HYBRID ELECTRIC DC – POWER GRID, A FUTURE PROOF SOLUTION FOR DREDGING VESSELS

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Introduction Bakker Sliedrecht

Key Company info

01

Dredging & offshore

Land based

NAVAL

Yachts

800+ employees
BSEI+RH Marine

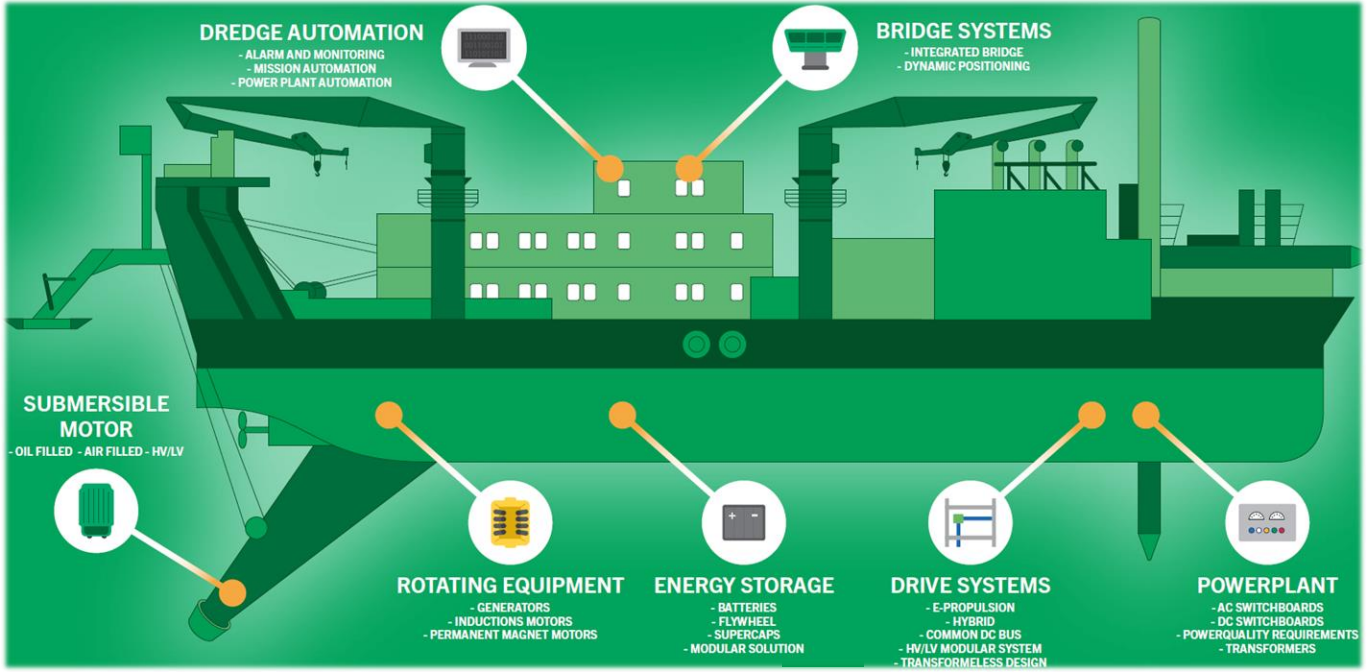
Average of 15+ years of experience

Located in the hart of the Dutch/Belgian Dredge industry

Introduction Bakker Sliedrecht

Broad Capabilities

01



- SYSTEM ENGINEERING
- INTERFACE DESIGN
- CABLE ROUTING
- SUBCONTRACTOR ALIGNMENT
- COORDINATION WITH CLASSIFICATION SOCIETY

Introduction Bakker Sliedrecht

Broad experience in the dredging industry

01

CALLAN MARINE
…safety…integrity…quality…

Royal IHC

DJN

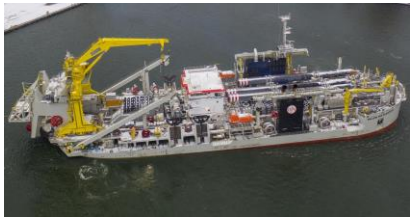
شركة الجرافات البحرية الوطنية
NMDC

DEME

Van Oord
Marine ingenuity

HUTA MARINE

Boskalis



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Case study Hybrid DC for a TSHD

A question from the industry

02

Interest for DC – Grid Solutions is growing. Both in Europe and the USA

- Can DC help to reduce environmental impact?
- Will the overall system size be smaller?
- Can a DC grid make my vessel ready for future technology?
- What is the difference in OPEX and CAPEX?

Can Bakker Sliedrecht make a comparison between AC vs DC Electric grid for a dredge?

Case study Hybrid DC for a TSHD

DC Grid – Benefits and Barriers

02

Benefits for introducing DC grid

- Improve efficiency of the prime mover (Using Variable speed generators)
- Savings on weight and required floorspace
- Faster and less complex integration of parallel generators
- Easier load-sharing over power sources
- Implementation of future technologies

Barriers for introducing DC grid.

- Too complex/ not as much used as AC
- Protection and safety, DC current harder to break
- Technical availability of parts
- Implementation by yard or Electrical integrator

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Case study Hybrid DC for a TSHD

Reference vessel for study

02

Reference vessel for Case-study

Length :	328ft (100 m)
Width :	82ft (25 m)
Capacity :	6500 Yd3 (5000m3)
Installed power :	4x 4000HP (3000kW)

General technical assumpions

- Diesel/Electric propulsion
- Main switchboard only (690V)
- Auxiliary switchboard not taken into account
- Main consumers 3 jetpumps, 2 dredge pumps and 2 bow thrusters.

Case study Hybrid DC for a TSHD

Conclusions from paper

02

Main conclusions from Case Study

- Traditional barriers are broken through technical developments
- Fewer components (impact integration/ installation / maintenance)
- Improve grid stability (Freedom Frequency / handle reactive power)
- Easier load sharing over different generators (or future ESS)
- Lower weight and required floorspace

	AC – Grid (12 pulse drives)	DC Hybrid Grid
REQUIRED FLOORSPACE IN M2	54	23
DIFFERENCE IN %		59% less space
WEIGHT IN KG	68950	25950
DIFFERENCE IN %		62% less heavy
COST DIFFERENCE IN %		17% less costs

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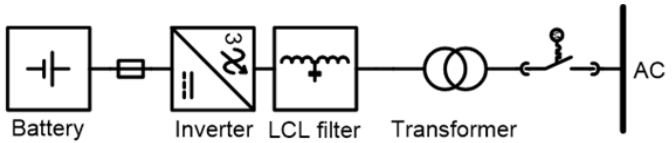
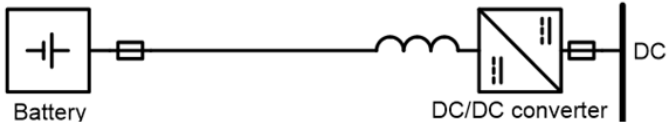
Adding Power: What can an ESS do?

03

Adding additional power sources (generated or stored) is easier in a DC-grid.....

.....but why would you do it?



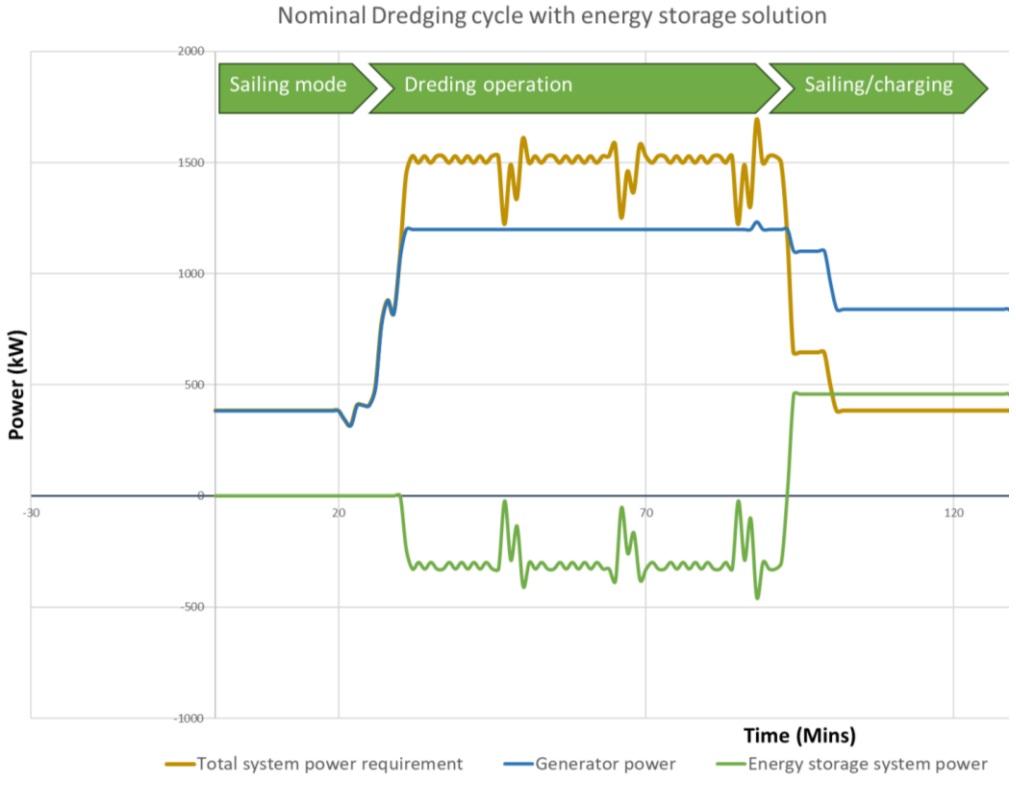


Adding Power: What can an ESS do?

03

Benefits of added ESS functionality

- Optimization of (diesel) powerplants
- React on end-costumers demands (emission free harbor operation).
- Ready for future fuels/technology



Futher possibilities Hybrid DC-power Grid 04

- Introduce DC grid solutions on other dredge equipment (CSD, crane barges etc)
- Add shore power functionality
- Full electric dredging

THANK YOU!

#BOOTH 531

ABOUT BAKKER SLIEDRECHT

We push technological boundaries for electrical installations and automation systems.

As system integrator, we provide innovative solutions for power and automation systems requiring high and specific demands like dynamic power requirements in high voltage ranges, low emission standards, and compact and redundant design criteria.