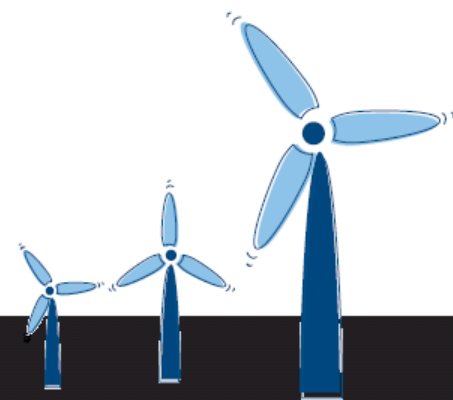


MEPRODUCTION

MEKANORD · TOPPENBERG · MARINE EXHAUST TECHNOLOGY



mekanord

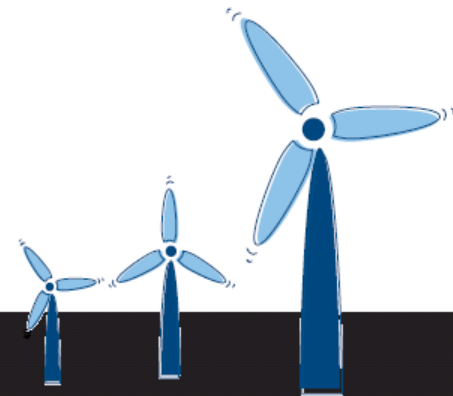
Gearbox Excellence. . .



MEPRODUCTION

MEKANORD · TOPPENBERG · MARINE EXHAUST TECHNOLOGY

- **Business Concepts**
- **Design and manufacturing of Controllable Pitch Marine Gearboxes**
- **Service and repairs of marine and **wind** gearboxes**
- **Design and manufacturing of Scrubbers for NOx and SOx wash out**
- **Specialized subcontracting work**



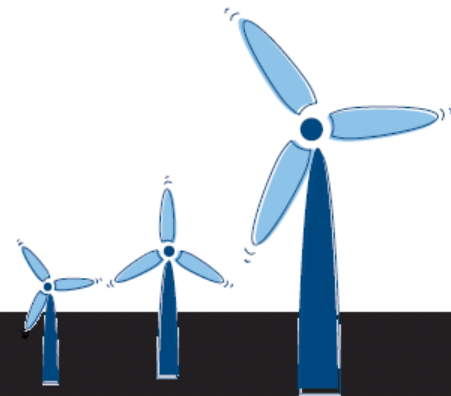
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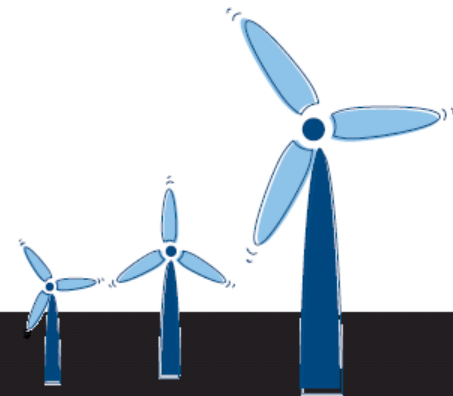
Mekanord brand stands for

- Own design for marine gearboxes
- Manufacturing in Frederikshavn
- More than 1500 marine gearboxes delivered
- More than 200 repairs for wind gearboxes delivered
- More than 12 years repair know how for gearboxes for windturbines
- Specialized in service



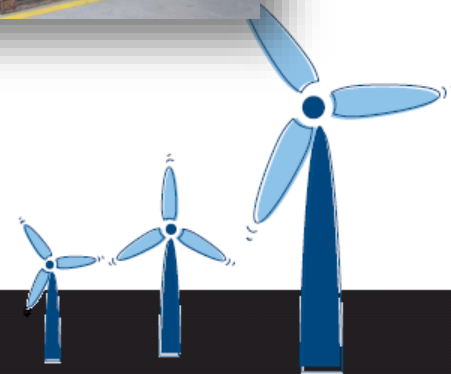
Why Mekanord?

- Quality repairs at competitive prices
- ISO certified procedures
- In house gearbox development and engineering
- Only high quality suppliers are used
- All gearboxes are spin tested
- 24 months warranty + extended warranty
- Delivery of accessories on request
- Short delivery times
- Plug and play solutions on request
- Extended insurance – in warranty period



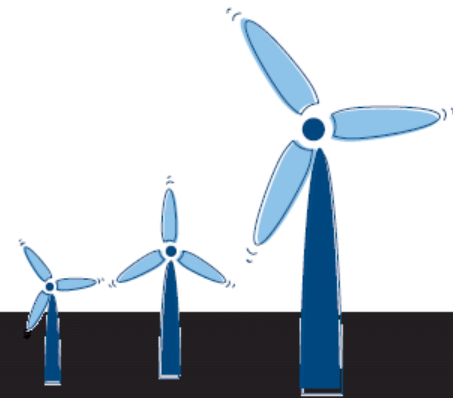
Business Concepts - Wind

- Repair of gearboxes
- Upgrading of gearboxes
- Delivery of exchange gearboxes



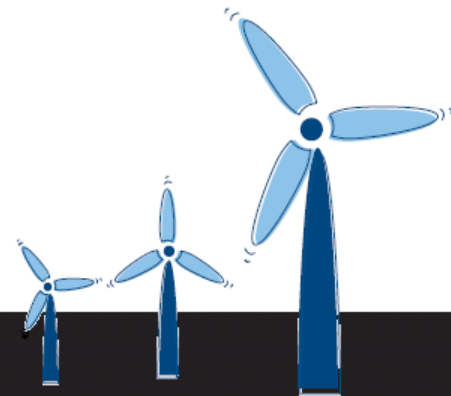
Key competences

- **Repair of all gearbox types, sizes and makes**
- **Production facilities – state of the art**
- **12+ years of experience from refurbishment of gearboxes for all kinds of wind turbines**
- **Gearbox exchange pool**



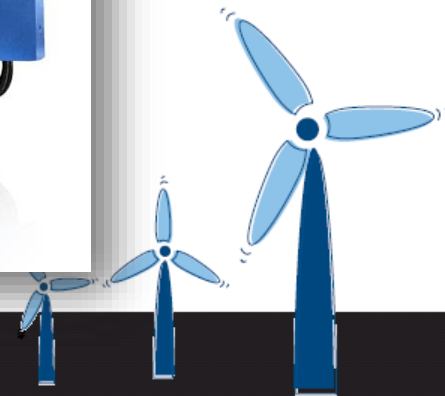
Re-engineering

- **Up to date calculation, design and software tools**
- **Analysis of Gearbox Conditions**
- **Design of customized gearbox retrofit and upgrade solutions**
- **Reengineering and improvement of spare parts**
- **Supply of original parts from OEMs**
- **Supply of reversed engineering parts**



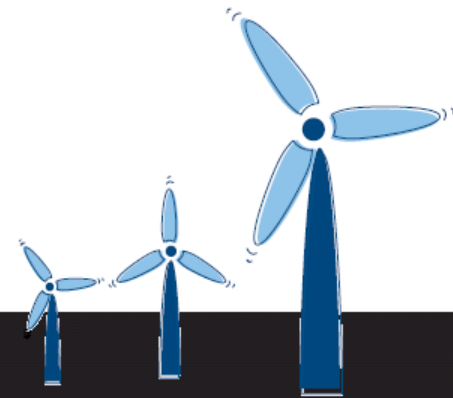
Upgrade solutions

- Bearing configuration upgrades
- Alarm kit for oil temperature and level
- Design and supply of gearwheels
- Oil filtration and enhanced lubrication kits
- Cooling systems
- Customized upgrades



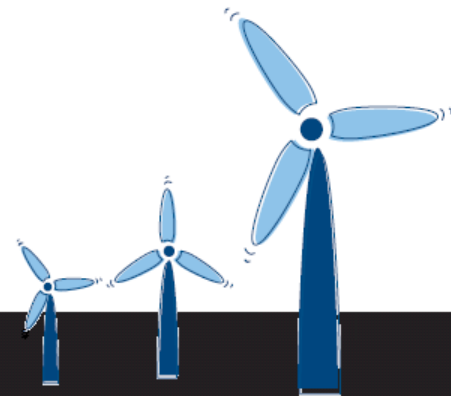
Workshop

- Handling of gearboxes of up to 32 t
- In house separate disassembling and assembling areas
- Cleaning facilities
- Clean room assembly procedures
- Integrated test facility
- Paint facility
- Separate warehouse facilities



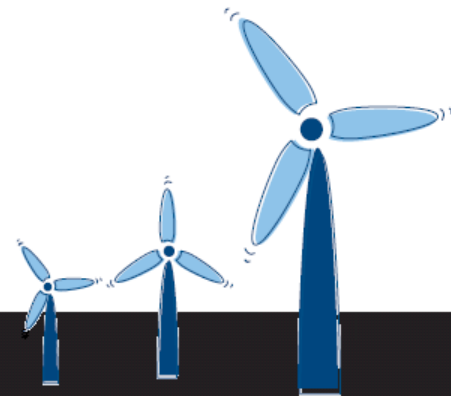
Workflow for a typical repair

Reception of gear box	1 day	
Disassembly/cleaning	5 days	
Failure detection/analyses	1 day	
Supply of Bearings/sealing's		1 week
Reassembly	5 days	
Spin testing/painting	2 days	
Forwarding	1 day	
<u>Days in total</u>	<u>15 working days</u>	



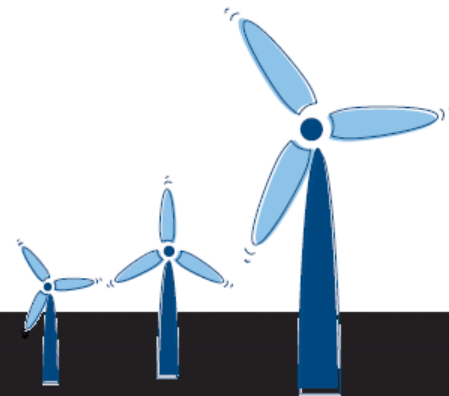
Quality discussions for a standard repair

- Visual inspection
- Hand polishing of all gear teeth
- No regrinding – replacing of wheels
- All bearings replaced
- All gaskets and sealing's replaced
- Spin testing
- Flushing ISO 4406 on request
- Load test on demand
- Spare parts from original suppliers
- Reverse engineering for gearwheels if necessary



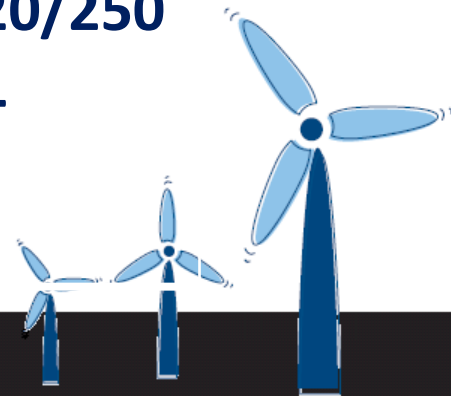
Quality

- ISO 9001:2008 quality system certification
 - Accreditation by BUREAU VERITAS
- All designs and processes approved by major classification companies



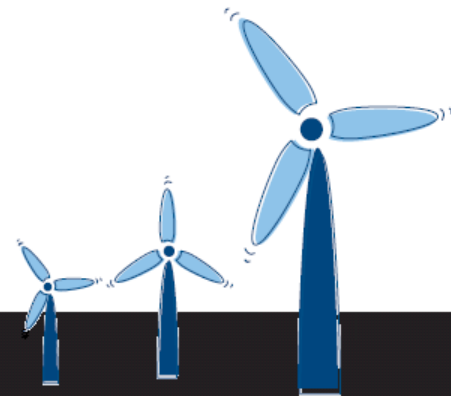
Reference list – repairs, type of gearboxes

- Hansen EH 804A
- Hansen EH 801 L31
- Hansen EH 55 G21
- Hansen EH 553 G21
- Winergy PEAK 4280
- Winergy PEAC 4300
- Winergy PEAS 4375
- Flender SDAK 1550
- Flender SZAK 1400
- Flender SZAK 2425
- Flender PEAK 4224
- Flender PEAK 4300
- Rexroth GPV 305 S
- Rexroth GPV 306 S
- Rexroth GPV 401 S
- Rexroth GPV 441 S
- Rexroth GPV 442 S
- Valmet S3GHD-506
- Wind World W3700/500
- Wind World 150
- Wind World W4200/600
- Wind World W2920/250
- Echesa GE 2000 PL

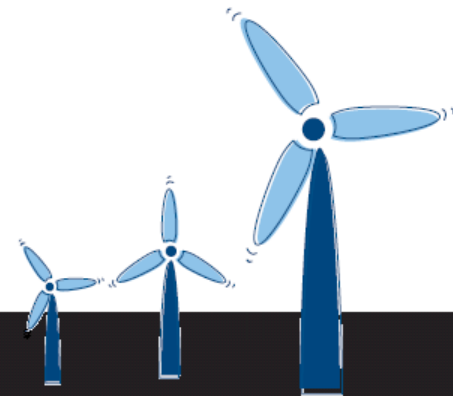
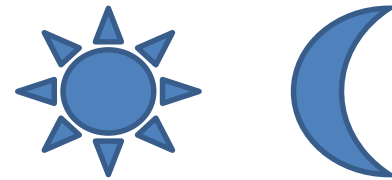


Reference list - customers

Vattenfall - RWE Innogy – Total Wind - WTG Partners – Vestas - Dansk Vindenergi ApS - Cunningham Lindsey - Windservice NF - Bettink Service BV - Dansk Vindmølle Service - DanRun Windservice - Windkraft Neukirchen GmbH - DONG Energy Wind Power A/S - EWI Windpark B.V. - Wind Energy Sud S.r.l. - Gruppo Energia & Servizi – Moventas - Siemens Wind Power – EDP Renewables Europe S.L – ENEL Green Power SpA.

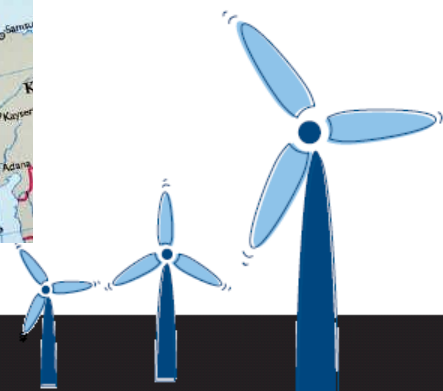


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