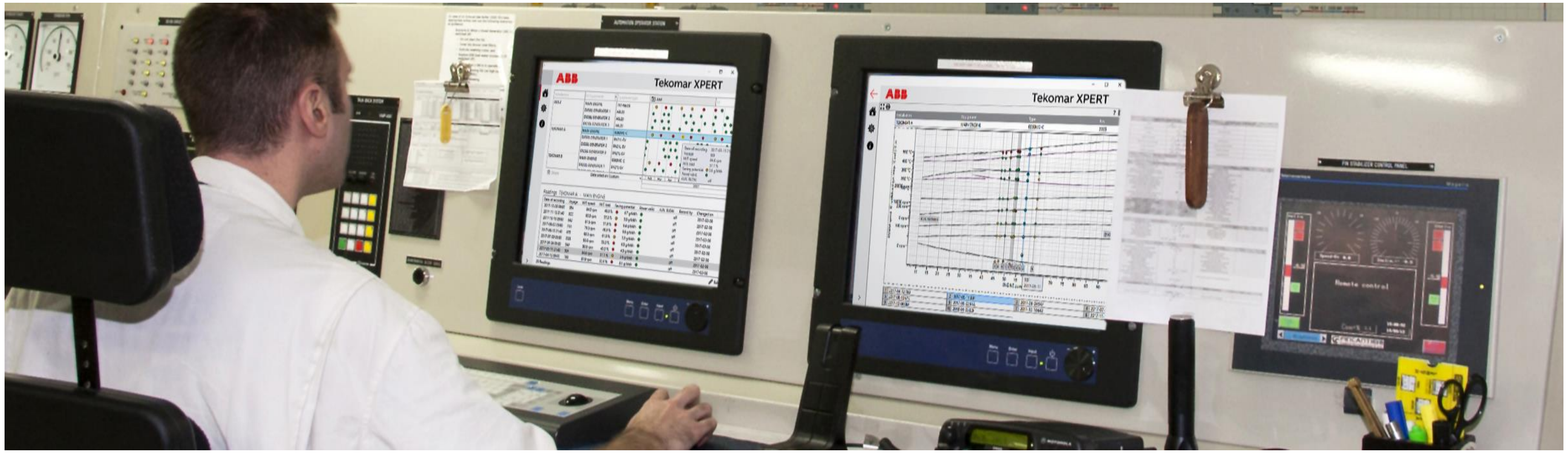
Tekomar XPERT for Engines

Engines performance analytics solution - New client application release 3.0

Made for technical management of vessels (e.g. superintendent, C/E)

Structured engine performance analysis independent of maker an type of equipment

Instant diagnostics and advice for improvement



State of the art intuitive UI Design

Save 2-3 hours analysis time per engine
Save up to 3 Tons per vessel/per day
Save up to 1000 $ per vessel/per day

KPI for fuel oil saving potential and behavior

Fleet overview

ABB Ability ™ Tekomar XPERT

Software features

Engine diagnostics and advisory software

Easy installation on computer (no board attendance required)

Data input/ import:

- Manual data input by crew or
- Data import from third party devices or monitoring systems

Evaluation of engine performance:

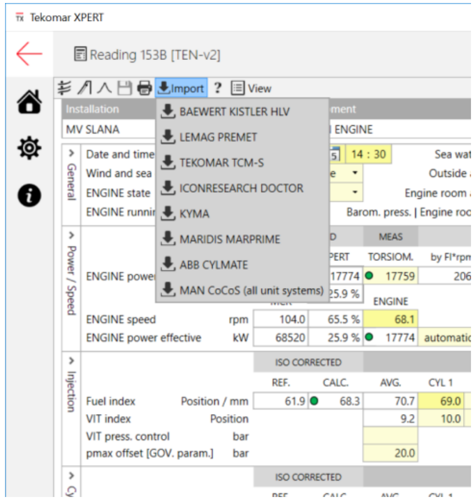
- Actual engine performance is compared to shop test reference values (baseline performance)

Diagnostics with advisory:

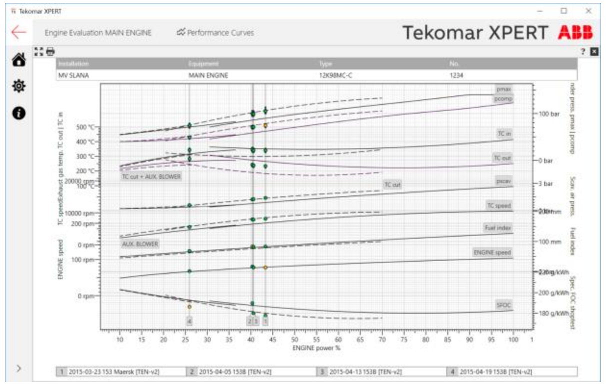
- Instant quantification of fuel oil saving potentials and advice about how to improve performance, including specific measures -adjustments and maintenance (on board))

Comparison of fleet

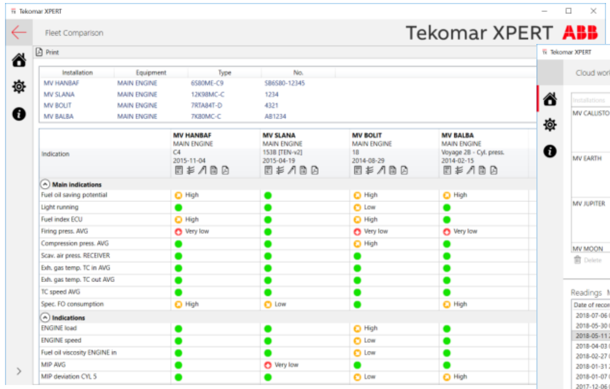
- Comparison of equipment across entire fleet
- Data sharing with office through cloud solution.



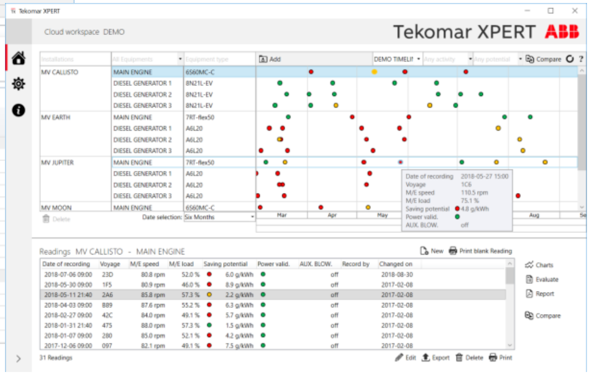
Data input/import



Evaluation in graphs and trends

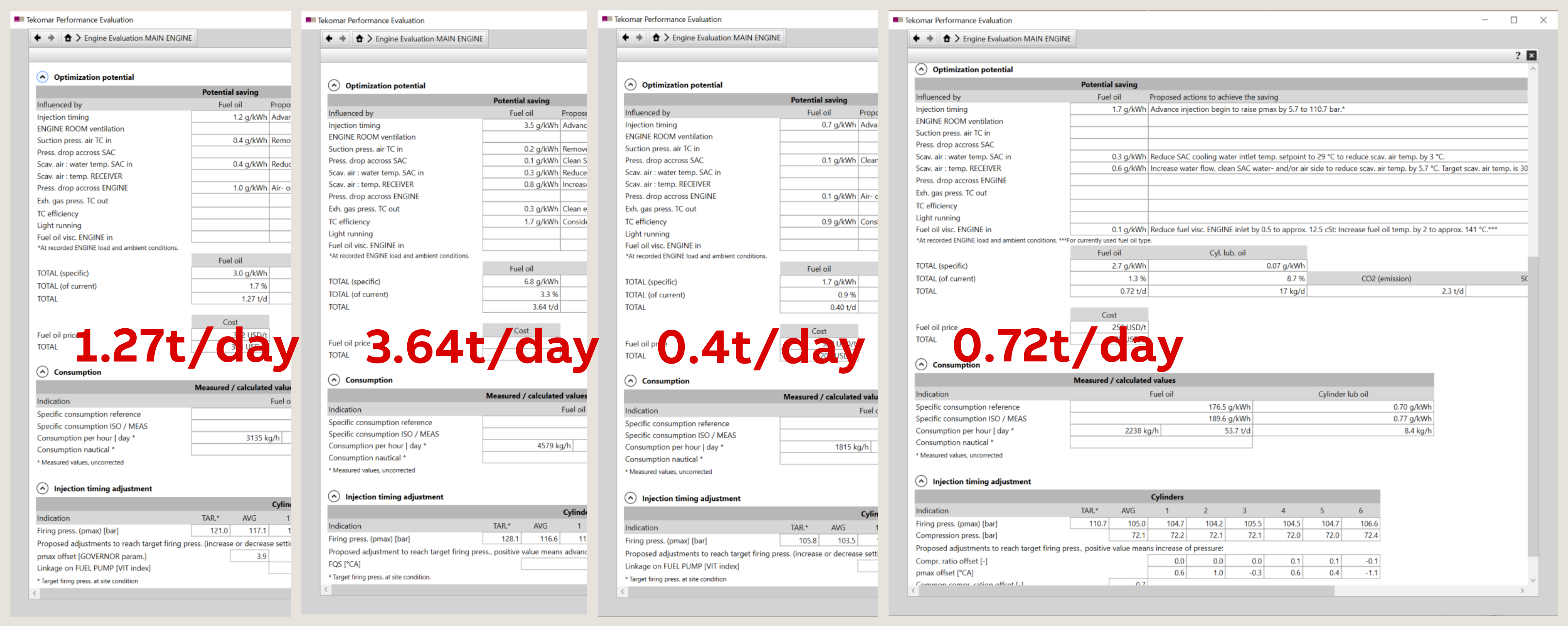


Diagnostics with advisory



Comparison of fleet

Significant savings…?

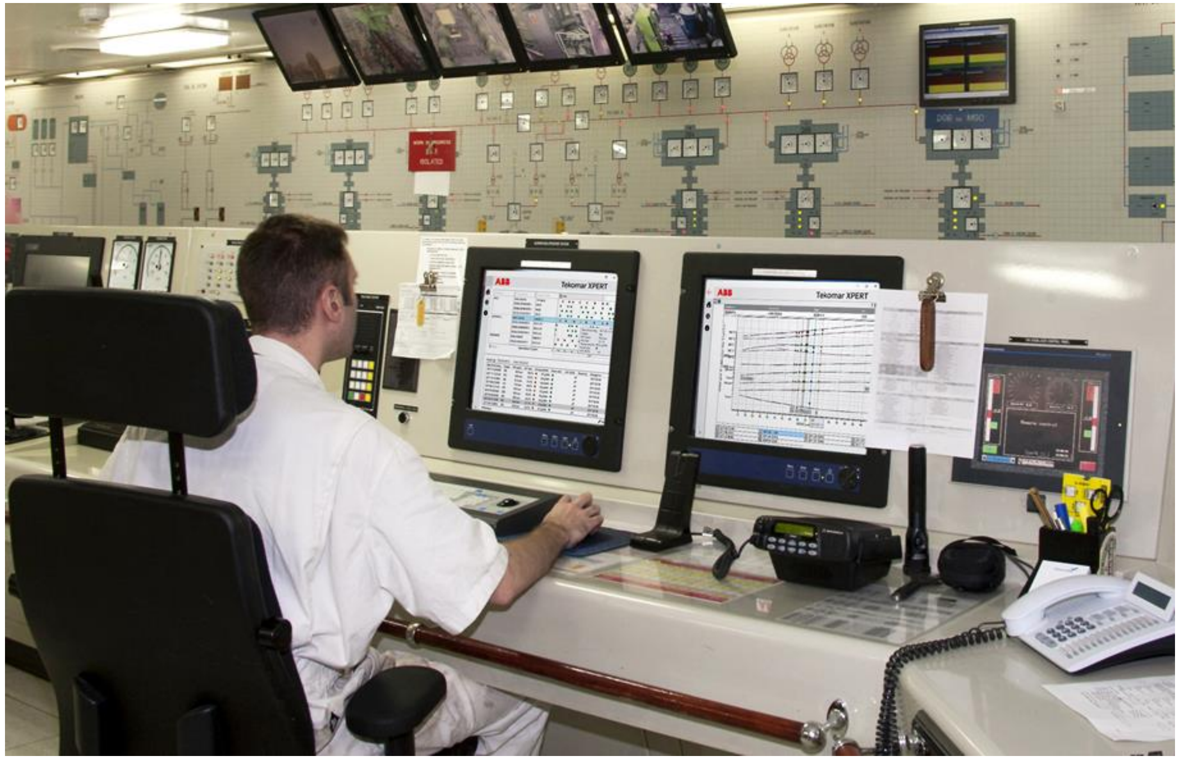


Knowing engine performance is important…!

- Means knowing savings potential
- Get recommended actions based on thermodynamic deviations.
  - Most actions cost nothing and / or reduce maintenance cost

- To judge ship performance

➢ Get your C/E hooked to engine performance, provide him the right tool and…



… the potential will turn into real savings

References

5600 engines, 1400 vessels, 60 customers

REEDEREI NSB
V.Ships Marine Travel
RZ
SELANDIA GROUP
COLUMBIA SHIPMANAGEMENT
CPO Containerschiffreederei
SOLVANG ASA
TEAM
TEO SHIPPING CORPORATION
TSAKOS Group
DONNELLY TANKER MANAGEMENT SETTING THE RIGHT COURSE
E.R. SCHIFFAHRT
BERGEBULK
Hafnia Tankers
JOHN T. ESSBERGER
TORM
HAMBURG SÜD
UNITED SEVEN 7
ST
CMA CGM
THORCO
HANSA SHIPPING GMBH & CO. KG
THOME GROUP
DANSK REDERI A/S BIANCO SHIPPING CO.
LOMAR
HAMBURGER LLOYD
WESTFAL-LARSEN SHIPPING
LAURITZEN BULKERS
Hapag-Lloyd
APL
NORDEN
MAERSK
AHRENKIEL STEAMSHIP
MSC MEDITERRANEAN SHIPPING COMPANY
Peter Döhle Schiffahrts-KG
NORDIC TANKERS
THOMAS SCHULTE SHIP MANAGEMENT
Offen Group

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