



# Energy Management

Eivind Vinje  
Technical Product Manager

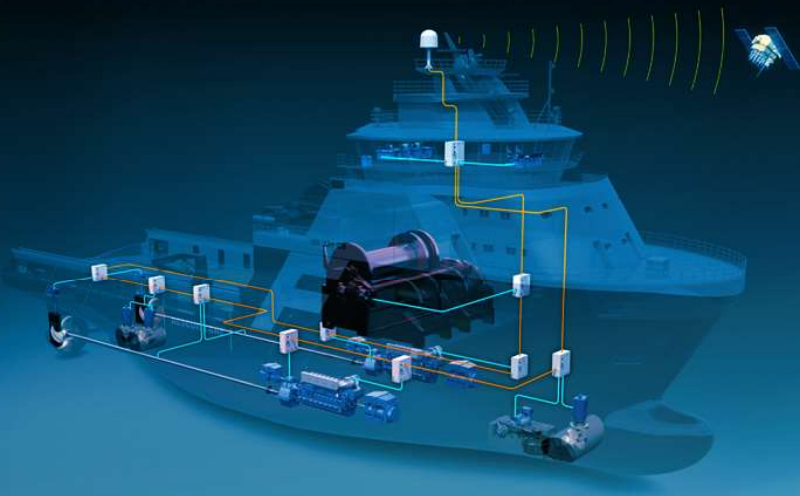
2017-09-13  
Rolls-Royce Marine

© 2016 Rolls-Royce plc

The information in this document is the property of Rolls-Royce plc and may not be copied or communicated to a third party, or used for any purpose other than that for which it is supplied without the express written consent of Rolls-Royce plc. This information is given in good faith based upon the latest information available to Rolls-Royce plc, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Rolls-Royce plc or any of its subsidiary or associated companies.



Rolls-Royce



## AGENDA

1. Introduction
2. Energy Management
3. Using data
4. Verification
5. Screenshots

# Rolls-Royce PLC

**Civil Aerospace**

**Defence Aerospace**

**Power Systems**

**Marine**

**Nuclear**



**Rolls-Royce**

# Marine - A comprehensive range of products

Focusing on environmental friendly solutions

## SHIP DESIGN



- Offshore supply and service vessels
- Offshore exploration and production vessels
- Cargo, container and passenger vessels
- Fishing vessels
- Naval vessels

## DECK MACHINERY



- Anchor handling and mooring winches
- Safer deck operations
- Handling systems for subsea, seismic and oceanography
- Positioning mooring
- Fishing winches
- Naval deck machinery

## AUTOMATION & CONTROL



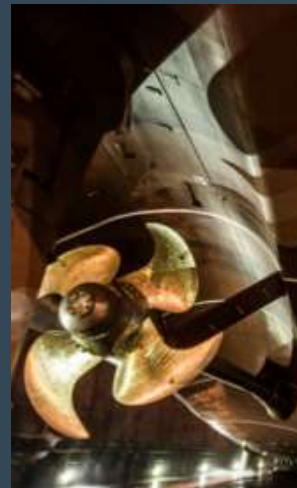
- Unified Bridge
- Propulsion control
- Dynamic Positioning
- Automation systems
- Electrical power systems

## ENGINES & GAS TURBINES



- Diesel and gas propulsion engines and generator sets
- Gas turbines

## PROPULSION & MOTION CONTROL



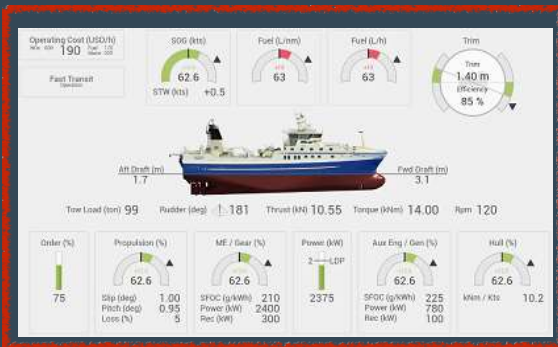
- Propellers and thrusters
- Rudders
- Steering gear
- Stabilizations



Rolls-Royce

# Energy Management

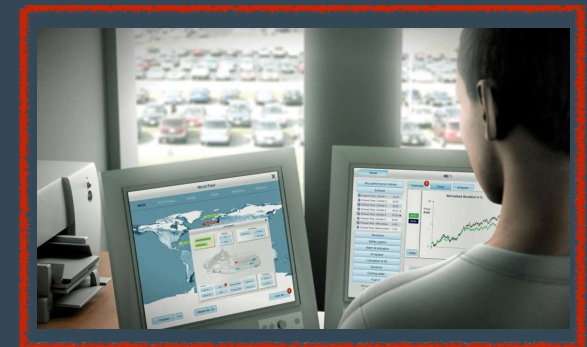
Energy Management is a suite of marine offerings aiming to reduce **energy consumption** and **emissions** by increasing **efficiency** and vessel **performance** through **awareness**.



On-board  
Real-time advisory



On-shore  
Fleet portal

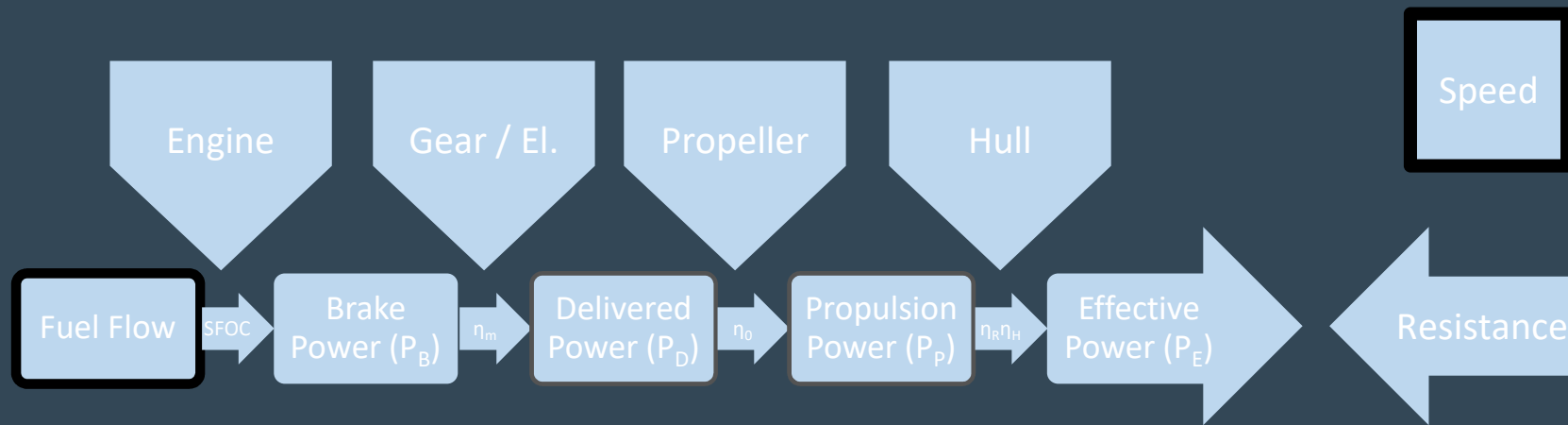


Analytics  
Expert in the loop

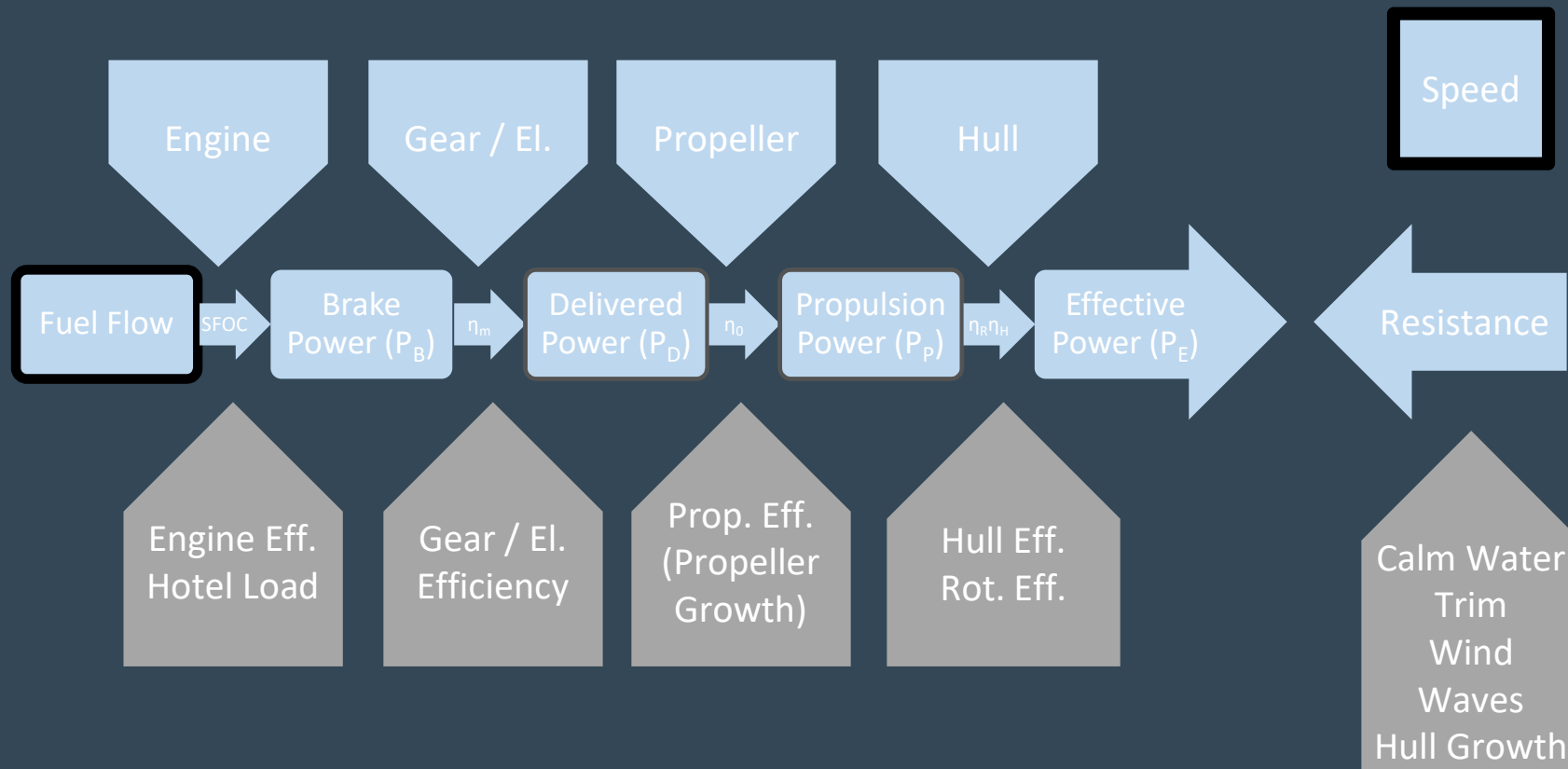


Rolls-Royce

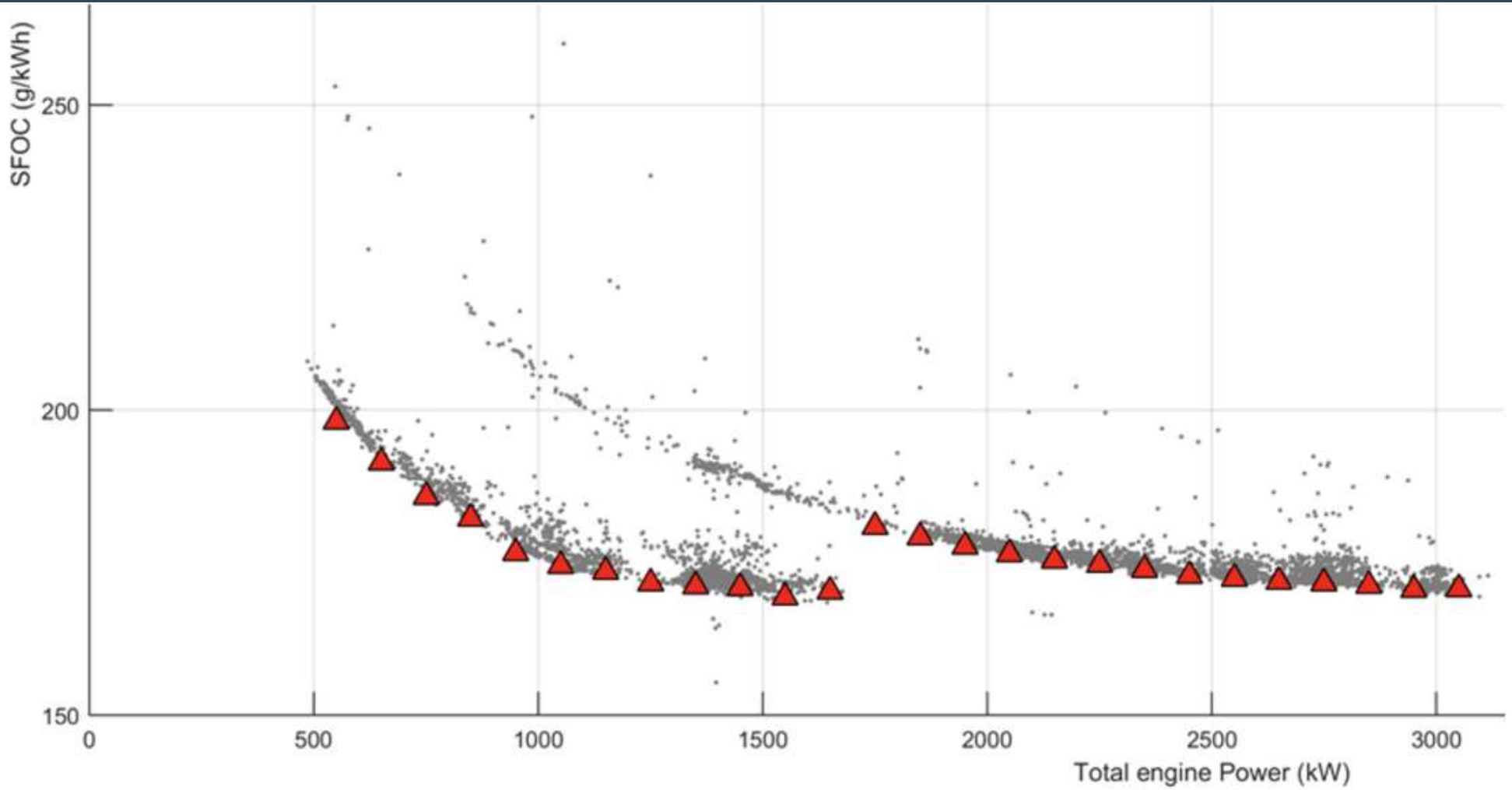
# Propulsion Energy



# Propulsion Energy

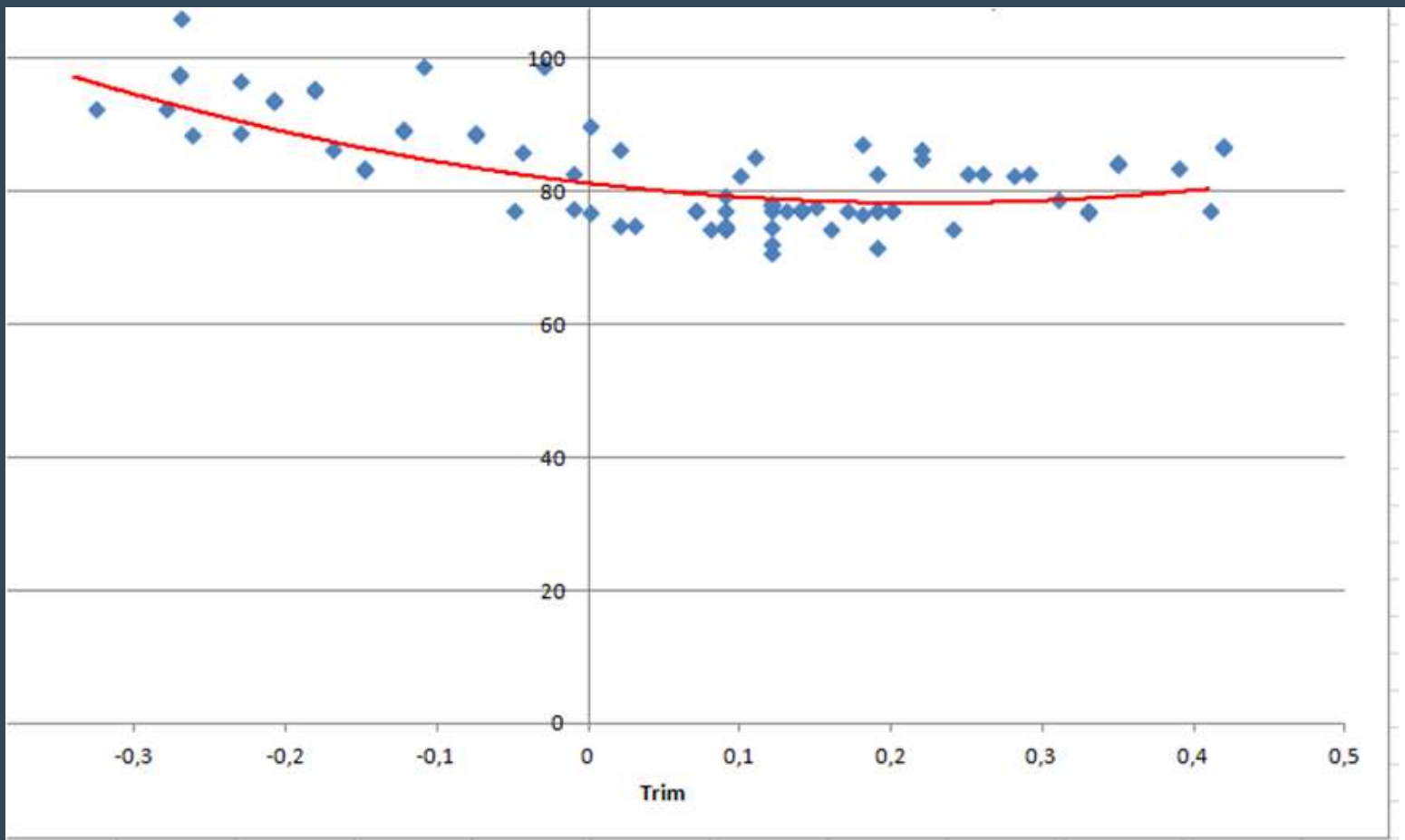


# Engine performance

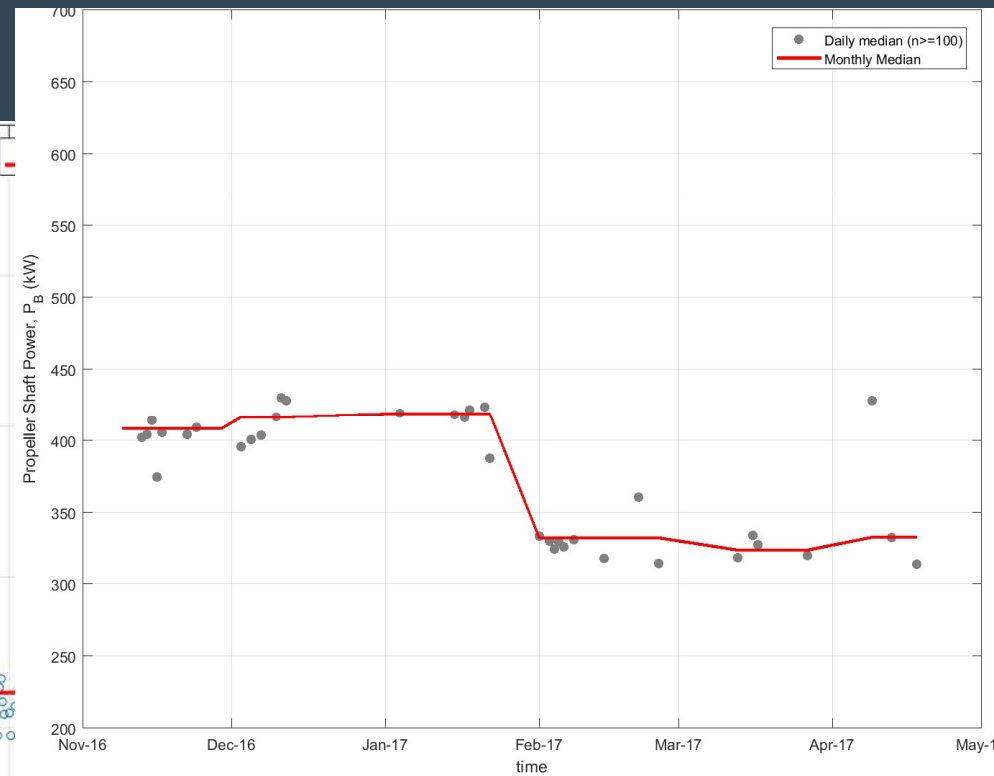
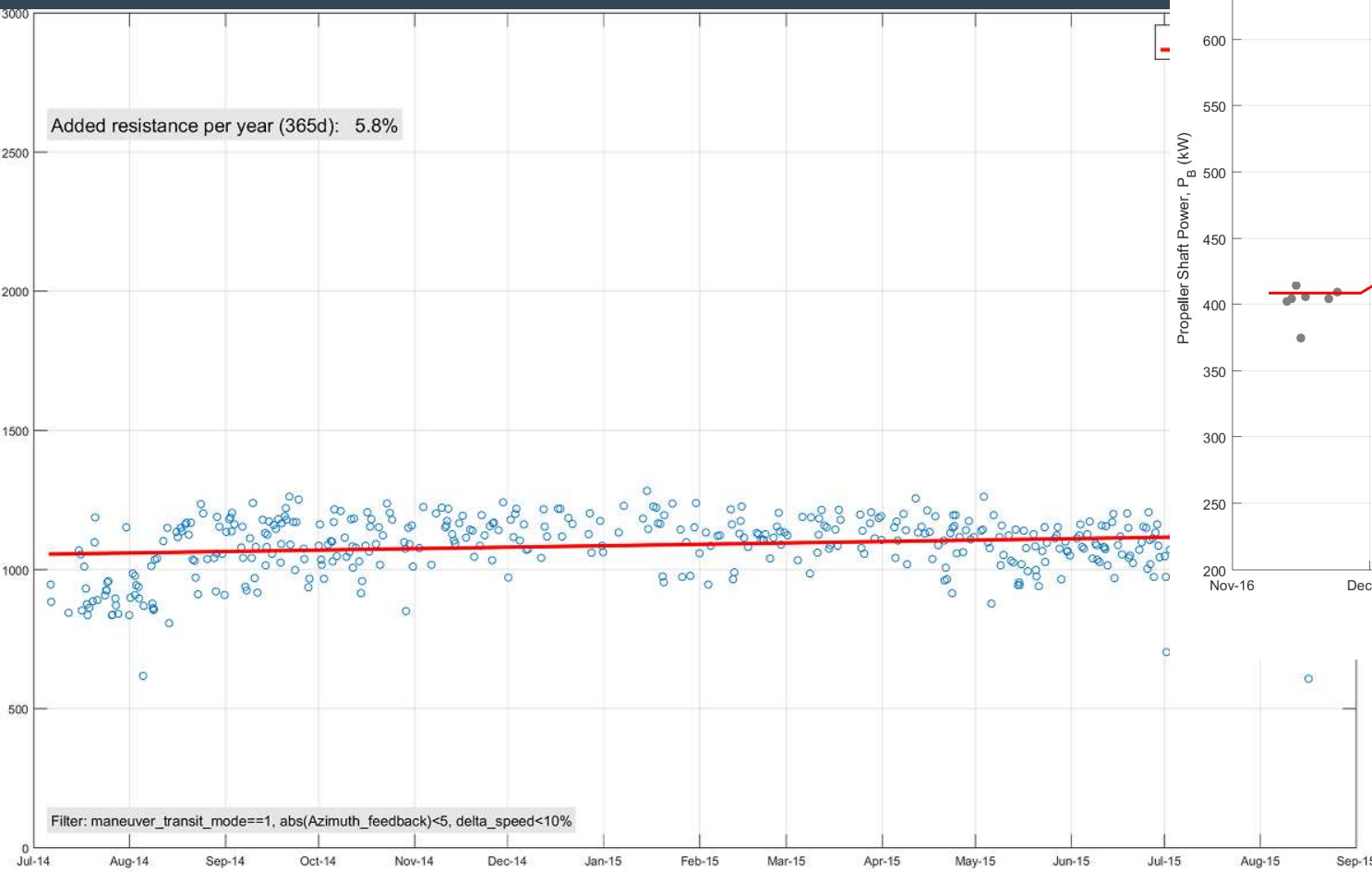




# Trim optimisation

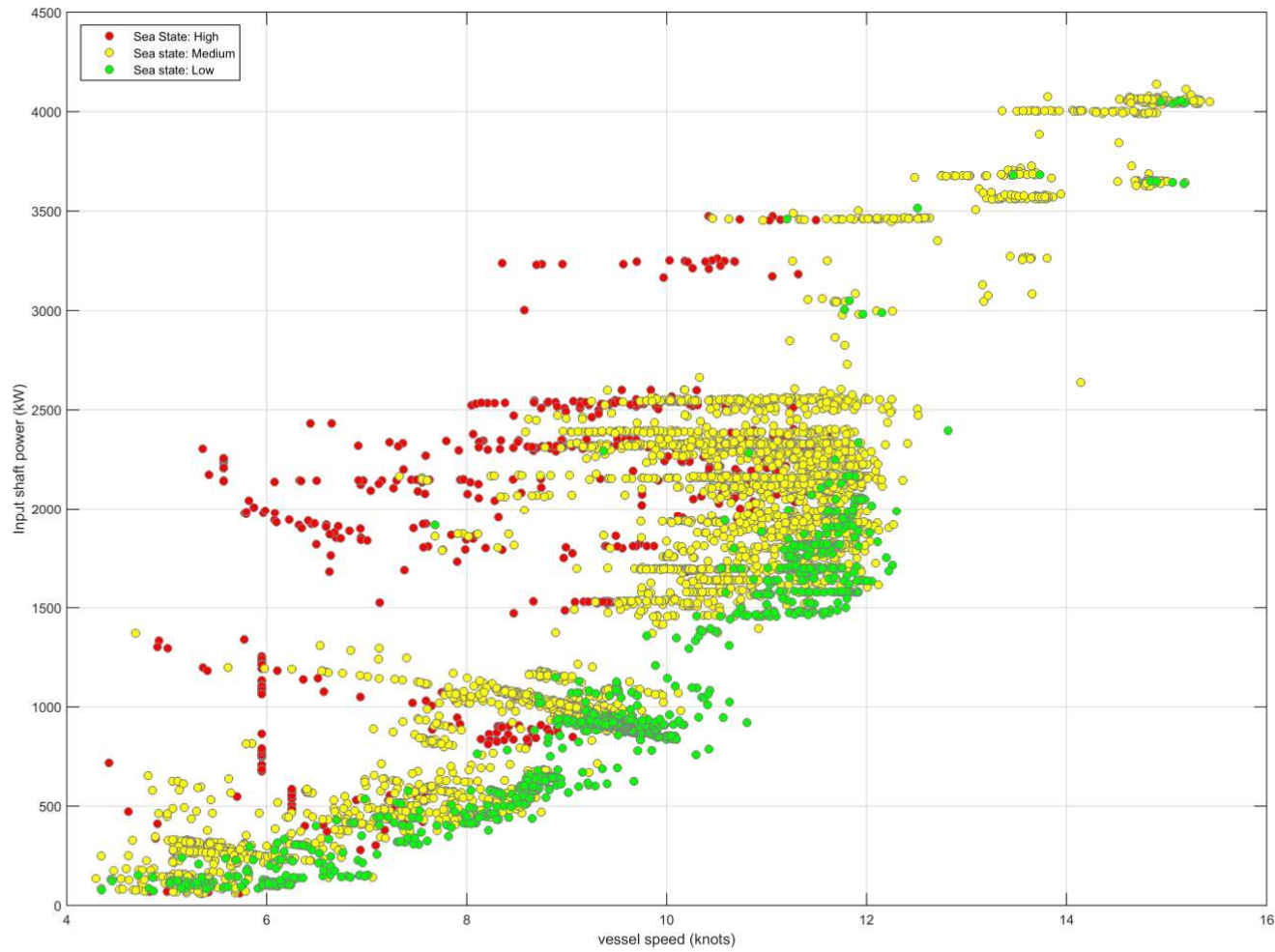


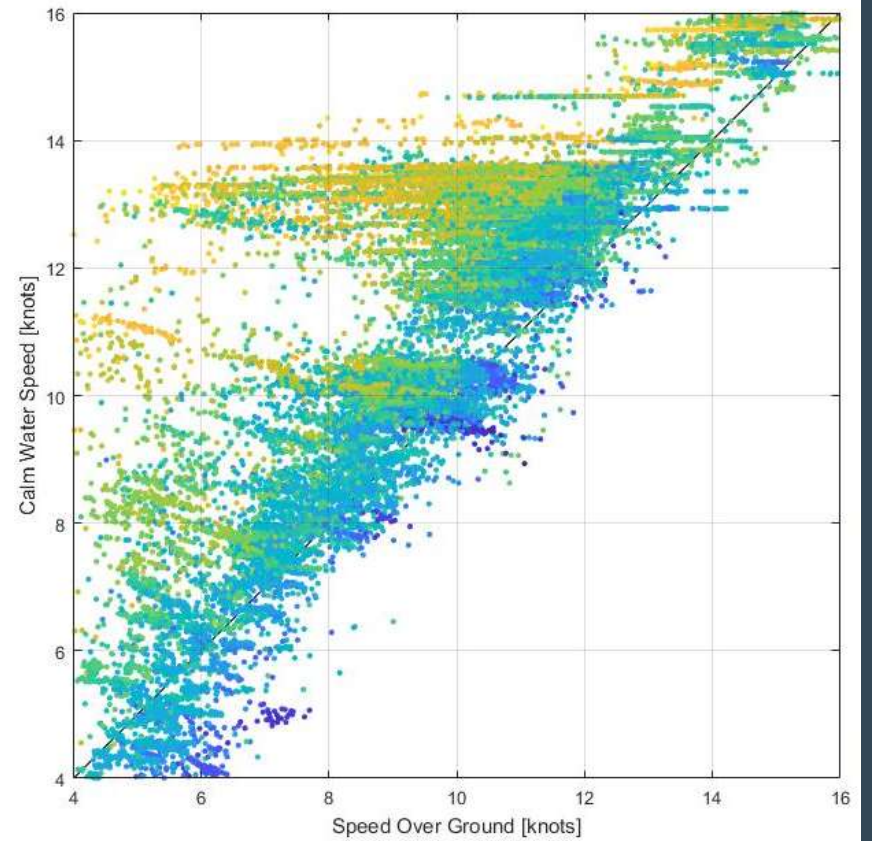
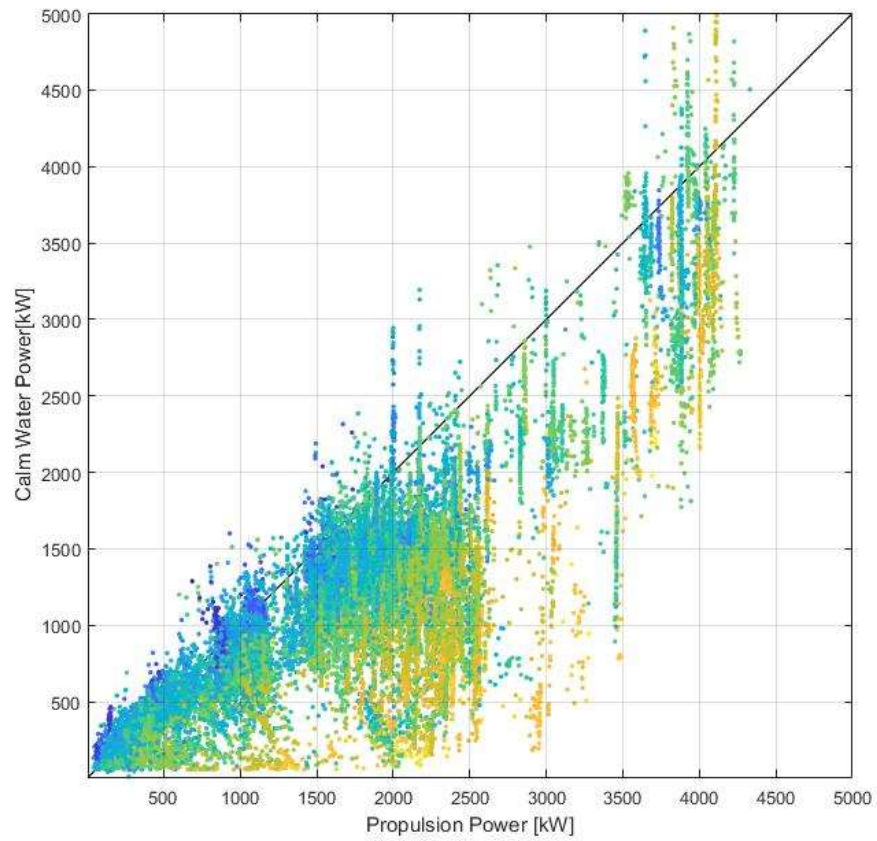
# Marine growth



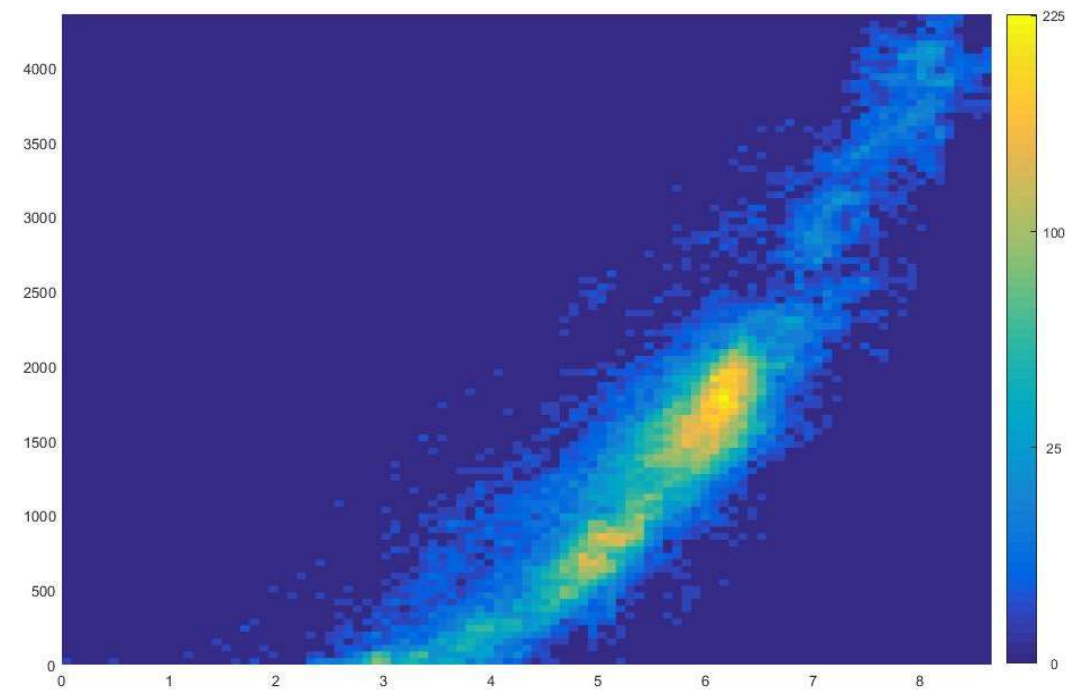
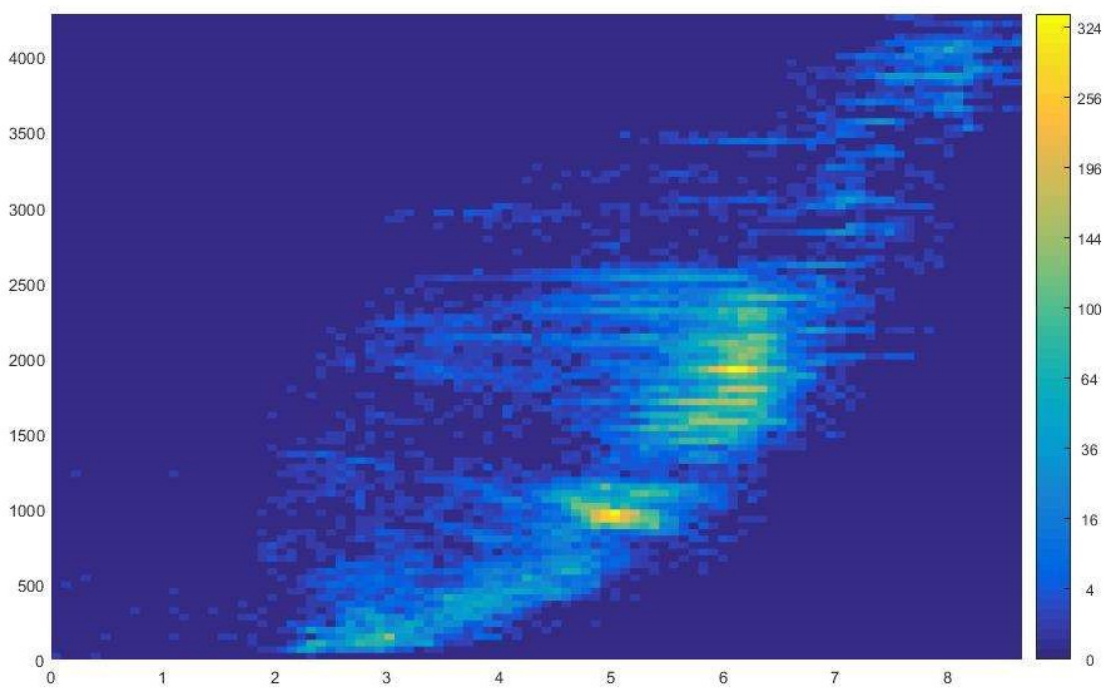
Rolls-Royce

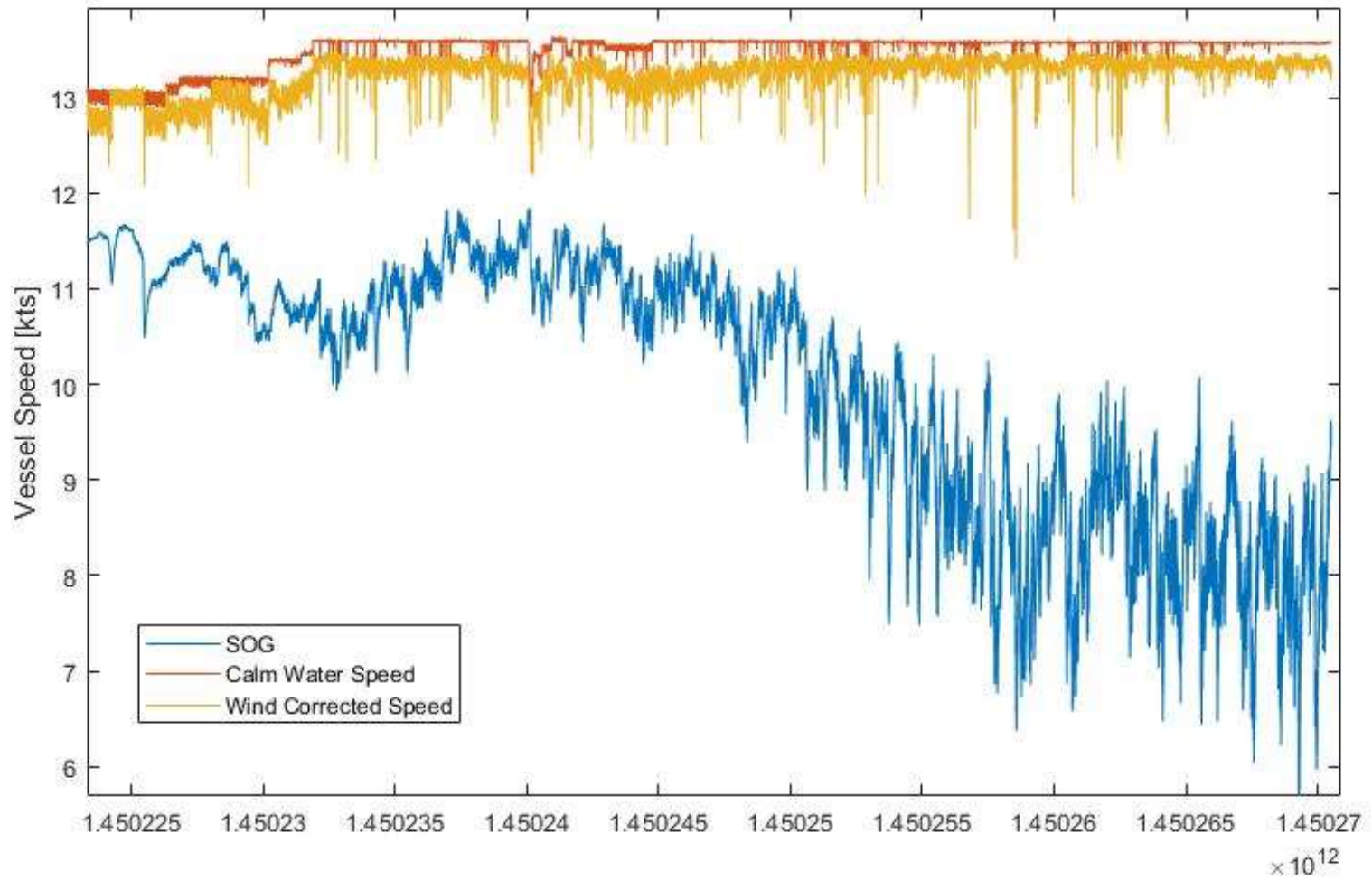
# The challenge



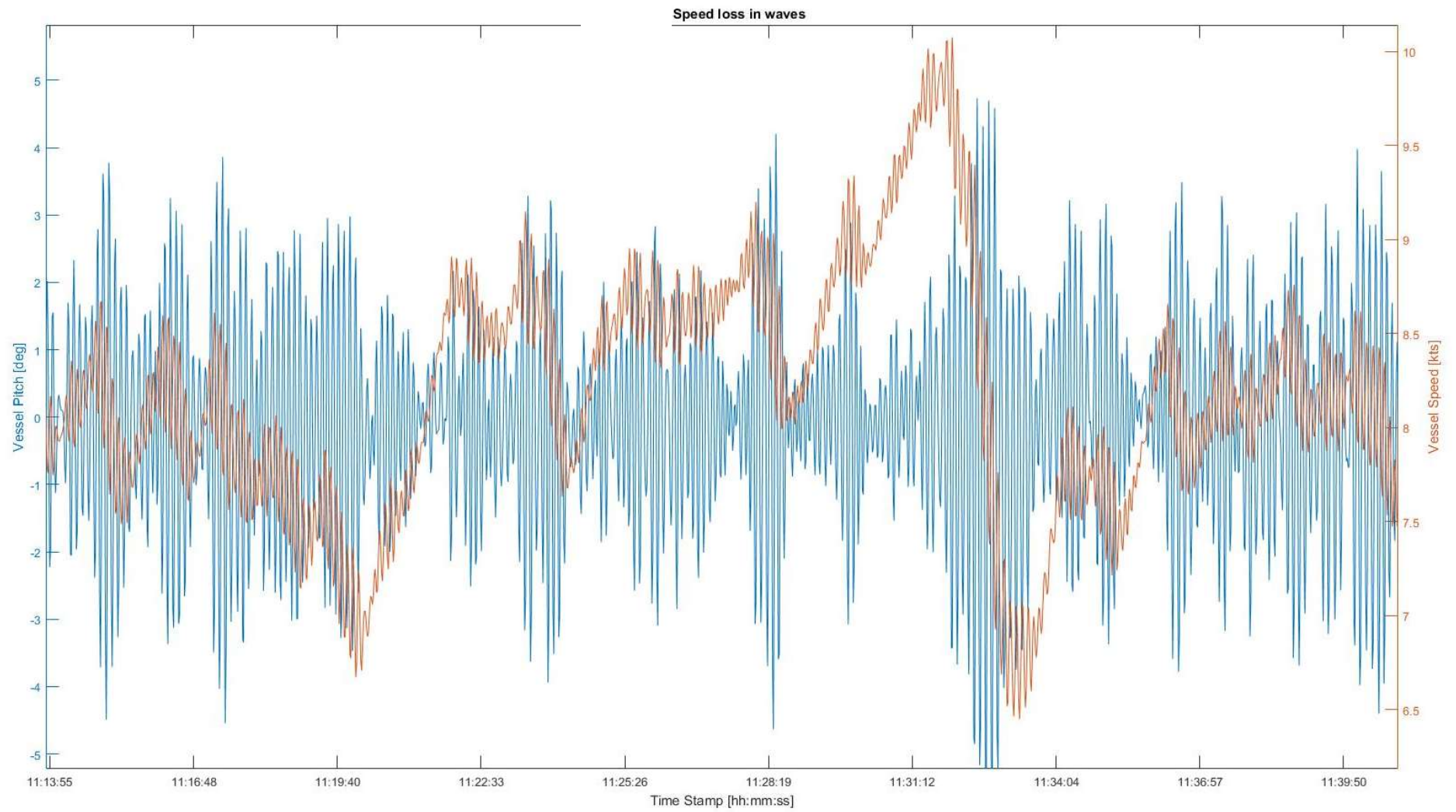


Rolls-Royce

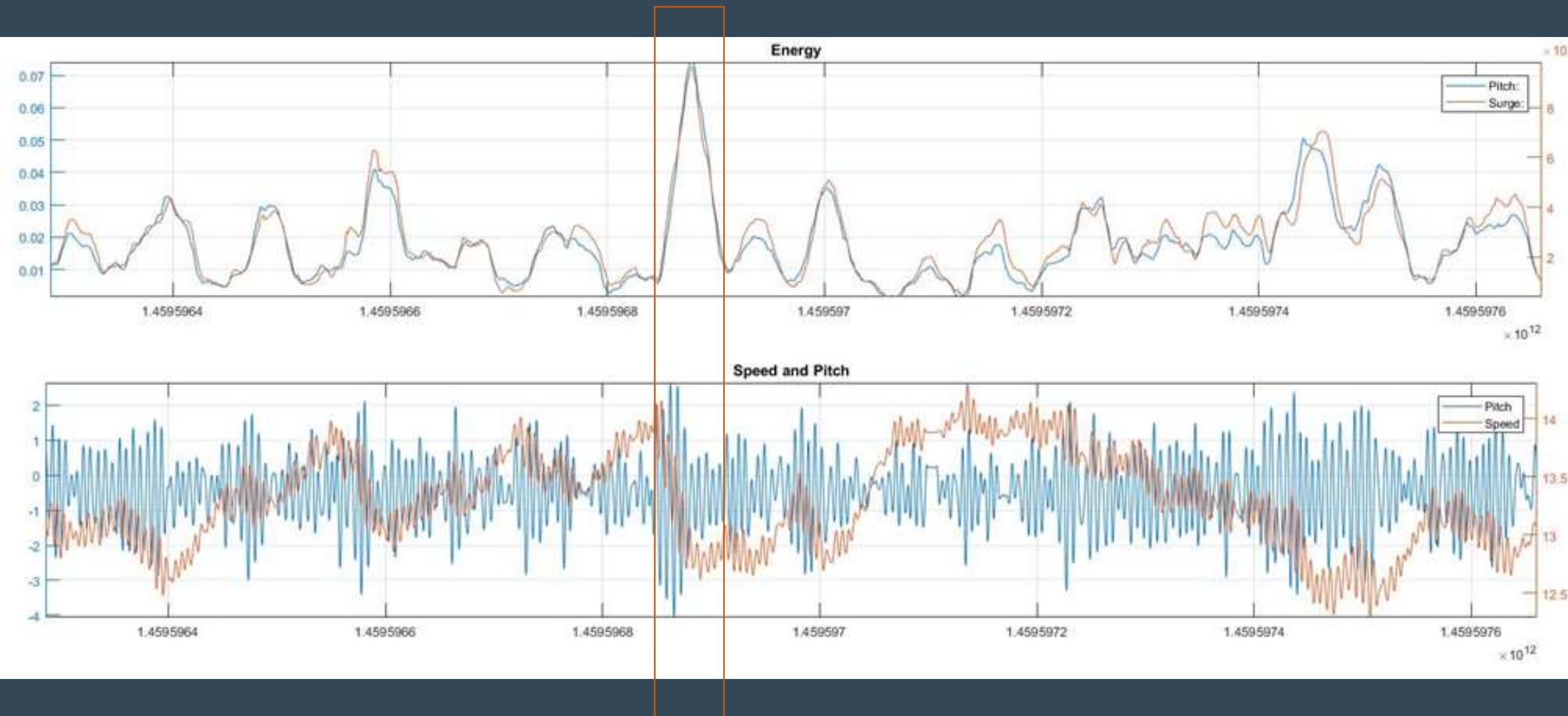




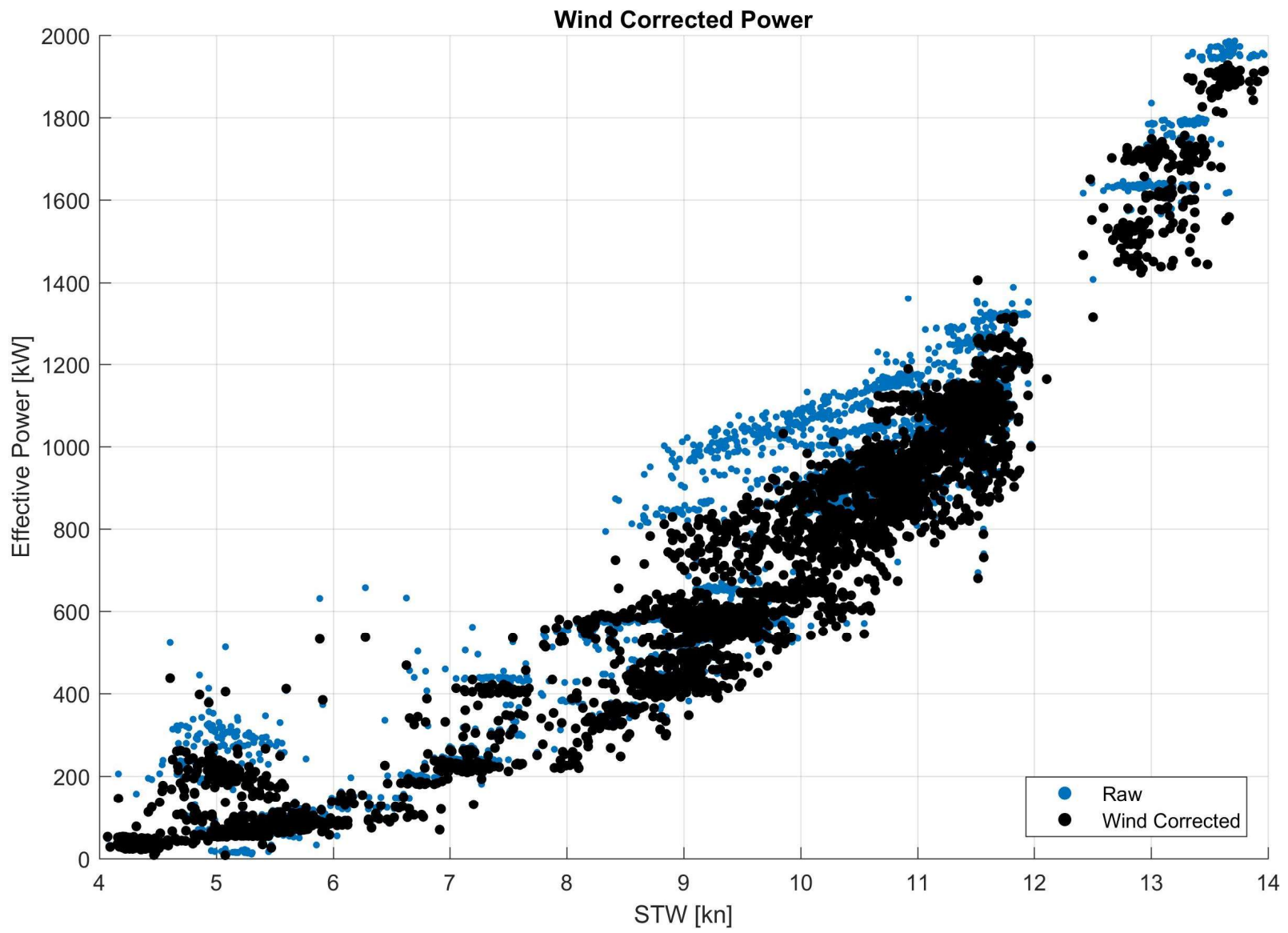
Rolls-Royce

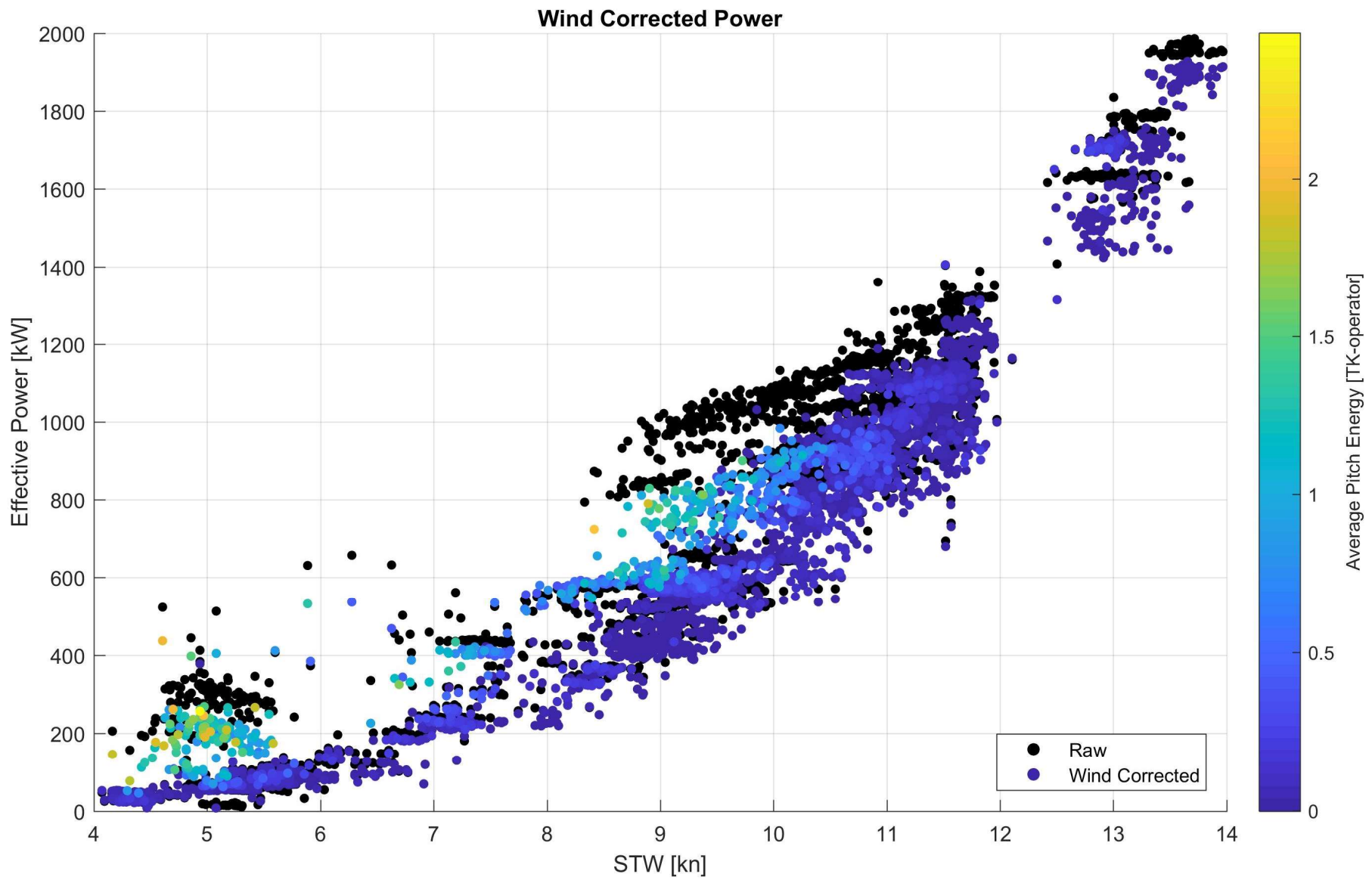


Rolls-Royce

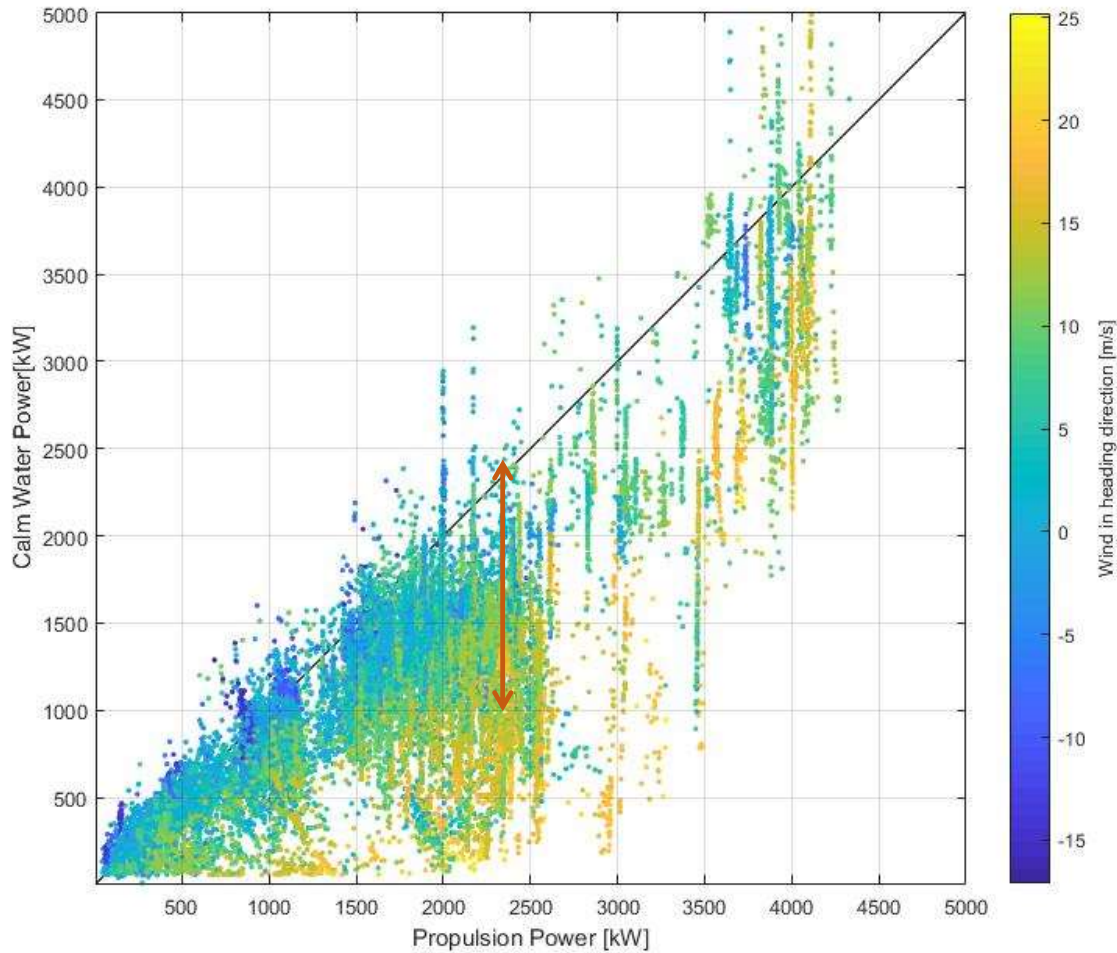




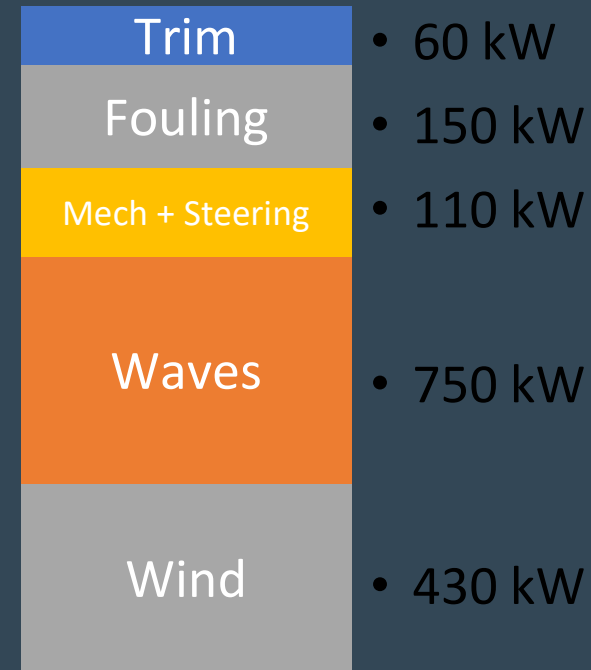




# Power

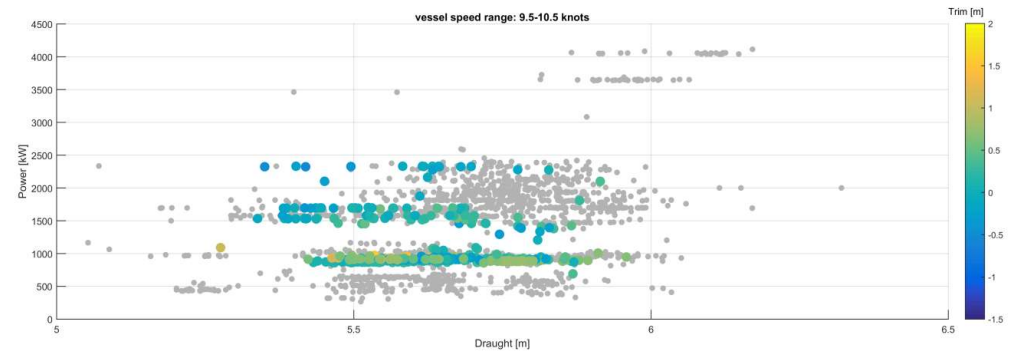
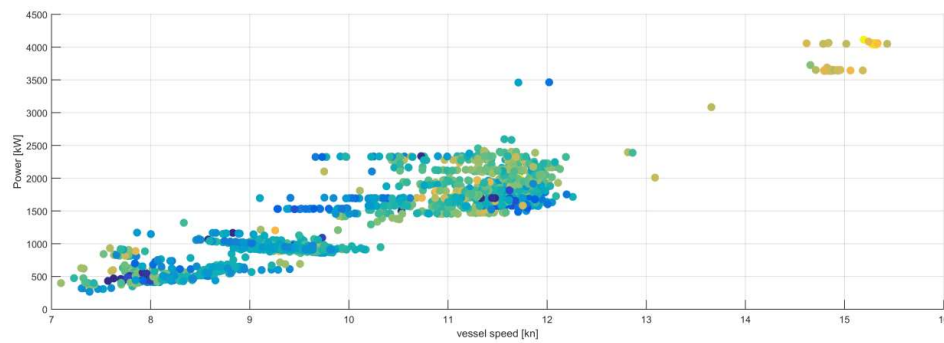
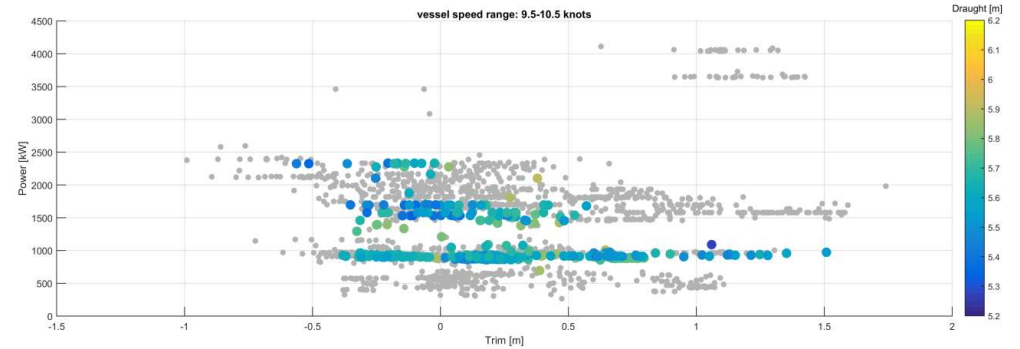
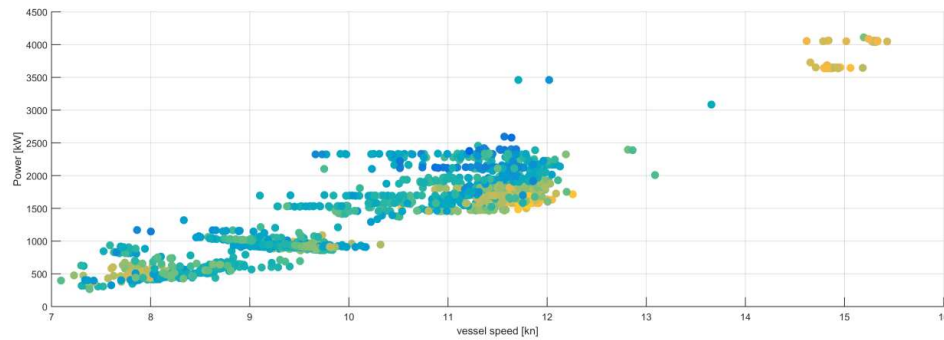


# Total 1500 kW Loss



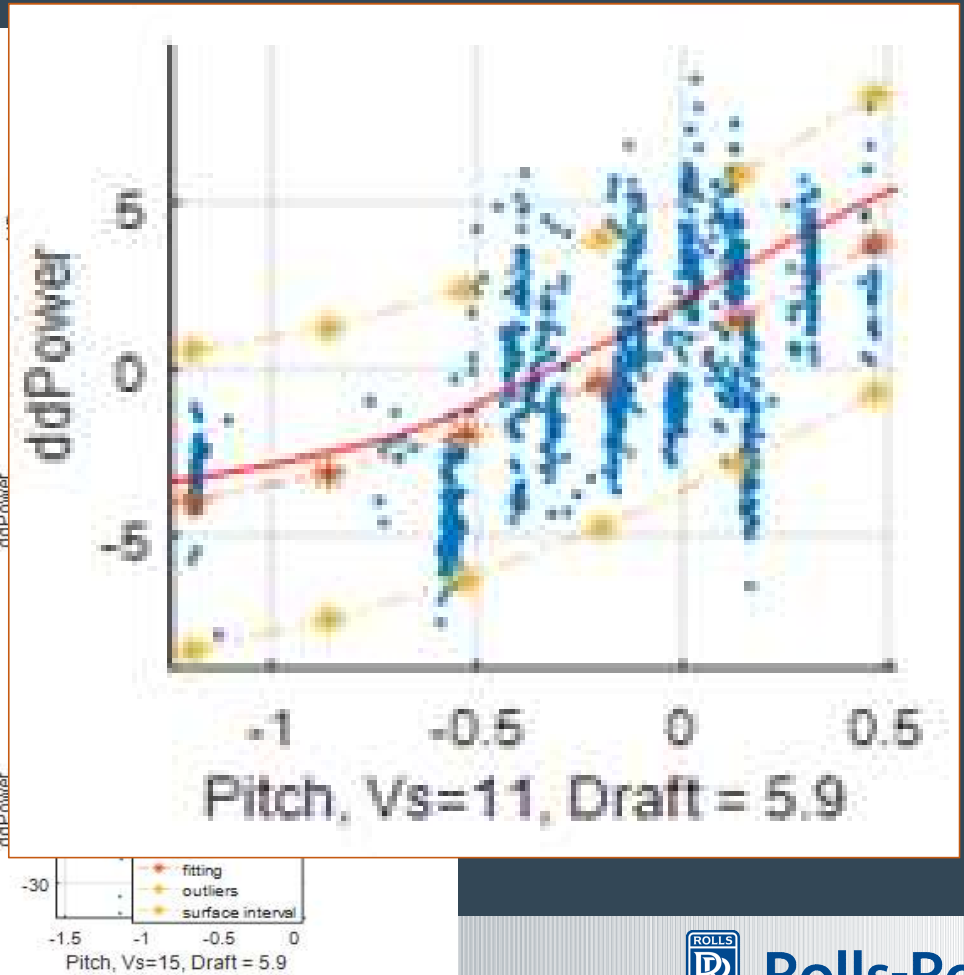
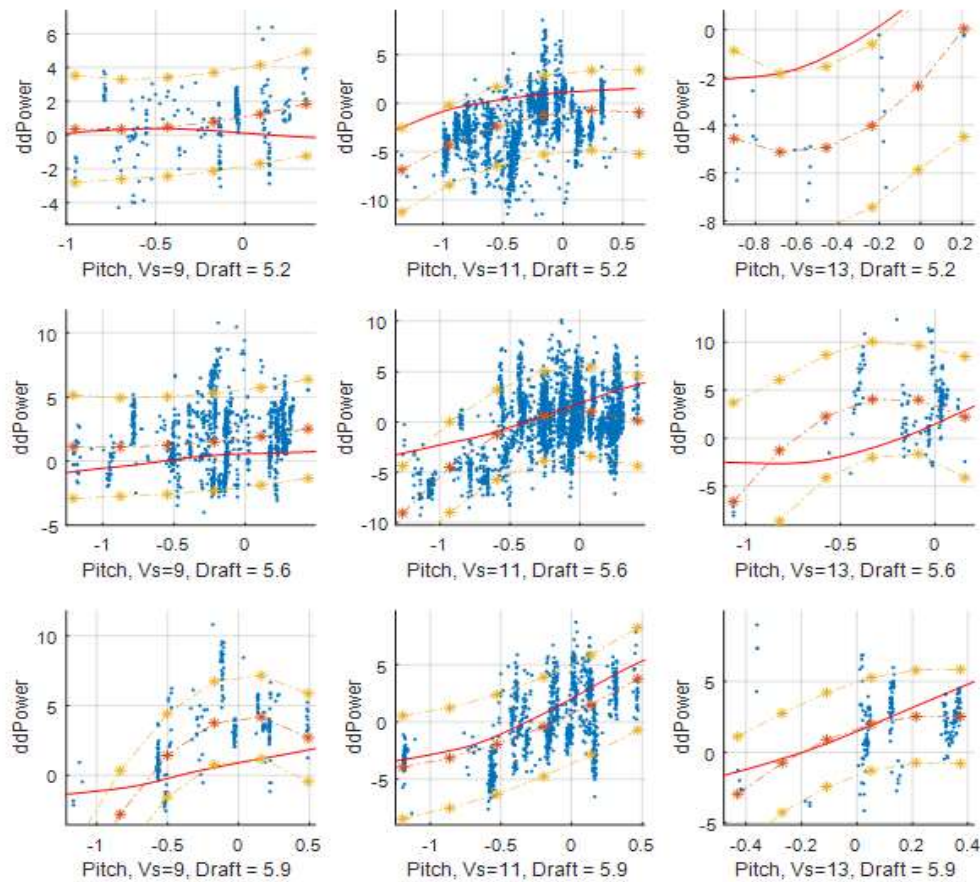
Rolls-Royce

# Trim



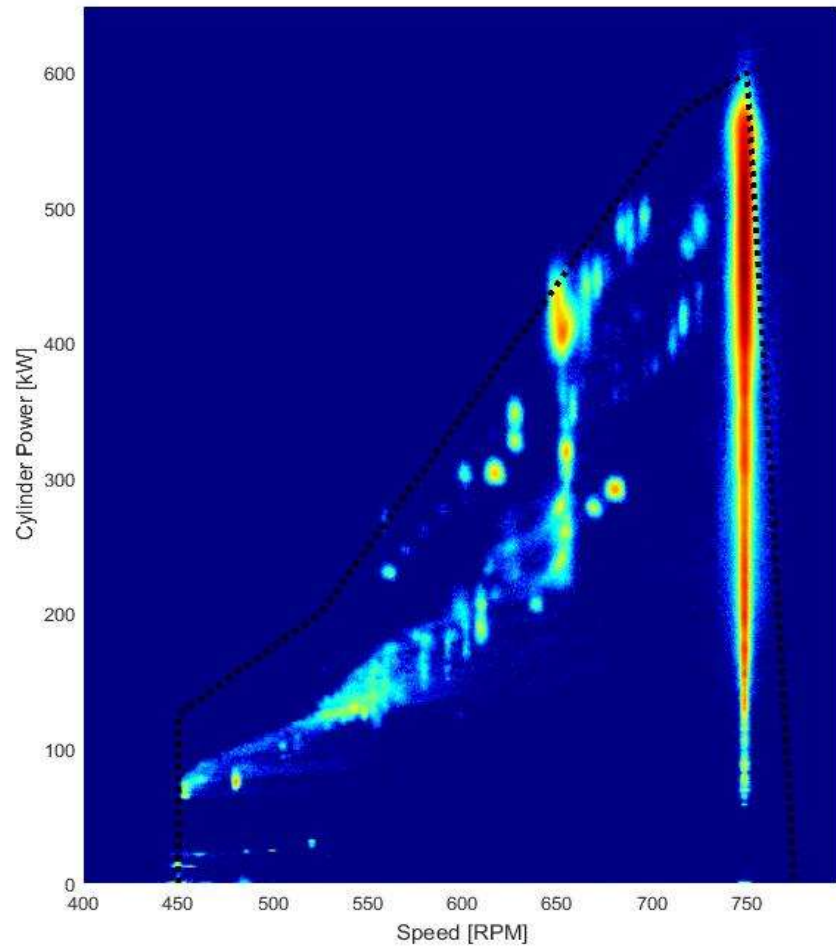
Rolls-Royce

# Verification

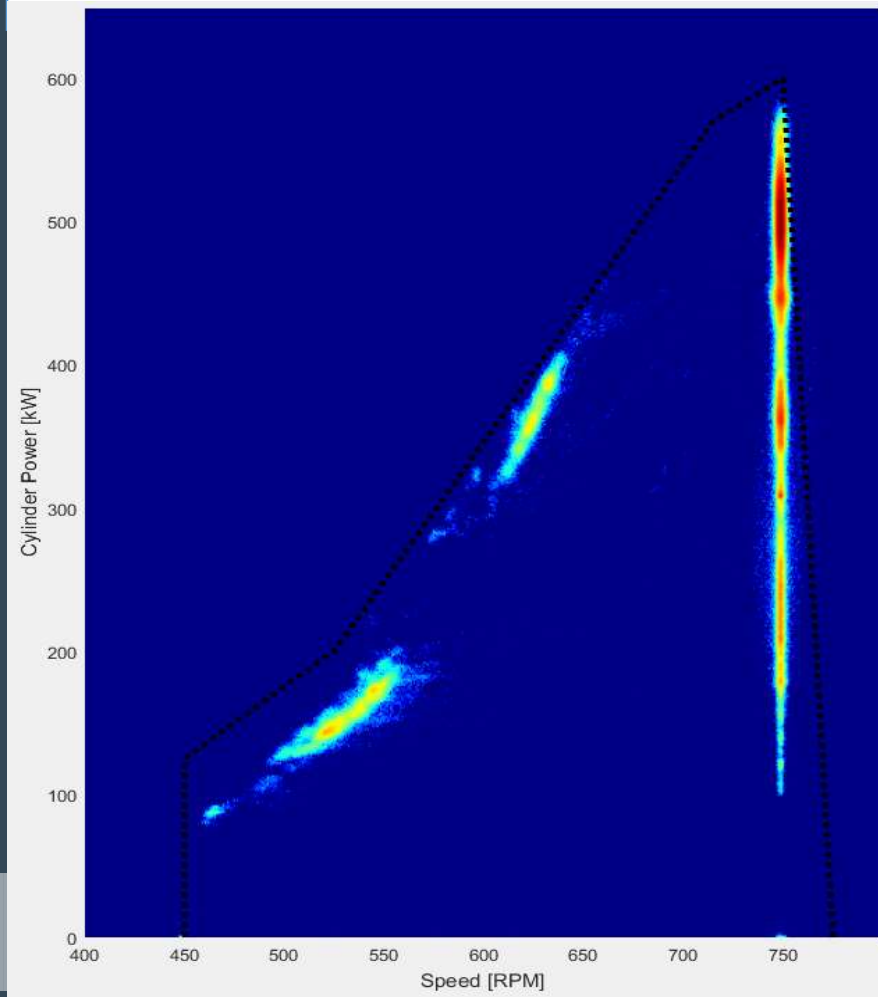


Rolls-Royce

Before awareness



After awareness



Voyage
Stop
Start
Cargo
Ton: 0
Pax: 0
Transit
Weather
0 kn

Prop Power



Sailing Performance



Speed (SOG)



Passive Performance



Engine Power



Voyage Information

Duration	0 : 08 : 12
Speed (SOG)	0.0 kn
Distance	1.71 nm
Fuel	123 L
Fuel avg	0 L/nm

Leg Calculator

Time Rem.	0 : 00 : 27	
Speed Benchm.	10.5 kn	
Dist. Rem.	0.08 nm	
Fuel Rem.	5 L	
Speed Alt.	Time Diff	Fuel Diff
9.4 kn	+0:00:04	0 L
11.5 kn	-0:00:02	+1 L

Leg Information

Duration	0 : 10 : 54
Speed (SOG)	12.2 kn
Distance	2.23 nm
Fuel	160 L
Fuel avg	160 L/nm

### Operating Cost

**2140** NOK/h  
**198** NOK/nm  
**20.0** K NOK

### SOG

+1.2

**11.2** kn  
 STW **11.5** kn

### FOC Sailing

+4

**53** L/nm

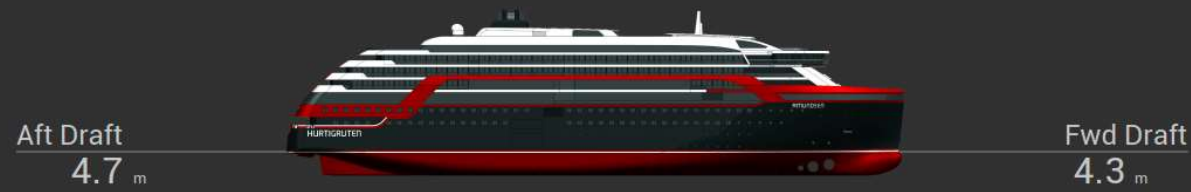
### FOC Passive

-20

**450** L/h

### Current Operation

Transit



PS	Thrust	<b>120.0</b> kN	Torque	<b>112.0</b> kNm	Rpm	<b>140</b>	PS
SB		<b>119.0</b> kN		<b>111.0</b> kNm		<b>140</b>	SB

### Prop Power

**4000** kW

### Propulsion

+4

**93** %

Slip **20 | 20** %

Pitch **95 | 95** %

PS SB

### Engines

-2

**225** SFOC

ME SFOC **200** g/kWh

AUX SFOC **250** g/kWh

### Hull

-2

**95** %

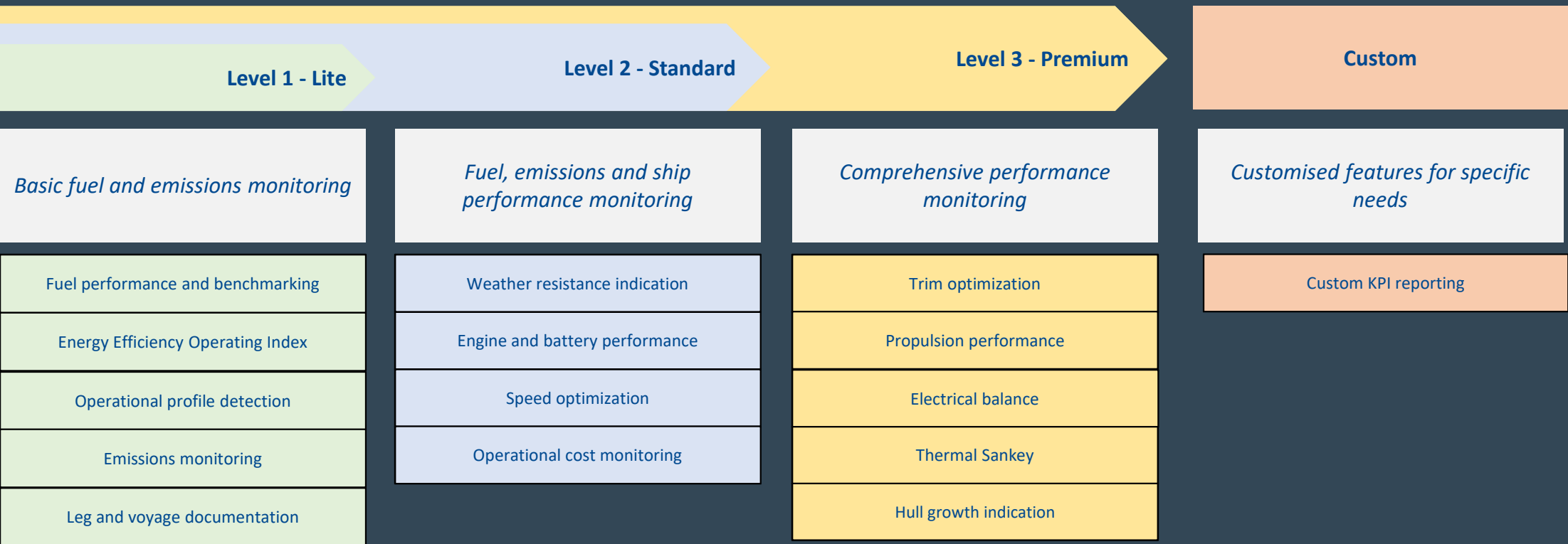
kW/kn **17.4**

### Engine Power

**7500** kW



# Energy Management



Dashboard

Fleet

Vessel

Map

Analysis

Reporting





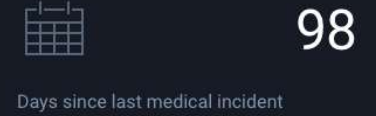
- FT T M SS DP2 DPS
- ATo ATe ADP P O

Top Five Vessels  
Best fuel performance, week 29

Ayame	7,9 % 136 m <sup>3</sup>
Eliza	4,2 % 317 m <sup>3</sup>
Petronia	2,1 % 328 m <sup>3</sup>
Zhou	0,1 % 853 m <sup>3</sup>
Jupiter	3,5 % 913 m <sup>3</sup>



Fuel Consumption Per Month



14,2 t/hr CO<sub>2</sub> ▲ 0.2%  
1,9 t/hr NO<sub>x</sub> ▲ 0.2%



[More Events](#)



Vessel

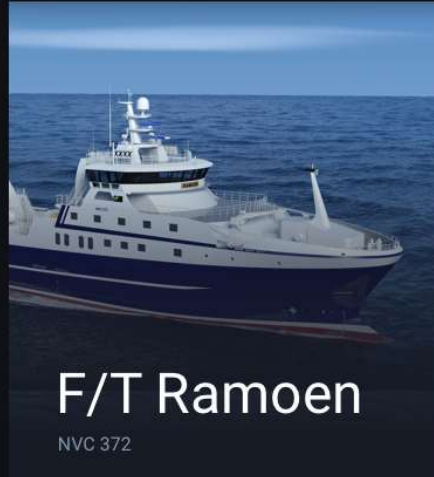
F/T Ramoen



July 2016

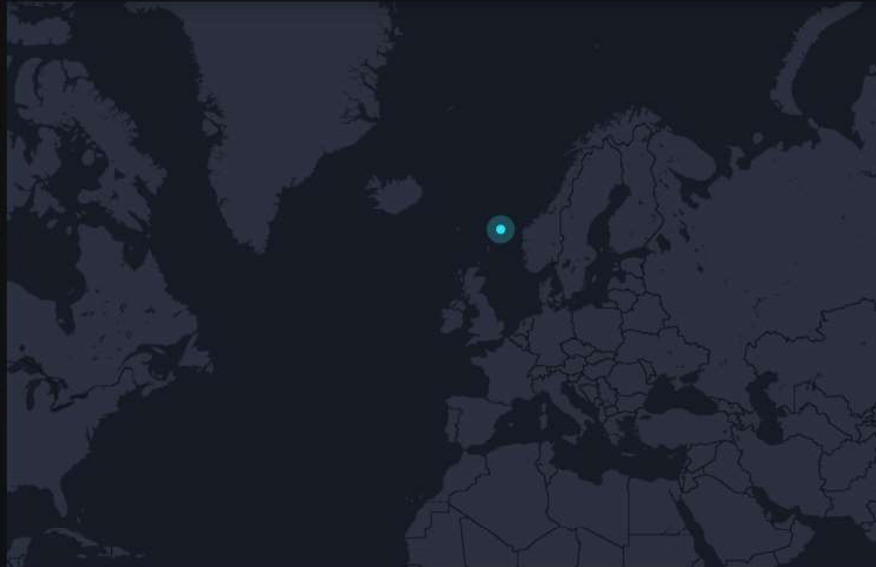


- FT Sailing
- T
- M
- DT Fishing
- ST
- P Port, other
- O



Main Engine  
1 x 3800 KW

Deadweight  
3500 mt



Avg. Sailing	Avg. Passive
68 % +0.2%	14,2 % +6.3%

Avg. Trim	Avg. Draught
1,4 m +0.2%	5,8 m +6.3%

Avg. Speed	Avg. EEOI Rating
12,1 kts +0.2%	12,3 +6.3%

Sailing	Passive
52 l/nm +0.2%	431 l/hr +6.3%

Port Side	Starboard Side
68 % +0.2%	69 % +6.3%



Vessel

F/T Ramoen



July 2016



POWER



ME1

RRM C25:33L 6A

408 m<sup>3</sup>

Total Fuel Use

2784 hr

Total Run Time

49.4 %

Avg. Load



RRM C25:33L 6A

MCR 1920kW

900/1000\*

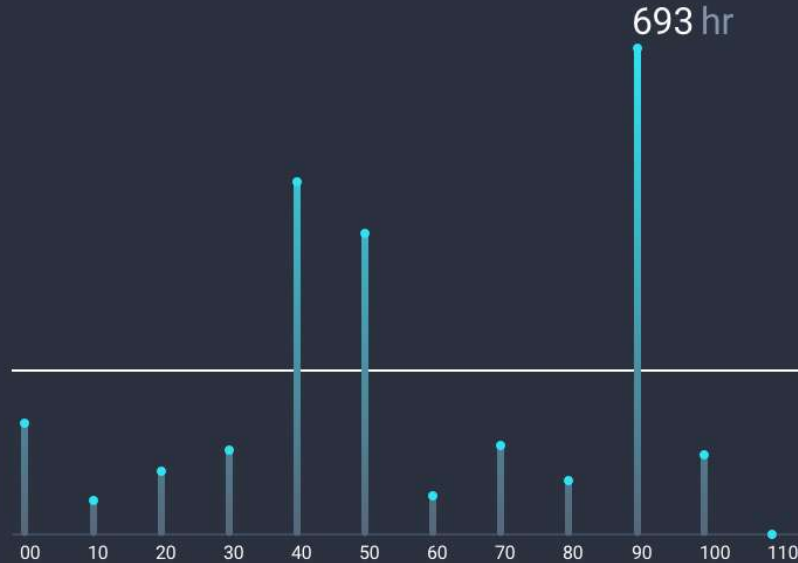
Engine Speed (r/min)

26.4/24.7

Mean Effective Pressure (bar)

Go to full [Fact Sheet](#)

LOAD PROFILE



OPERATION

OPERATION	RUN TIME (hr)	FUEL USE (m <sup>3</sup> )	PERFORMANCE (g/kWh)
Fast Transit	75	121	231
Transit	780	102	268
Manoeuvre	412	98	241
Double Trawl	112	12	193
Single Trawl	448	34	12
At Port	173	28	238
Other	102	6	201
<b>Avg.</b>	<b>300</b>	<b>57.2</b>	<b>198</b>



G1

66.3 m<sup>3</sup>

Total Fuel Use

192 hr

Total Run Time

88.5 %

Avg. Load



G2

66.3 m<sup>3</sup>

Total Fuel Use

192 hr

Total Run Time

88.5 %

Avg. Load



Questions?



Rolls-Royce