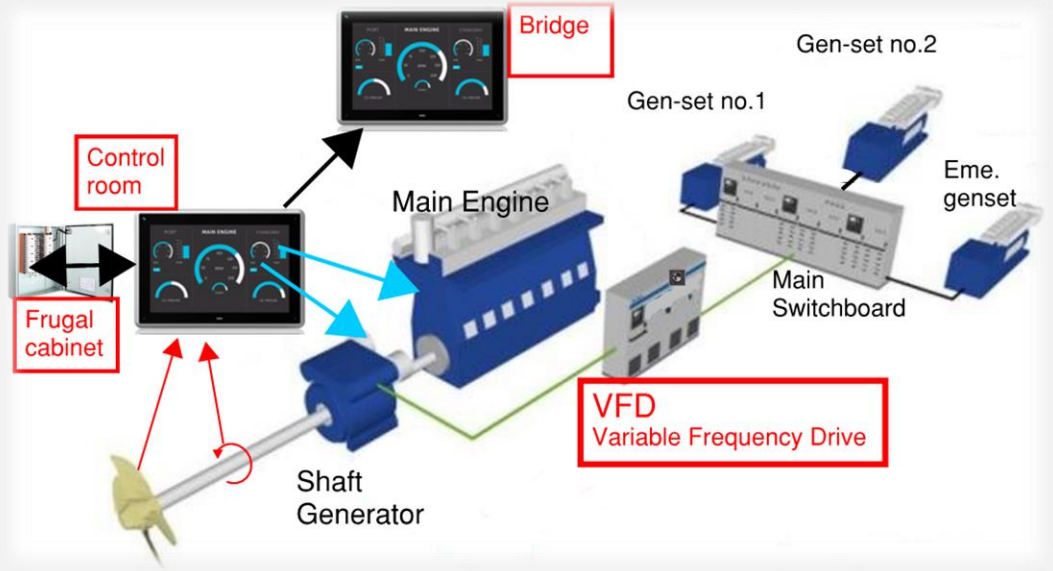
FRUGAL TECHNOLOGIES

FRUGAL PROPOLSION

Frugal Technologies is all about saving fuel and CO2 emissions.

Guarantied significant cost saving and CO2 emission reduction



Speed, Fuel consumption, RPM, Pitch, "Dybgang", Trim, Flow , Torque

Frugal Propolsion

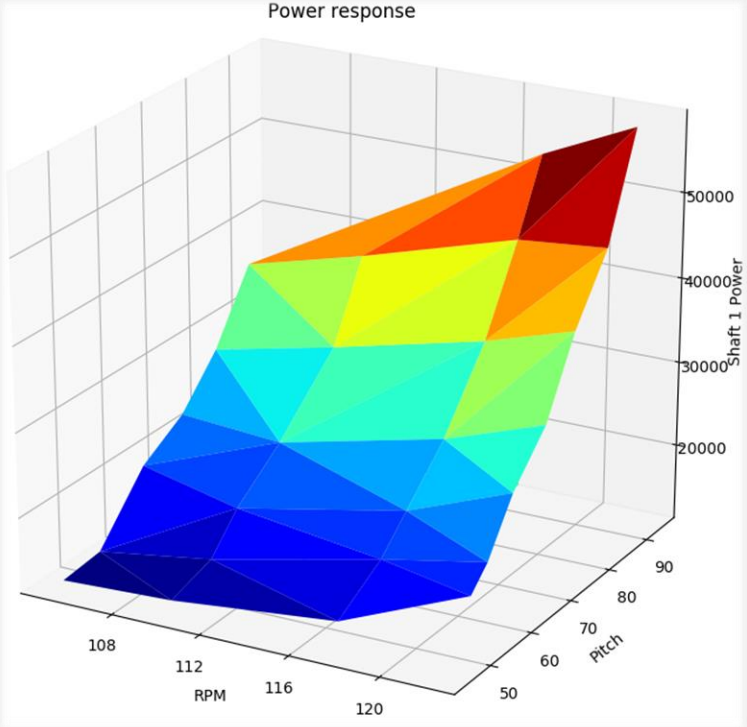
- Intelligent on-top system optimizing RPM and Pitch.
- Data collection from existing and new sensors
- Intelligent processing in cloud service
- Integration of VFD for power

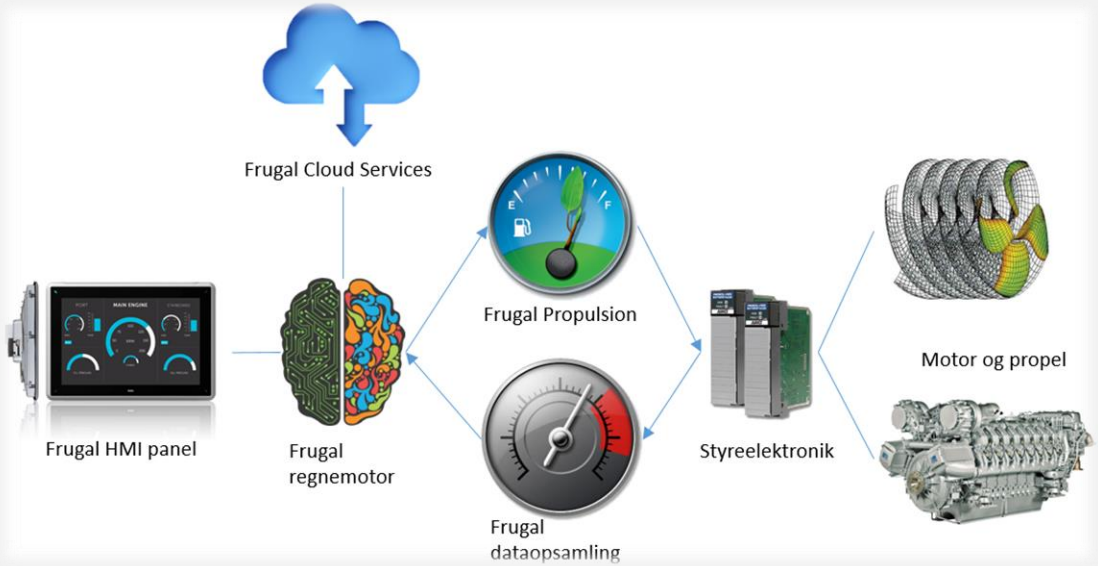
Gain

1. Proven fuel saving of +10% - saving money
2. CO2 reduction + 10% - environmental responsibility
3. Datacollection from ship
   - Surveillance of ship performance
   - Prediction of required maintenance

Advantages

1. Documented gain before purchase
2. Approved by class
3. Patented technology
4. Skilled technicians and installation in 5 days, 2 days along pier (60Hz ships)
5. Proven results from several solutions





Solution

Frugal Propulsion collects constantly
- Speed, Fuel consumption, RPM, Pitch, Draft, Trim, Flow , Torque

Intelligent algorithm dynamically learning ship behavior and performance

Based on selected speed the algorithm controls
- RPM
- Pitch

for optimum utilization of fuel

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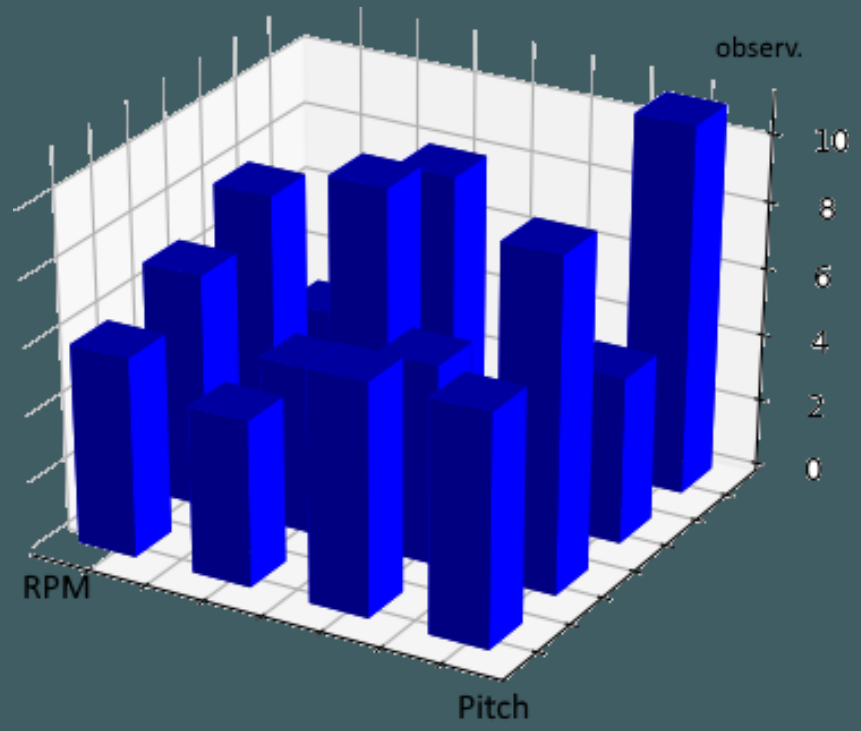
Solution – security first

Frugal Propolsion

- Approved by class
- On top system – all existing systems are maintained
- All existing security systems are maintained
- The solution is designed always to fulfill the engine load limits



Business case

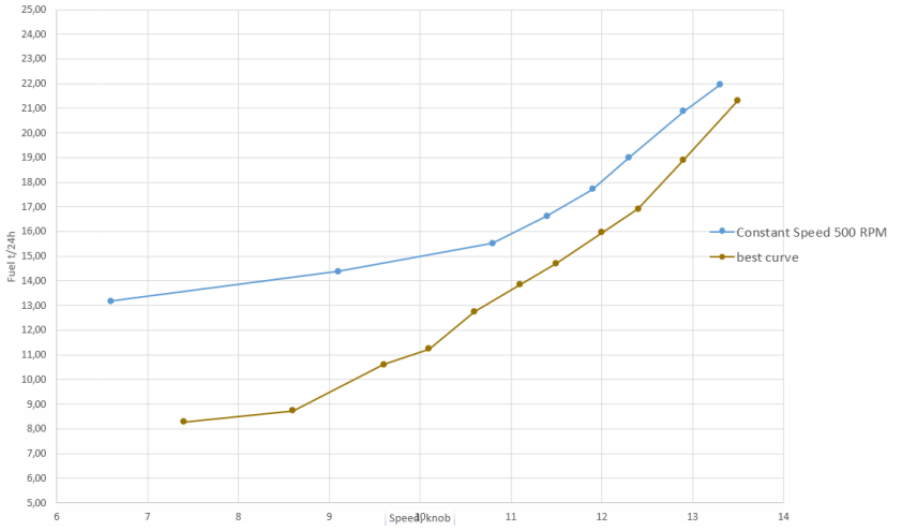
Before purchase the ships performance will be measured

Based on measurements the expected fuel saving is calculated

The business case is based on real measurements from the ship

Resultater

På Selandia Swan har vi udført en test primo januar 2018. De måledata vi har indsamlet, har vi omsat til kurverne herunder:



Bemærk at de to kurver herover begge er lavet uden belastningen fra akselgeneratoren. Det er ganske tydeligt, der er et stort besparelsespotentiale her. I runde tal ser det således ud ved udvalgte hastigheder:

HASTIGHED	BASELINE FORBRUG	BEST CURVE	BESPARELSE
10 KN	15 t/24hr	10 t/24hr	33%
11KN	16t/24hr	13,6t/24hr	15%
12 KN	18 t/24hr	16t/24hr	11%

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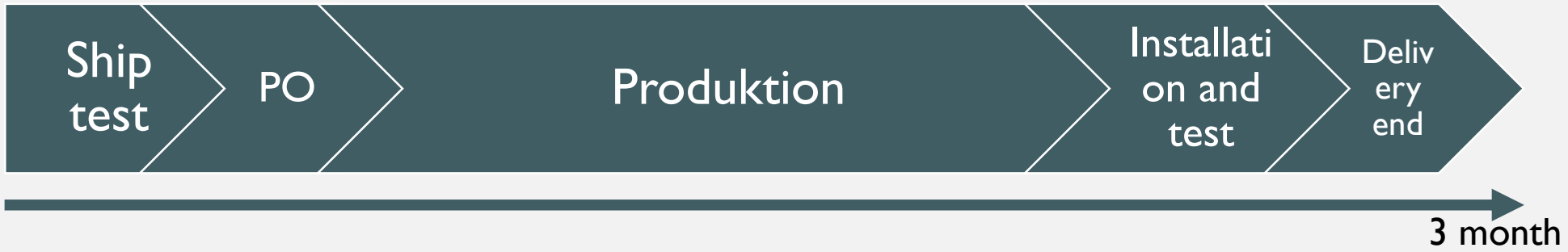
Business case

Fuel prices			
	Fuel type	Sulfer	Price USD
	HSFO	2,8%	502
	LSFO	0,5%	650
	ULSFO / MGO	0,1%	682
Fuel mix			
	HSFO	0%	
	ULSFO / MGO	100%	
Ship and engine			
	MCR	3.840	kW
	Utilisation	70%	
	Running h/year	5.500	Hours
	Specific consumption:	210	g/kWh
	24 h average consumption	8,5	mt/d
	Running day/year	229	days
	24 h consumption	14	mt
	Yearly consumption	3.105	mt

Average saving			
	Saving	12%	
Opex			
	Fuel cost pr day ex Frugal	5.801	USD
	Fuel cost pr day inc Frugal	5.105	USD
	Daily saving	696	USD
	Annal saving	**254.084**	USD
Capex			
	VFD KS Elektro	81.481	USD
	Frugal propolsion	74.074	USD
	Noris integration	14.815	USD
	Logimatic PLC	10.370	USD
	Cabeling	-	USD
	torque meter	14.815	USD
	Draft Sensors	-	USD
	Flowmeter	3.704	USD
	Class	11.111	USD
	Traveling	3.704	USD
	Total capex	**214.074**	USD
	Nox fonden	-	
Payback time		**0,84**	**Years**
		10,1	**Month**


Frugal Propolsion
Benefit
Adventage
Solutions
Business case
Offer


Ship test
PO
Produktion
Installation and test
Delivery end
3 month