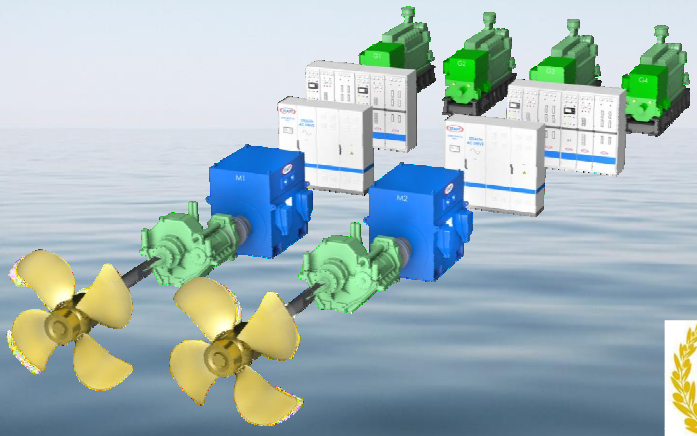
STADT
POWER TECHNOLOGY

Company presentation

STADT STASCHO NO LOSS DRIVE



Annual Offshore Support Journal conference & awards 2014 Environmental Award

The annual Marine Propulsion & Auxiliary Machinery Awards 2015

SUSTAINABILITY – PARTNERSHIP – RELIABILITY

ELECTRIC PROPULSION SYSTEMS

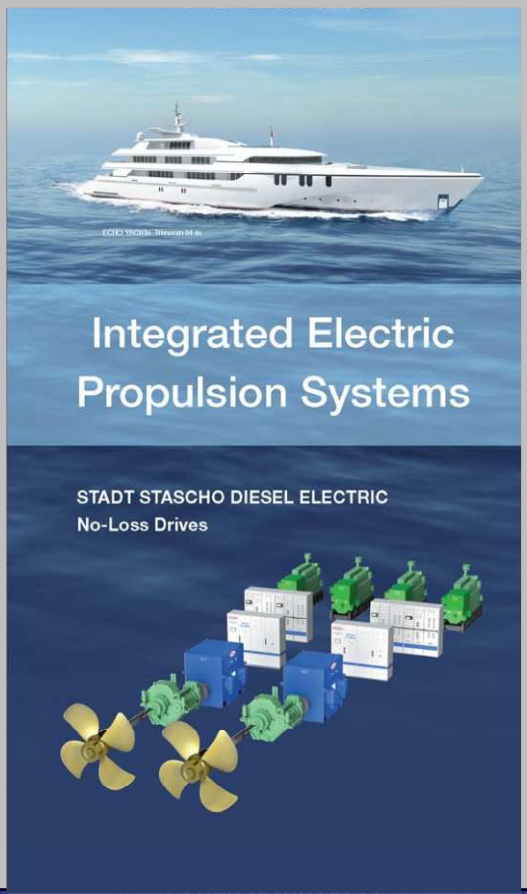
STADT

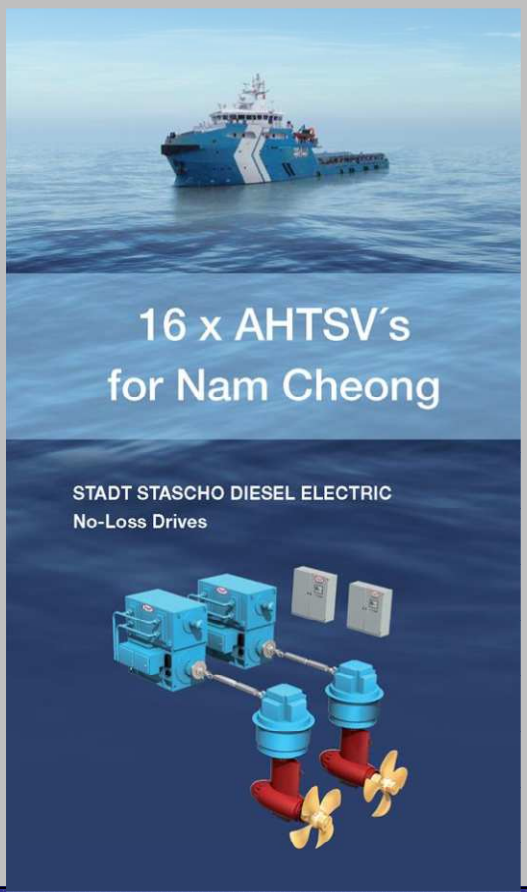
ELECTRIC PROPULSION ? ? ?

- NO WAY ! !
- To complex and vulnerable …
- Noise and disturbances
- EMC problems
- HIGH LOSSES
- SERVICE COSTS
- To big and heavy , NO SPACE for it
- To expensive
- RISKY BUSINESS !
- Not for our type of CREW

WELL BOAT – SEIHAV
3000 kW electric propulsion

SUSTAINABLE POWER TECHNOLOGY





SUSTAINABLE POWER TECHNOLOGY

OUR GREEN MISSION

SUSTAINABLE TECHNOLOGY

An optimization of:

- FUEL SAVING
- EMISSION REDUCTIONS
- RELIABILITY
- USE OF RESOURCES
- SIMPLICITY

STADT AS - Power Technology

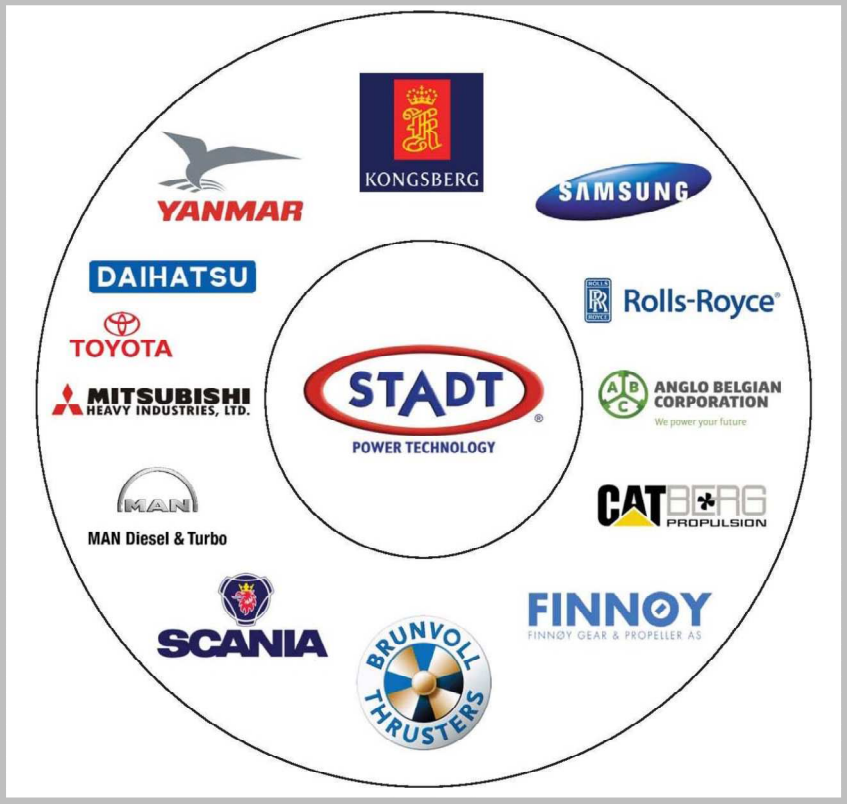
- Started in 1985 in Gjerdsvika
- Norwegian forerunner in AC DRIVES
- Complete electric propulsion for any ship type

SUSTAINABLE POWER TECHNOLOGY

STADT New Location 2015

SUSTAINABLE POWER TECHNOLOGY

SUSTAINABILITY- PARTNERSHIP- RELIABILITY



SUSTAINABLE POWER TECHNOLOGY

Design parameters

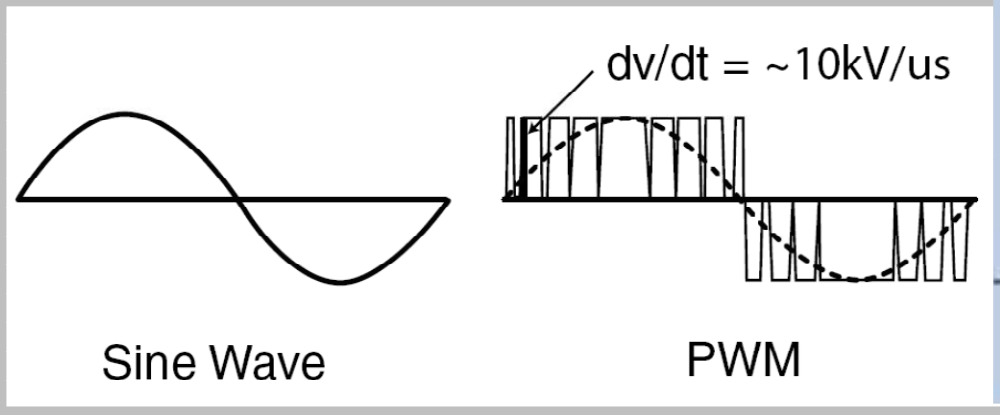
¤ VOLUME ¤ WEIGHT ¤TRANSFORMERS
¤ COMPLEXITY ¤ LOSSES ¤ EFFICIENCY
¤ SINUS vs PWM ¤ MAINS THD
¤ SCREENING OF CABLES
¤ BEARING CURRENTS
¤ AUDIBLE NOICE
¤ VOLTAGE
¤ PRICE

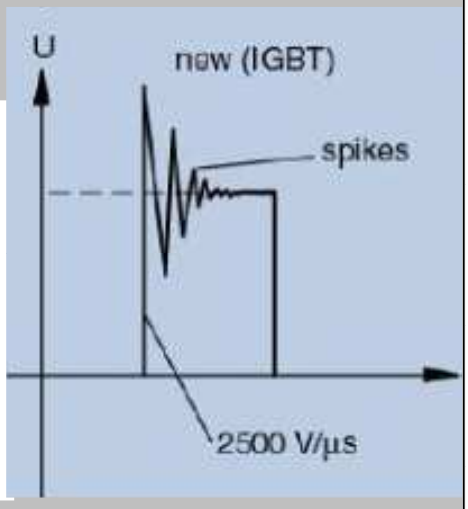
See our GUIDELINE

No-Loss Sinus-teknologi

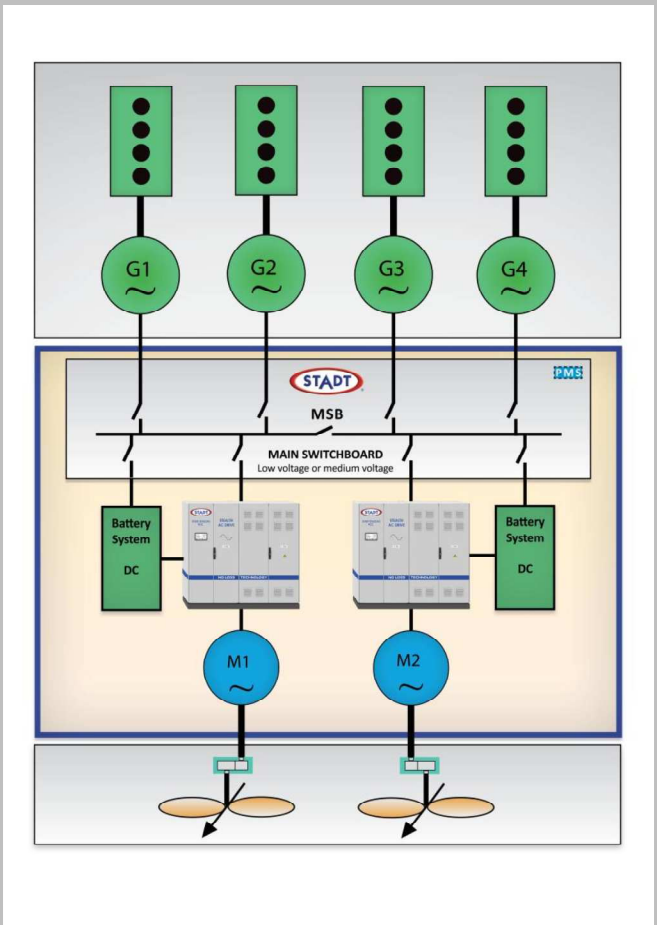
- SINUS or PWM : a major difference

Pulse With Modulation – the artificial sinus





PWM- the source for **EMC** problems, bearing damages, audible noice. Calles for Screened expensive cables, cable segregation, filtering, special motors etc.



- ROBUST AC TEKNOLOGI
- BATTERIKOMBINASJONAR
- 440 V 690 V 6600 V 11 kV
- Var. generatorturtal 45-65 Hz

16 pcs AHTSVs for Nam Cheong

2 SSVs for Vestland Offshore at Cemre

SUSTAINABLE POWER TECHNOLOGY

4 Offshore SSVs for PGS At Besiktas Shipyard

SUSTAINABLE POWER TECHNOLOGY

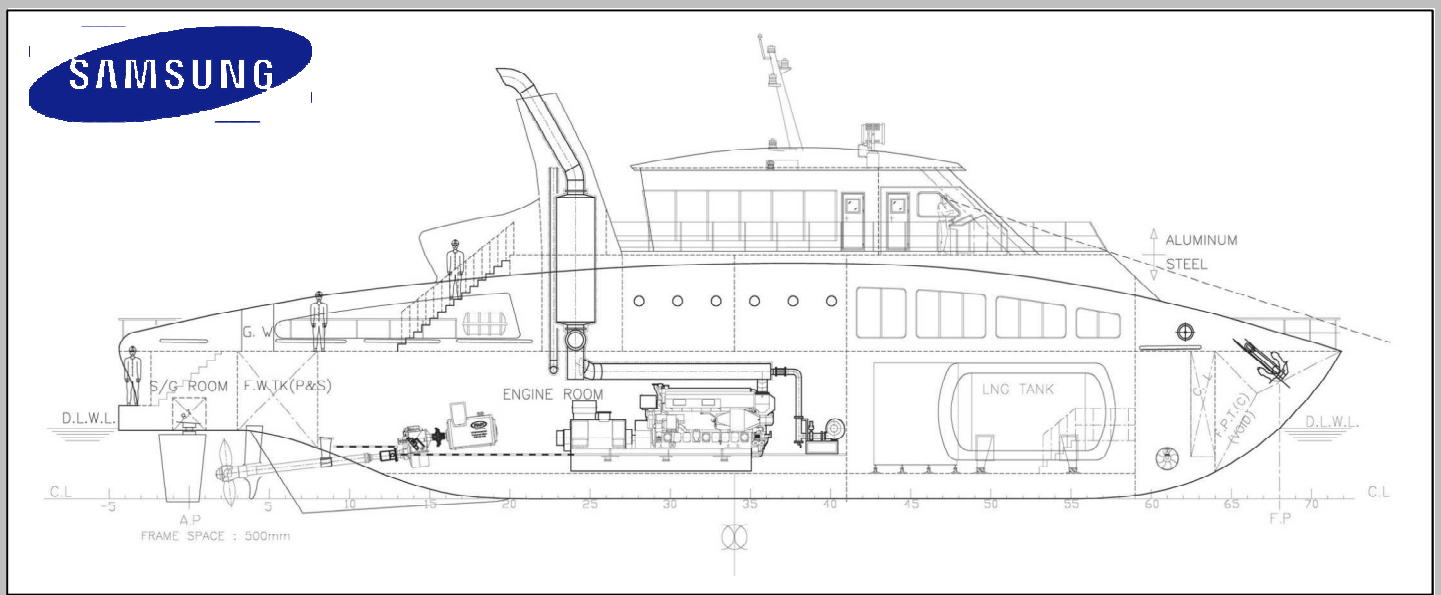
Dual fuel LNG electric propulsion

STADT NO-LOSS at MV `` Econuri ``

SUSTAINABLE POWER TECHNOLOGY

Dual fuel LNG electric propulsion

STADT NO-LOSS installation nr 7



SUSTAINABLE POWER TECHNOLOGY

85 meters luksusyacht - 4200 kW propulsion

SUSTAINABLE POWER TECHNOLOGY

NY 120 meter super trimaran

Performance wise she will achieve a top speed of 20 knots and a maximum cruising range of around 5,000 nautical miles. Suited to various propulsion systems including hybrid diesel electric with CP propellers, the trimaran will provide lower running costs and exemplary sea keeping.

6 generatorar

2 x 3750 kW prop

SUSTAINABLE POWER TECHNOLOGY

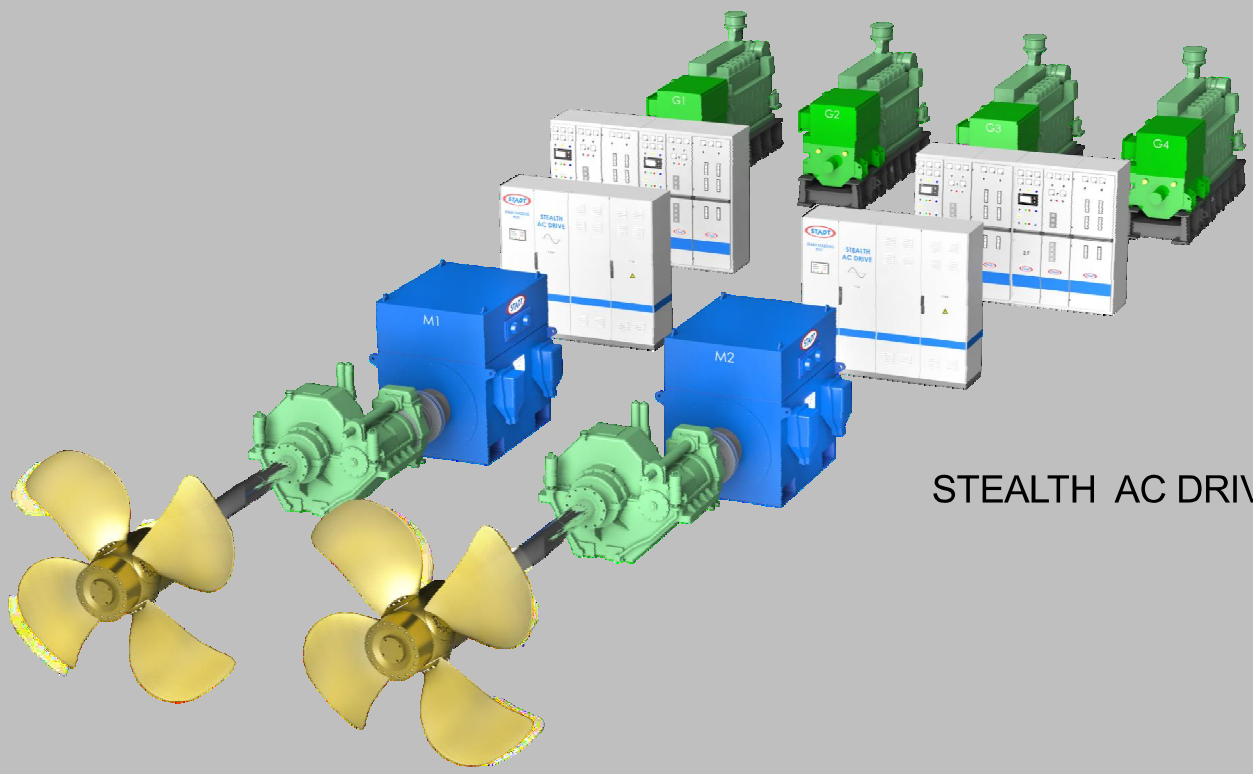
MS SANCO STAR
MS SANCO SPIRIT

STADT D.E. PROPULSION 5000 kW using our 5. generation STASCHO -
Successfully in operation since 2008

SUSTAINABLE POWER TECHNOLOGY

STADT STASCHO

NO LOSS AC DRIVE WITHOUT TRANSFORMERS



STEALTH AC DRIVE

SUSTAINABLE POWER TECHNOLOGY

MS MELØYFJORD

STADT D.E. PROPULSION 1400 kW using our 5. generation STASCHO

SUSTAINABLE POWER TECHNOLOGY

FLEXIBILITY IN MAKE

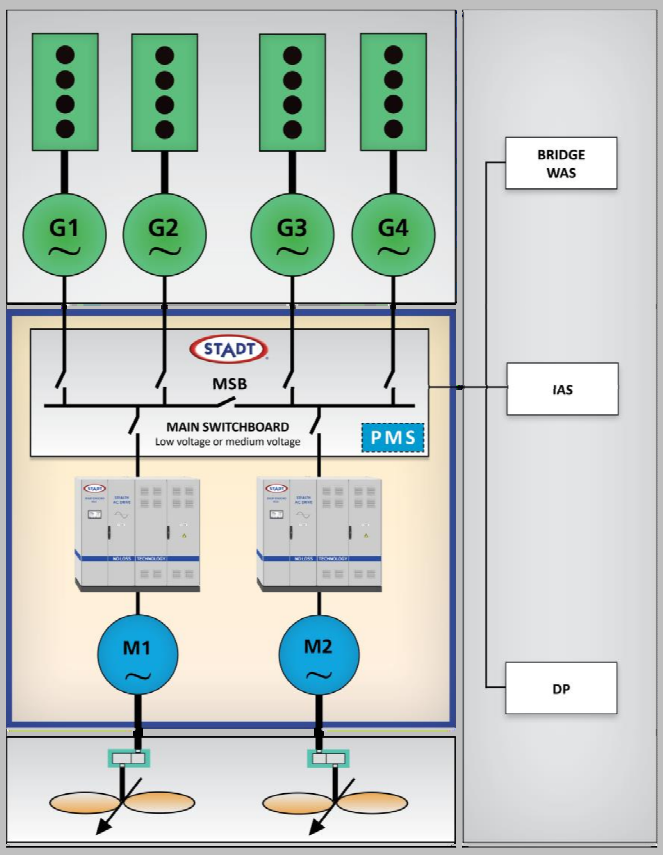
DIESEL OR LNG GENERATORS

ABC, CATERPILLAR, CUMMINS, DAIHATSU, DETROIT, EMD, GE, HYUNDAI, MAN B.W., MAK, MITSUBISHI, RR, SCANIA, VOLVO, WARTSILA, YANMAR

STADT – When reliability counts

PROPELLERS IN CPP DESIGN

BERG, BRUNVOLL, ESCHER, FINNØY, HELSET, HEIMDAL, HUNDESTED, KAMOME, KAWASAKI, MAN B.W., RR, SERVOGEAR, SCANA VOLDA, VOITH, SCHOTTEL, VEST MEKAN, WARTSILA, ZF



AUTOMATION

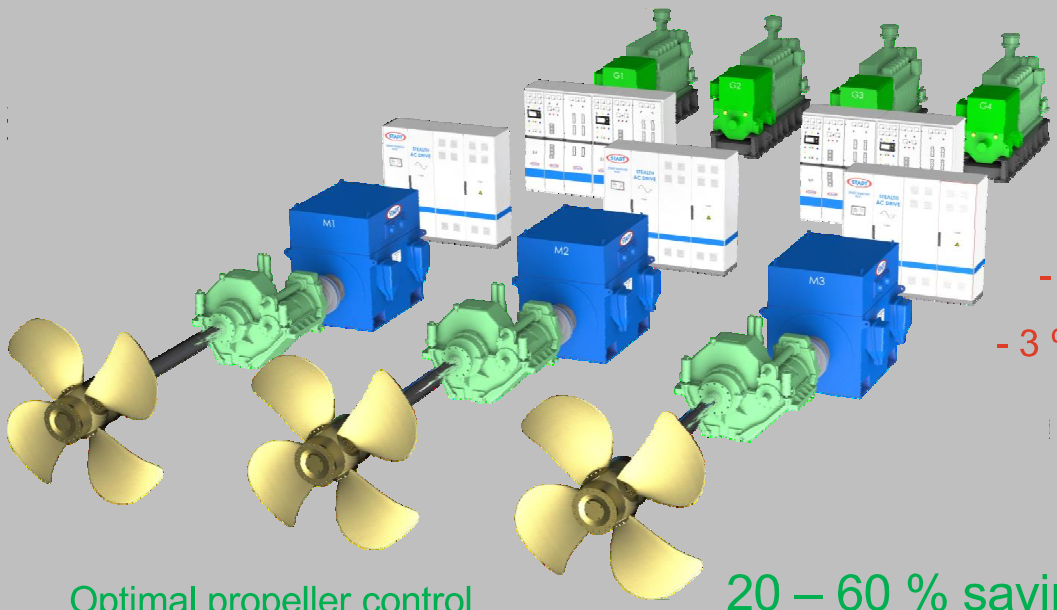
SUSTAINABLE POWER TECHNOLOGY

Where are the savings?

Slow steaming optimisation

No Aux gensets needed

Dynamic generator operation: 1 to 4 - load dependent



- 3 % in alternator
- 0 % in trafoes
- 0 % in No-Loss Drive
- 3 % in AC Motor

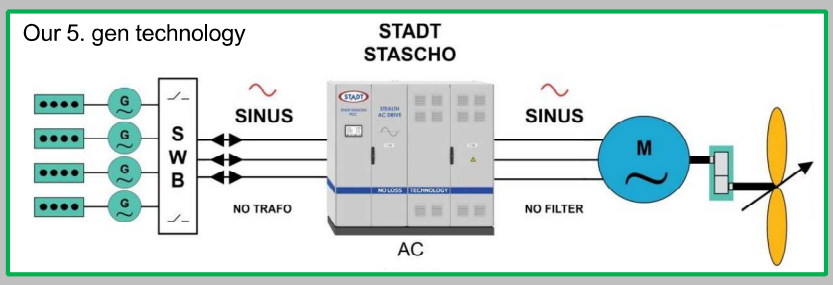
Optimal propeller control

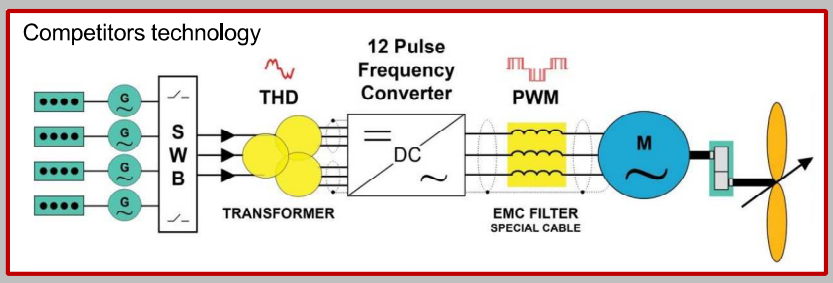
20 – 60 % savings are possible

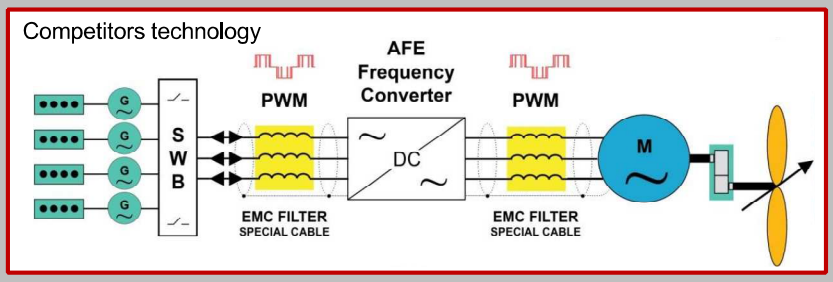
STADT STASCHO Benefits

- **Electric losses** reduced by up to 55 %
- **Weight** reduction of 80 % vs AFE
- **Volume** reduction of 85 % vs AFE
- **THD and EMC** eliminated 100 % - Unique STEALTH
- **Redundancy** built in to all items
- **Lifetime** improved from 10 to > 25 years
- **MTBF and MTTR** improved several folds
- **FUEL SAVINGS** – the best in class

Technology comparison







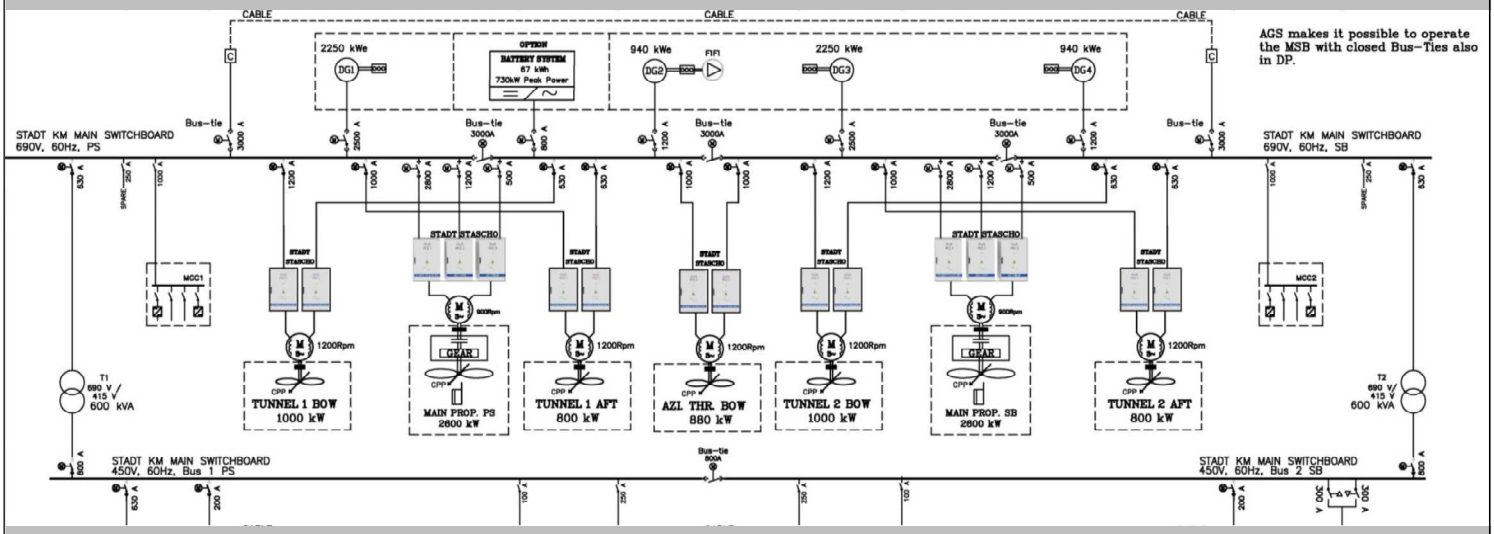
Huge differences

- TRANSMISSION LOSSES
- ECONOMICAL LIFETIME,
- MTBF, MTTR
- REDUNDANCY
- EMC, THD
- VOLUME, WEIGHT
- COMPLEXITY
- **PWM RELATED ISSUES:**
- Electric and acoustic noise
- Bearing currents
- Voltage stress, cabeling
- AC versus DC systems
- PRICE, SERVICE COST

SUSTAINABLE POWER TECHNOLOGY

STADT SOLUTION FOR CONSTRUCTION VESSELS

- For the highest ERN and operation safety requirements -

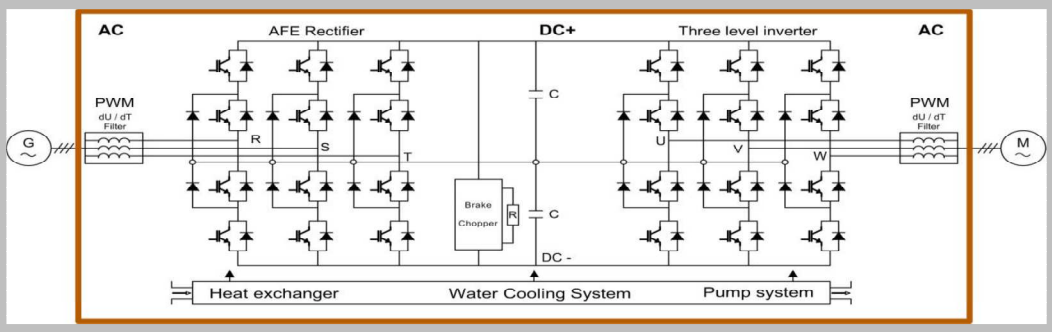


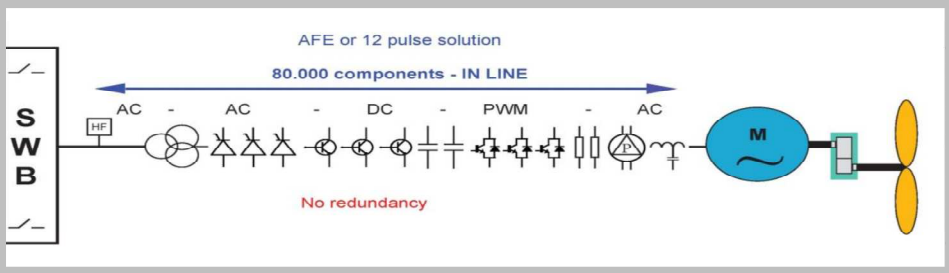
SUSTAINABLE POWER TECHNOLOGY

AFE – PWM

This is our competitors technology.

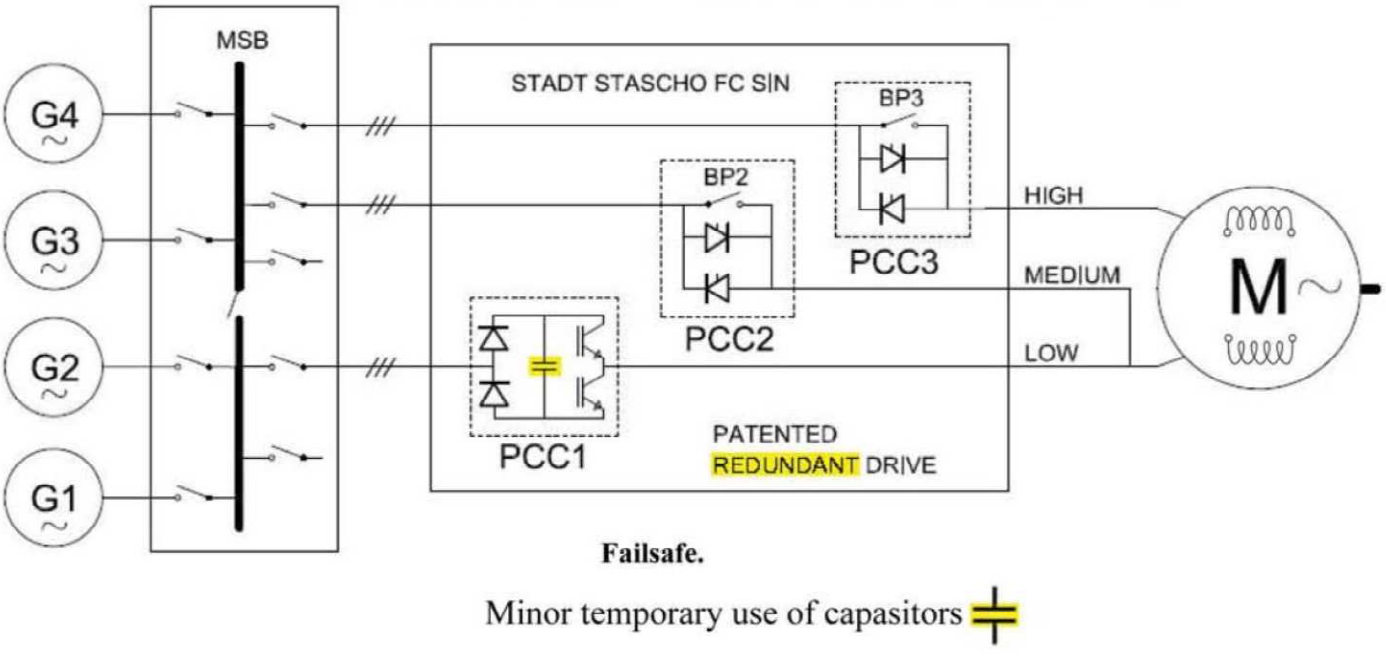
Very complex, Noisy, and Expensive. Creates 6 % higher losses than our No-Loss drives





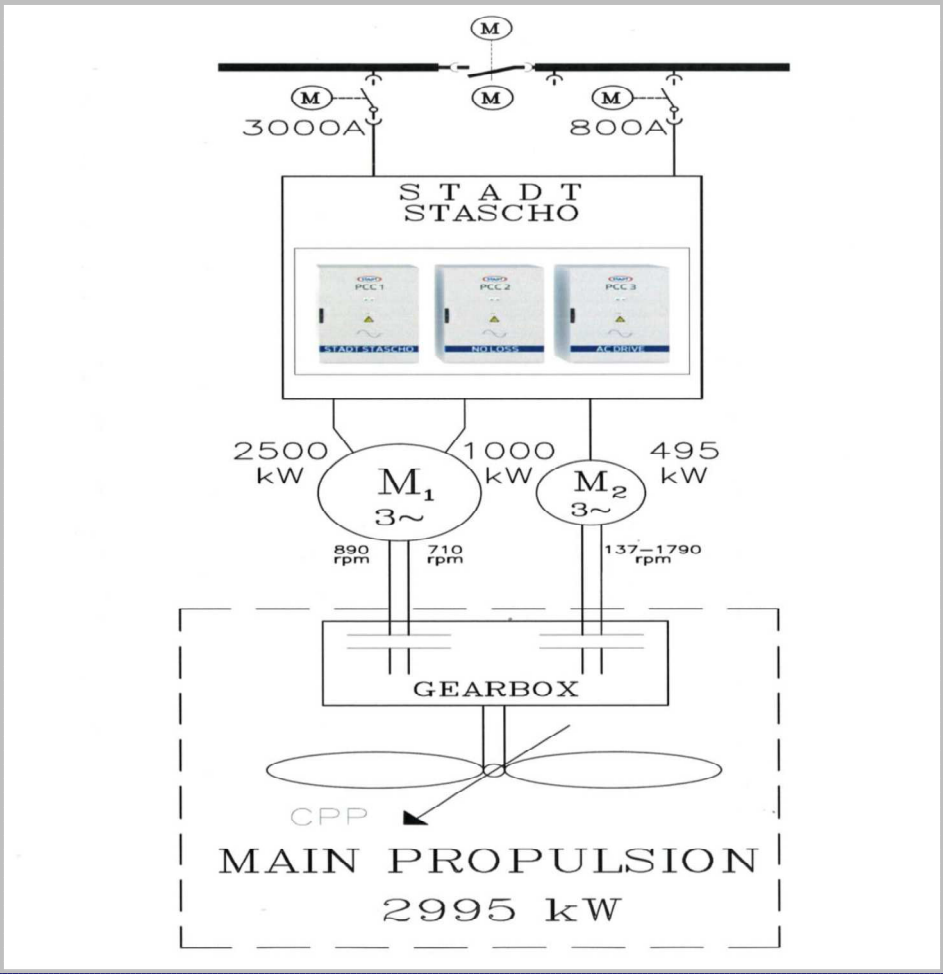
Redundant STADT technology

How it is arranged electrically in one of the STADT STASCHO models:



Failsafe.

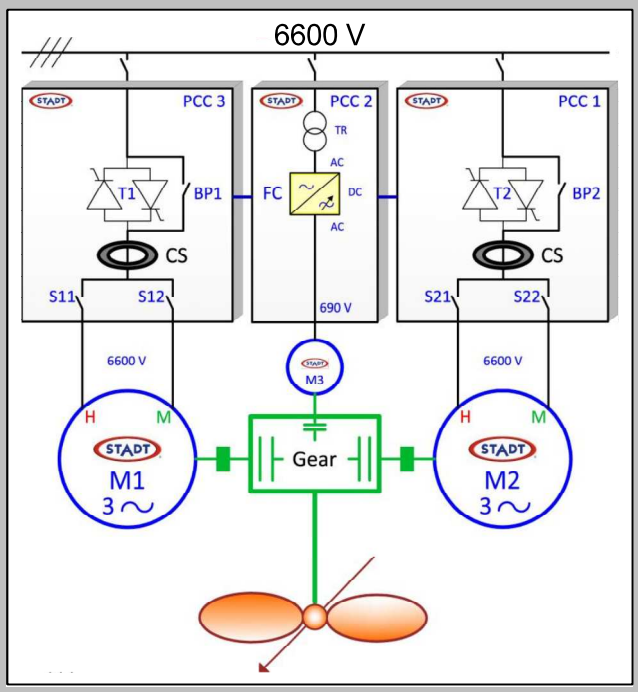
Minor temporary use of capasitors



STADT STASCO IN SINGLE SCREW :

0- 495 kW
0- 1000 kW
0- 1495 kW
0- 2500 kW
0- 3000 kW

STADT STASCHO MODELS



PATENTED

TRIPLE REDUNDANT DRIVE 6600 V

3 electric motors - 5 windings

Twin input gearbox + PTI

Combination of 690 V and 6600 V

IDEAL FOR SINGLE SCREW

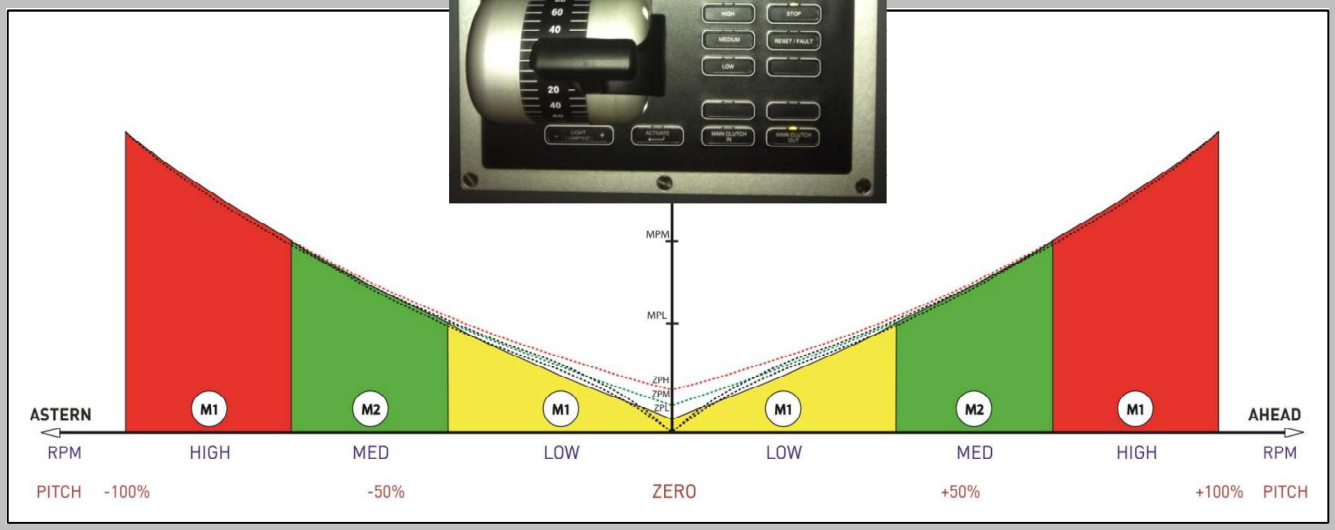
UP TO 50 MW

One of several 6600 V models.

Redundant STADT drives

A DRIVE FAILURE WILL ONLY LIMIT THE PROPULSION POWER

PROPELLER CONTROL



STADT STASCHO

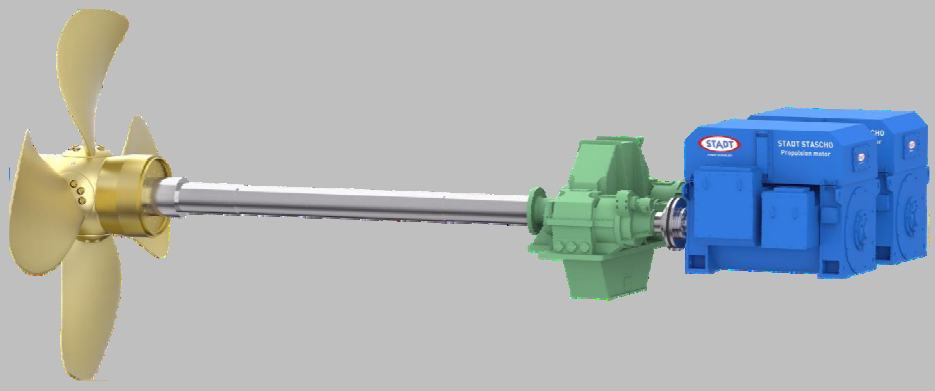
Proven NO LOSS technology

- Model range 100 kW to 100 MW
- In all voltages from 220 V to 15 kV
- Several types of configurations
- Easy, reliable, cost effective, no loss
- Patented sine wave technology
- Utilise CPP propellers control
- DNV-GL, ABS, BV, KR & NMD approved

SUSTAINABLE POWER TECHNOLOGY

CPP Propellers in any power

The Propeller can be made by a long list of companies that we cooperate with



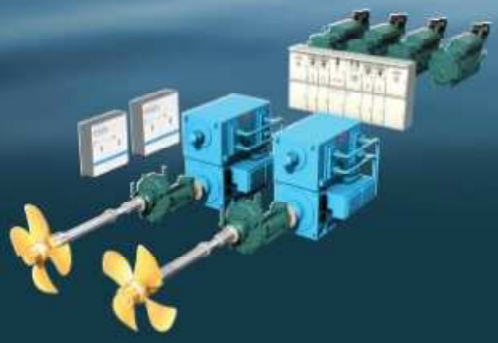
Examples, not STADT deliveries : THE ”MAKIN ISLAND” **2 X 35 MW CPP**

SUSTAINABLE POWER TECHNOLOGY

STADT

POWER TECHNOLOGY

STEALTH AC drives for the full electric warship



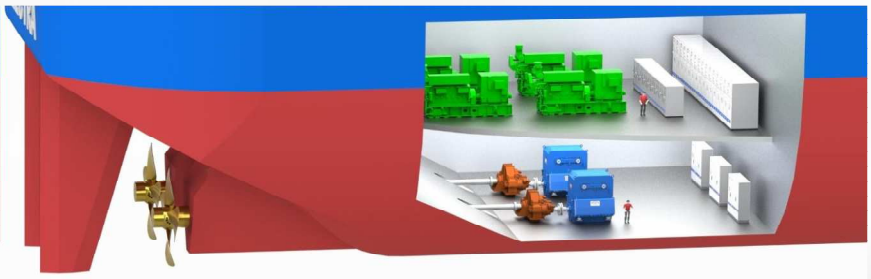
- No electromagnetic interference, EMI, due to sine wave operation
- No harmonic voltage distortion, THD, on the ship
- No transformers for the propulsion are needed
- No electric losses in the drives at normal operation (BP)
- No torque pulsations in AC motor
- High redundancy in all levels of the drive systems
- Major reduction of space and weight for the drives
- No need for screened power cables and cable segregation
- Minimal need for cooling of drives and its systems
- Environmentally friendly and economical operation
- Extended operation range due to fuel efficiency
- Rugged and very well proven technologies, 6 vessels in operation
- MTBF and lifetime improved dramatically compared to competitors
- Simplified technology , 80 % reduction in number of components

Silent - by all means

SUSTAINABLE POWER TECHNOLOGY

Large ship solutions three-fuel-electric

STADT



SUSTAINABLE POWER TECHNOLOGY

WHY CHOOSING STADT :

- *UNIQUE NO LOSS STEALTH DRIVE TECHNOLOGY*

- *ROBUST – REDUNDANT- LONG LIFE TIME*
- *COMPACT FOOTPRINT and LOW WEIGHT*
- *EASY INTALLATION AT YARD – NO EMC NO THD*
- *EASY MAINTENANCE FOR SHIP OWNER*

- *FLEXIBILITY IN PACKAGE ARRANGEMENT*
- *PARTNER FOR LIFETIME OF THE SHIP*

- *EXPERIENCED INTERNATIONAL SYSTEM PROVIDER*

FOR YACHTS – OSV – MILITARY VESSELS - TANKERS

SUSTAINABLE POWER TECHNOLOGY

STADT AS

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Email: hallvard@stadt.no

Web: www.stadt.no

Contact: Man. Dir. Hallvard L. Slettevoll

TRUST US IN YOUR NEXT VESSEL

SUSTAINABLE POWER TECHNOLOGY