STATE OF THE ART and NEW TECHNOLOGIES OF DIRECT DRIVE WIND TURBINES

Klinger, Friedrich

INNOWIND Forschungsgesellschaft mbH, Germany

in cooperation with Fraunhofer IWES
Altenkesseler Str. 17/D2, 66115, Saarbrücken, Germany
f.klinger@wind-energy-research.de

IRENEC
INTERNATIONAL 100% RENEWABLE ENERGY CONFERENCE AND EXHIBITION
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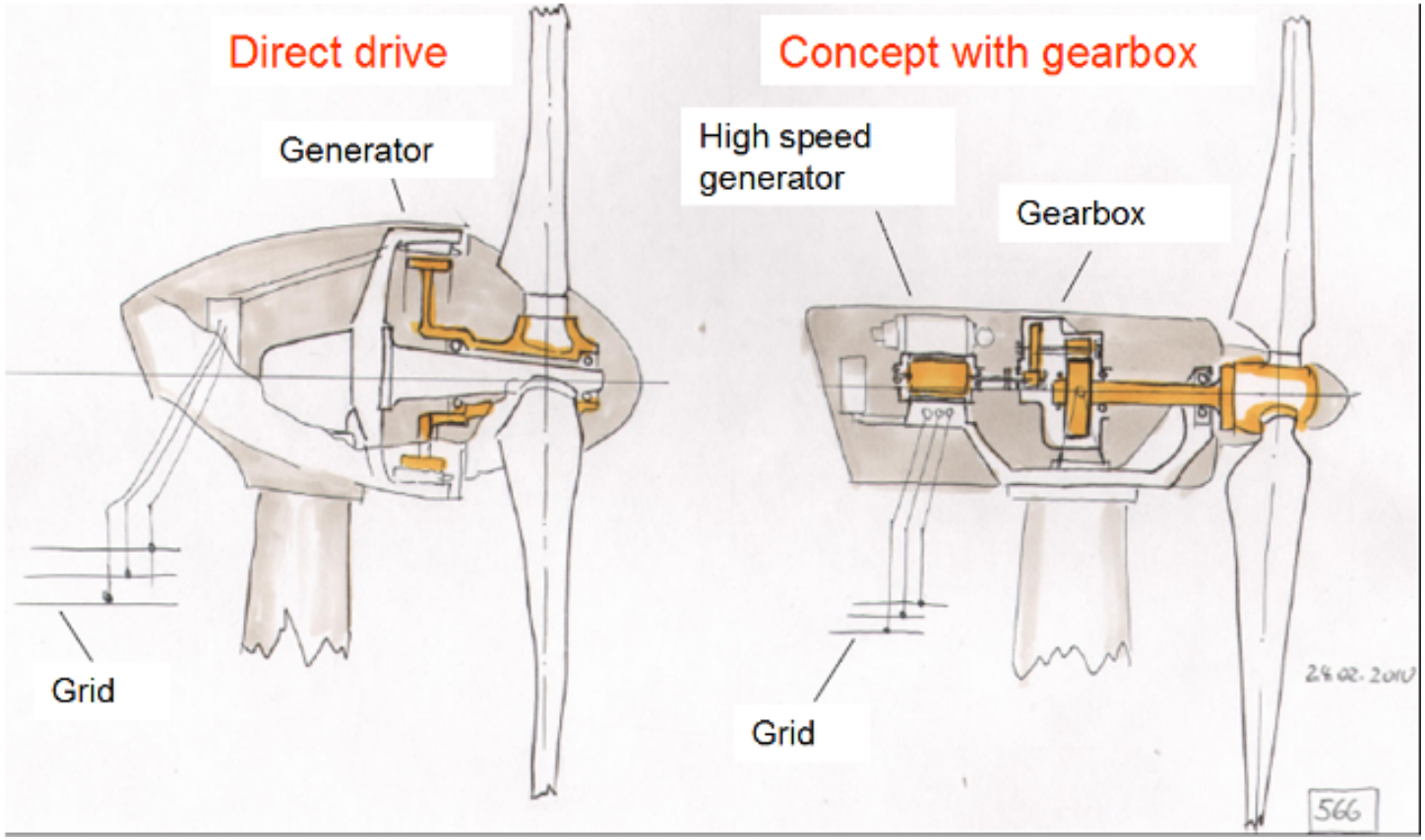
ADVANTAGES OF DIRECT DRIVE WIND TURBINES

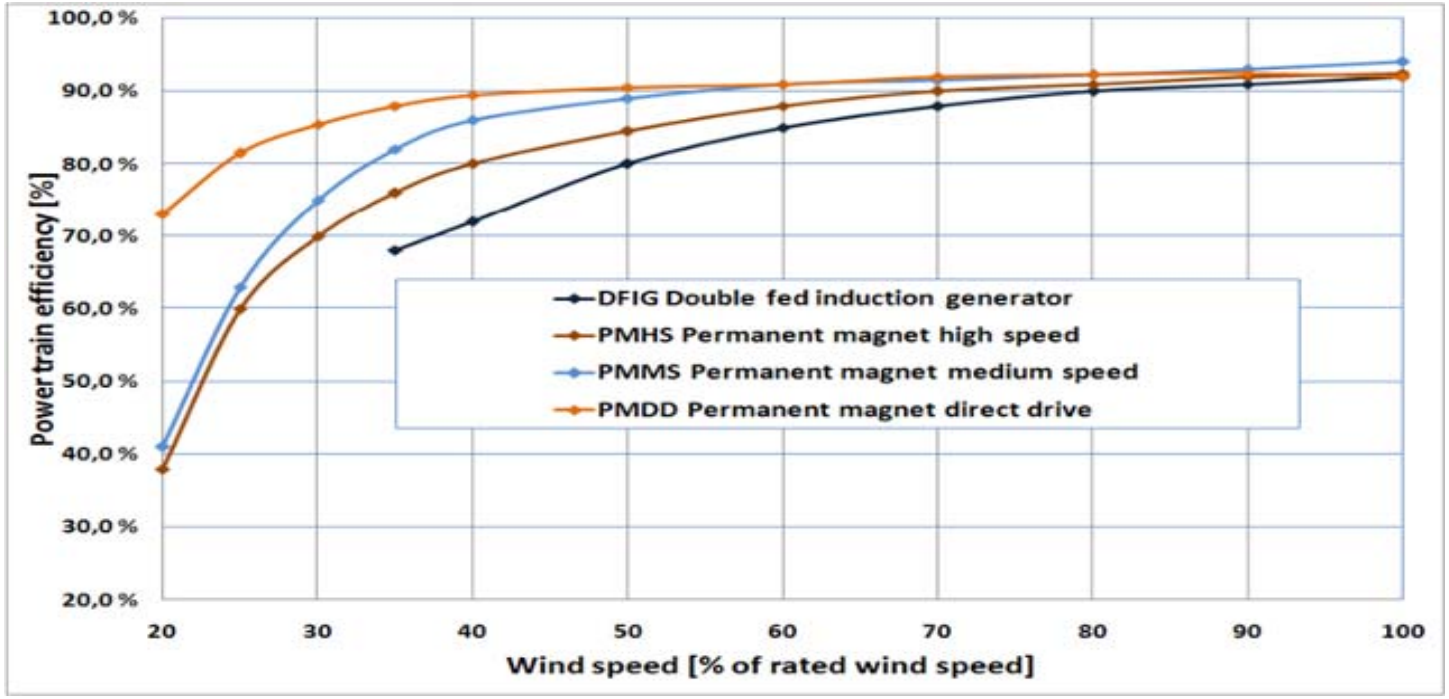
Gearbox Failure

ADVANTAGES OF DIRECT DRIVE WIND TURBINES



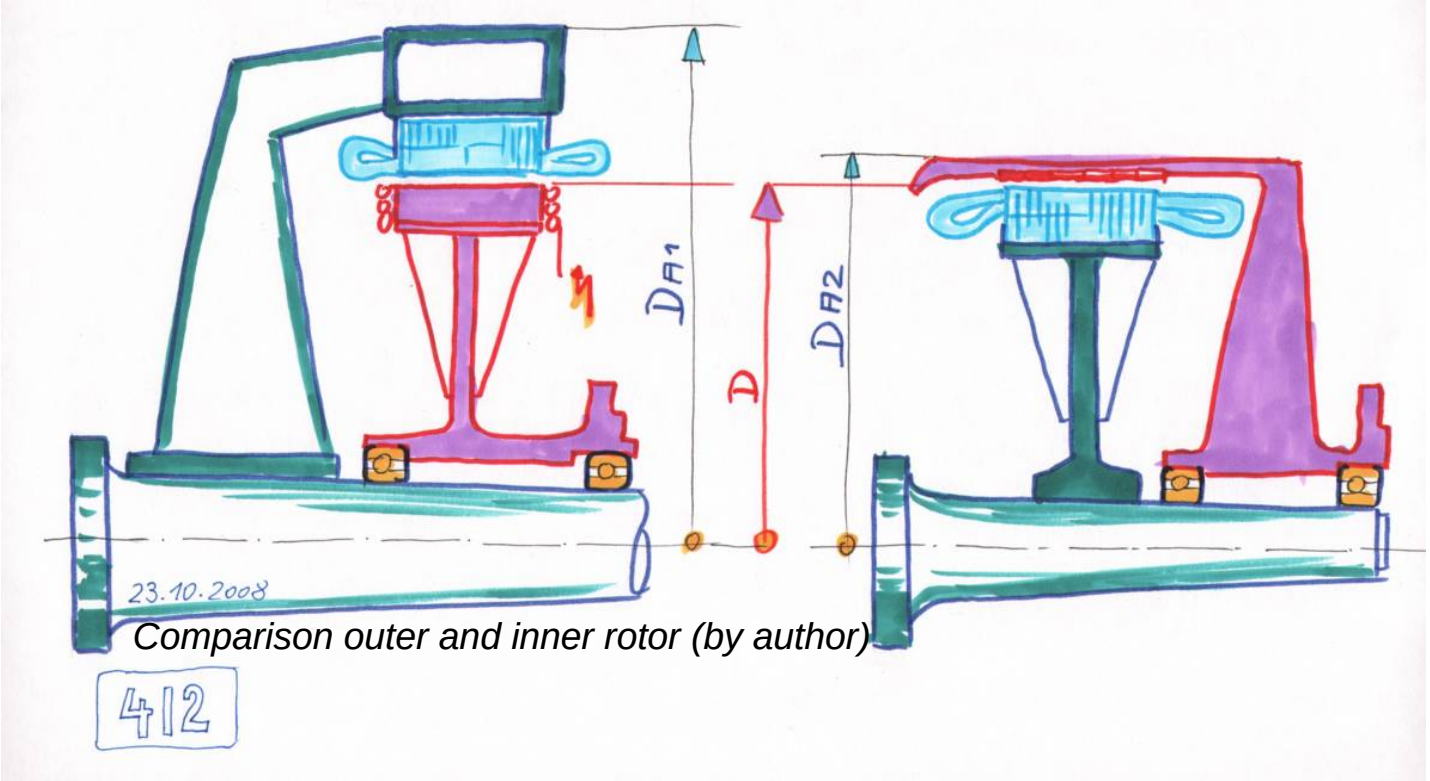
Comparison wind turbine with and without gearbox(by author)

ADVANTAGES OF DIRECT DRIVE WIND TURBINES



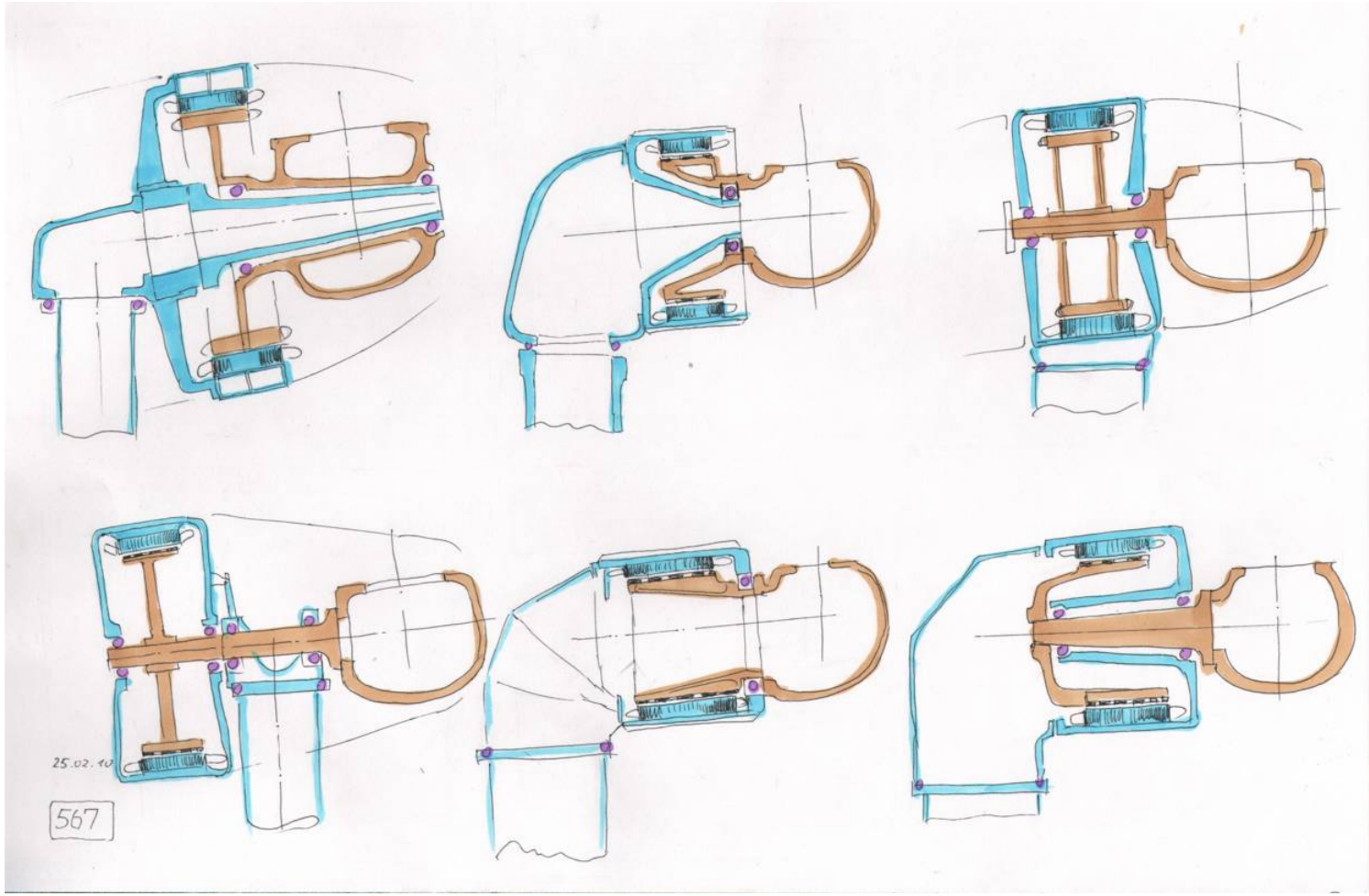
Efficiency comparison for different drive train concepts (Origin: THE SWITCH)

ROTOR CONCEPTS



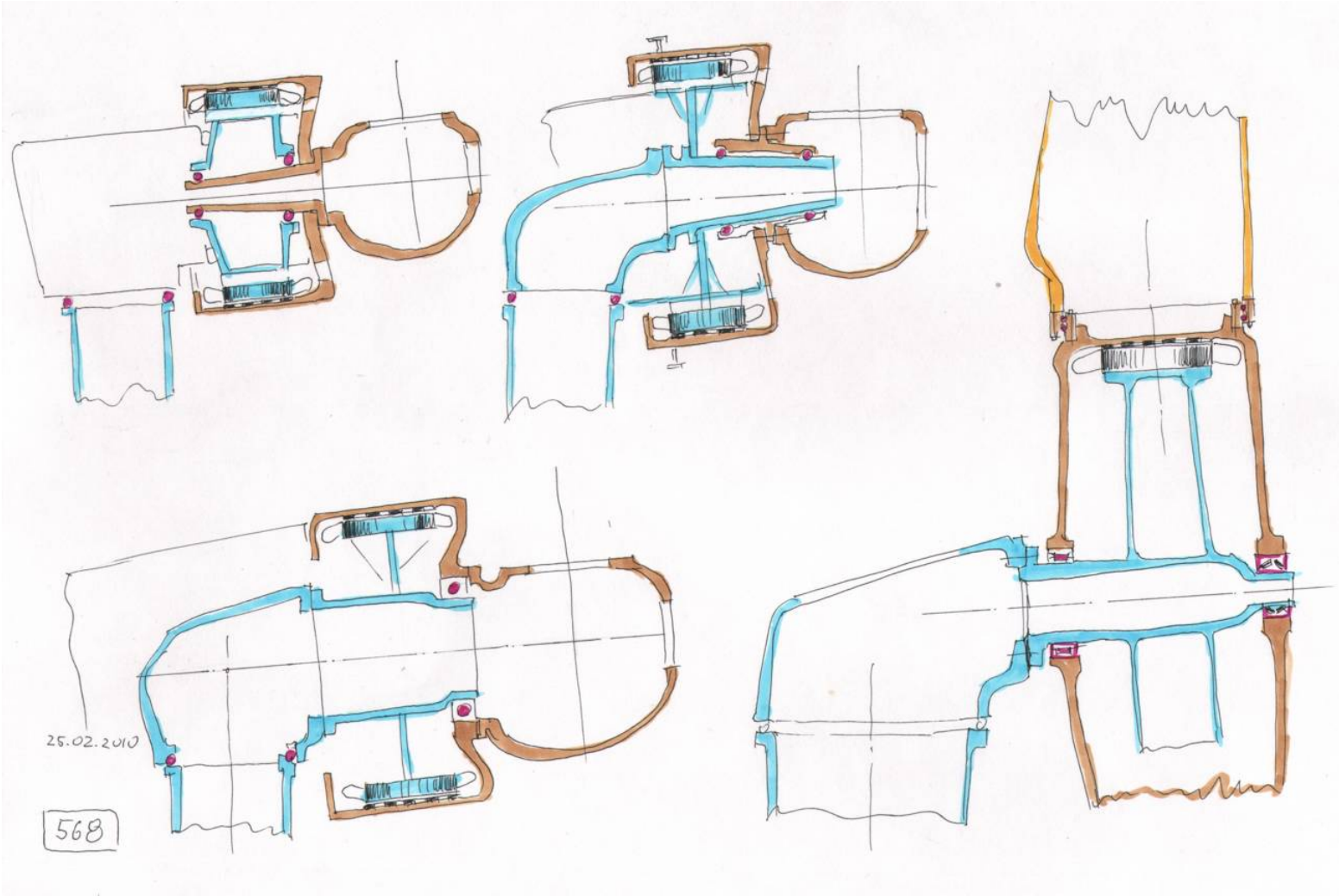
Comparison outer and inner rotor (by author)

ROTOR CONCEPTS



Bearing concept with inner rotor (by author)

ROTOR CONCEPTS



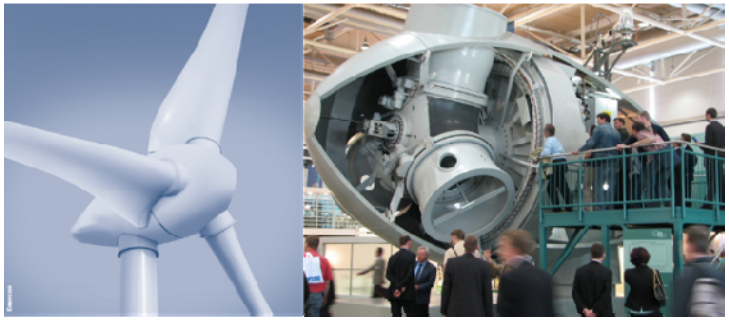
Bearing concept with outer rotor (by author)

GENERATOR DESIGN CONCEPT - STATE OF THE ART

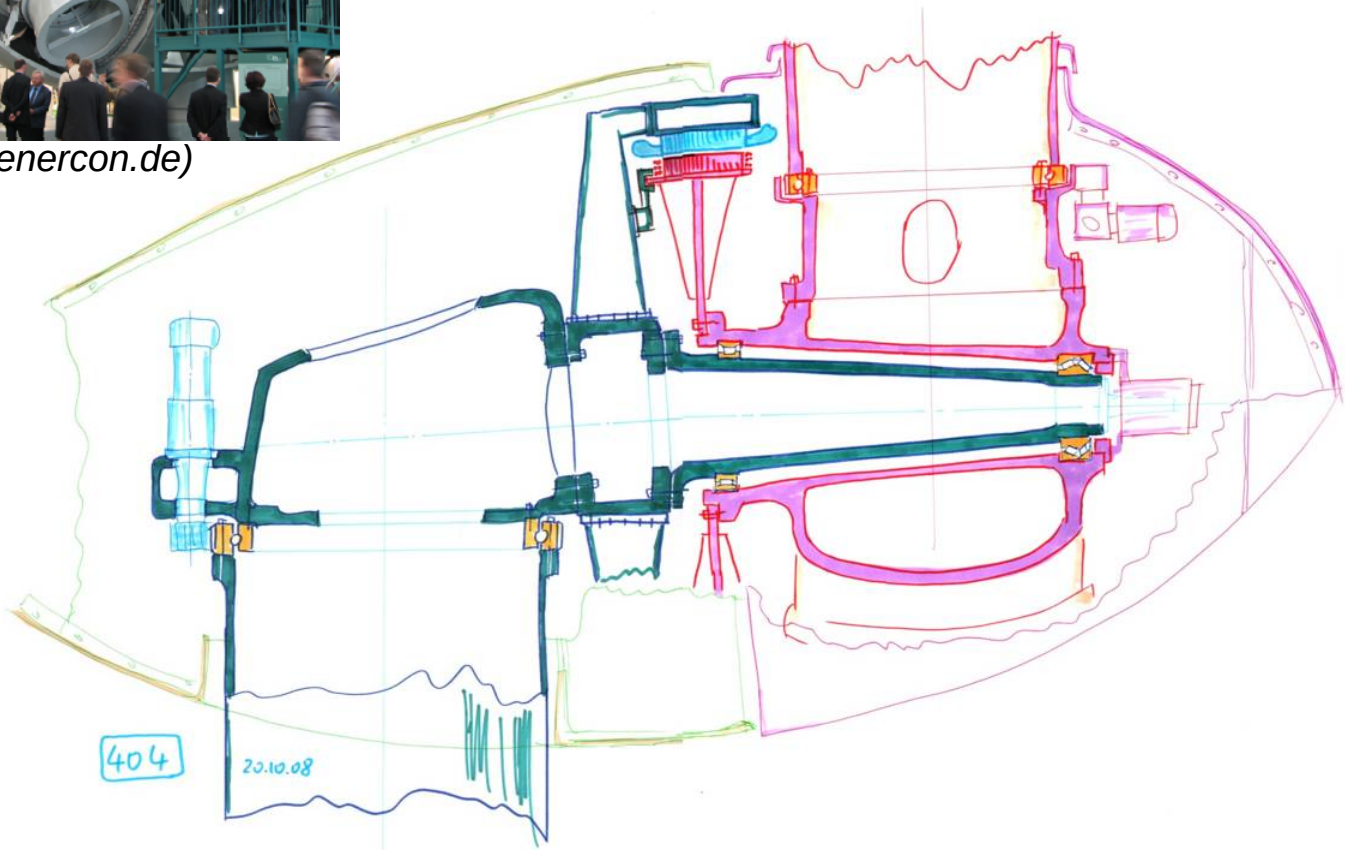
Manufacturer	Power [MW]	Rotor Arrangement	Number of blades
Enercon	3	Internal	3
Genesys	0,6	External	3
Vensys	1,5	External	3
Vensys	2,5	External	3
Harakosan	2	Internal	3

examples of state of the art wind turbines

GENERATOR DESIGN CONCEPT - STATE OF THE ART

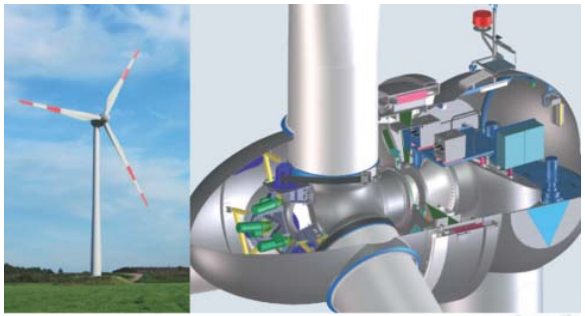


Enercon (Origin: www.enercon.de)

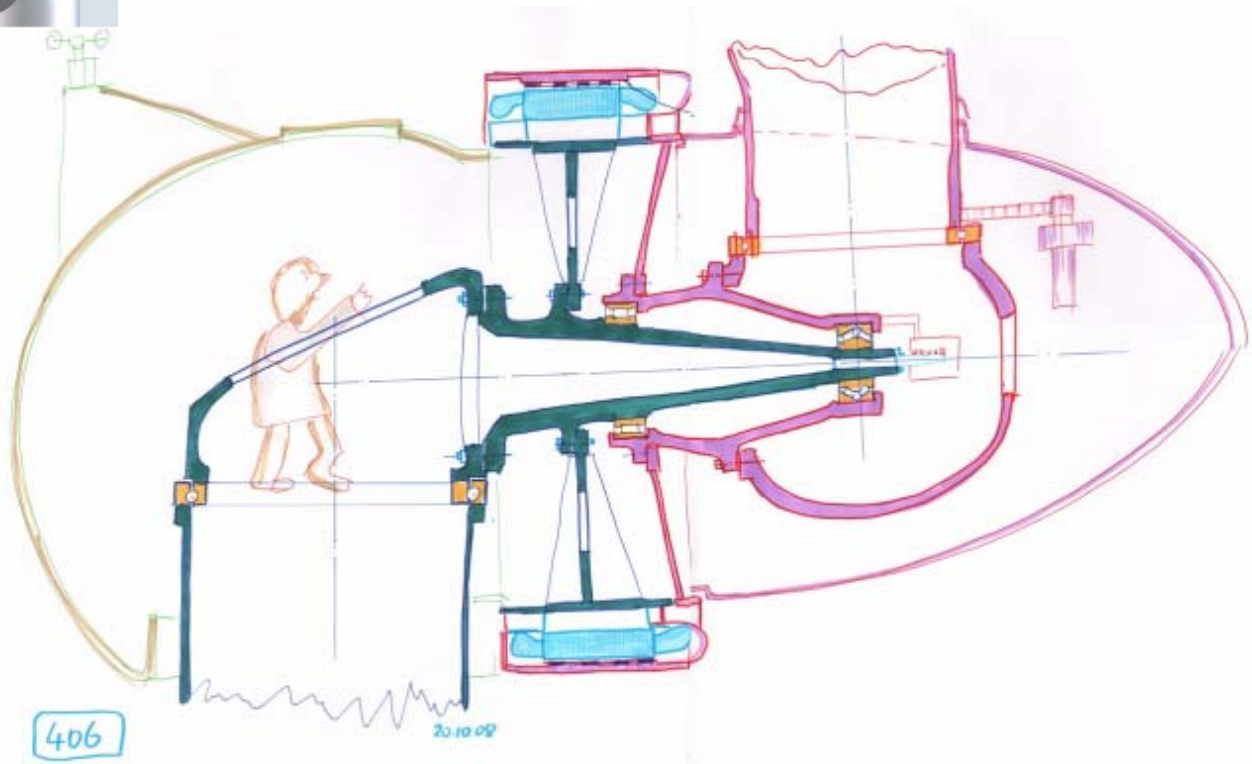


Design concept of Enercon E82 (by author)

GENERATOR DESIGN CONCEPT - STATE OF THE ART



Vensys V70 (Origin: Vensys brochure)



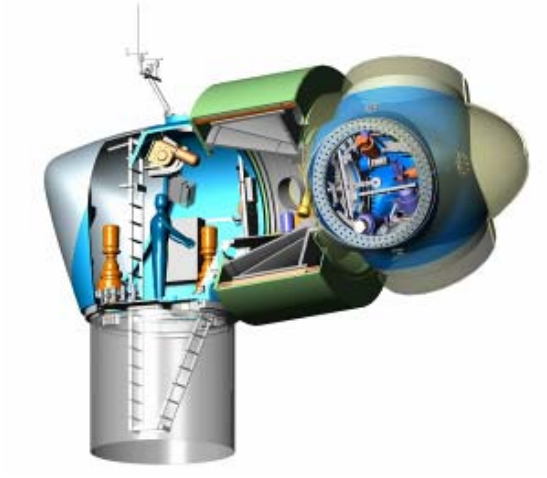
Design concept 1.5 MW of Vensys/Goldwind V70 (by author)

GENERATOR DESIGN CONCEPT - STATE OF THE ART

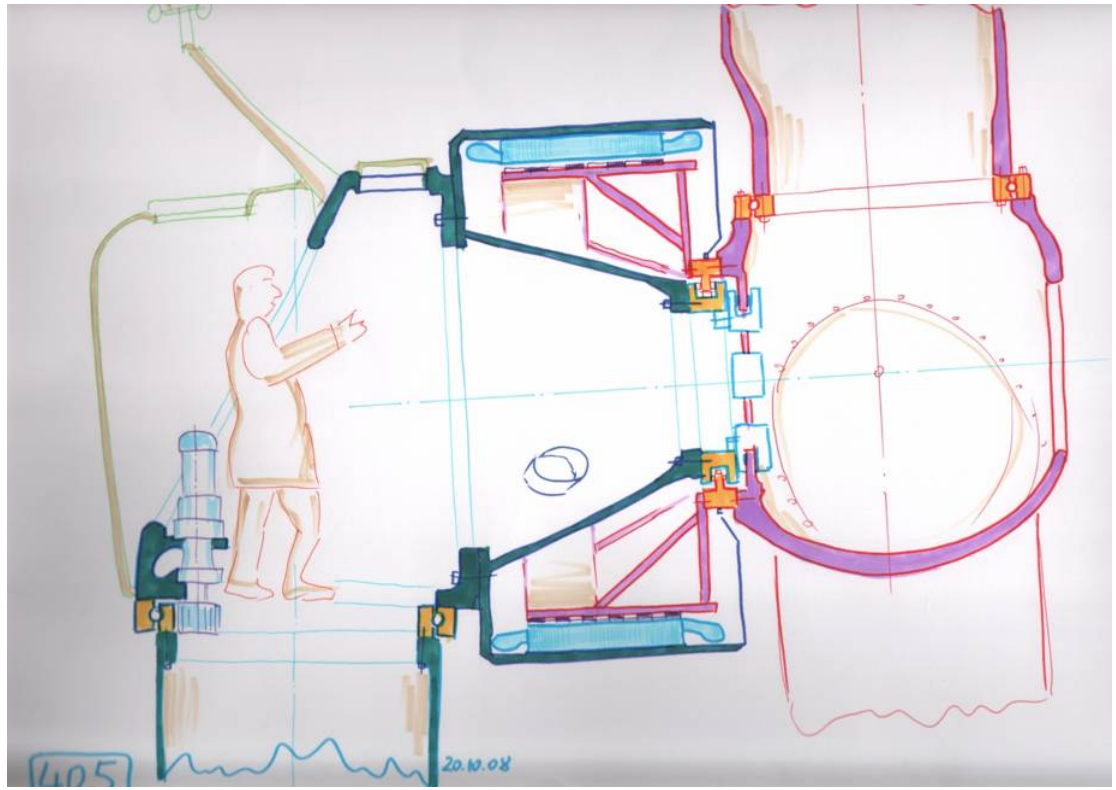
Vensys V90 (Origin: Vensys brochure)

Design concept 2.5 MW of Vensys/Goldwind V90 (by author)

GENERATOR DESIGN CONCEPT - STATE OF THE ART



Harakosan Z72
(Origin.: Harakosan brochure)



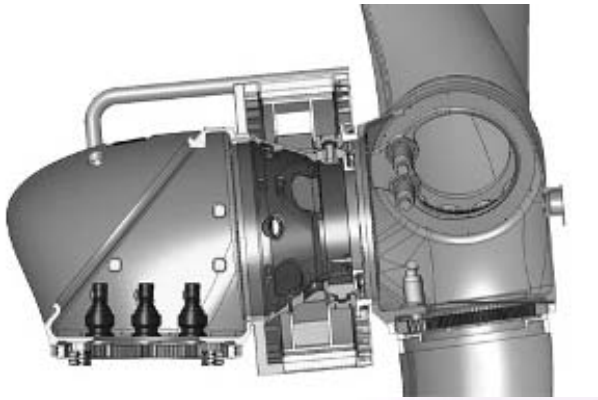
Design concept of Harakosan Z72 (by author)

GENERATOR DESIGN - FUTURE CONCEPTS

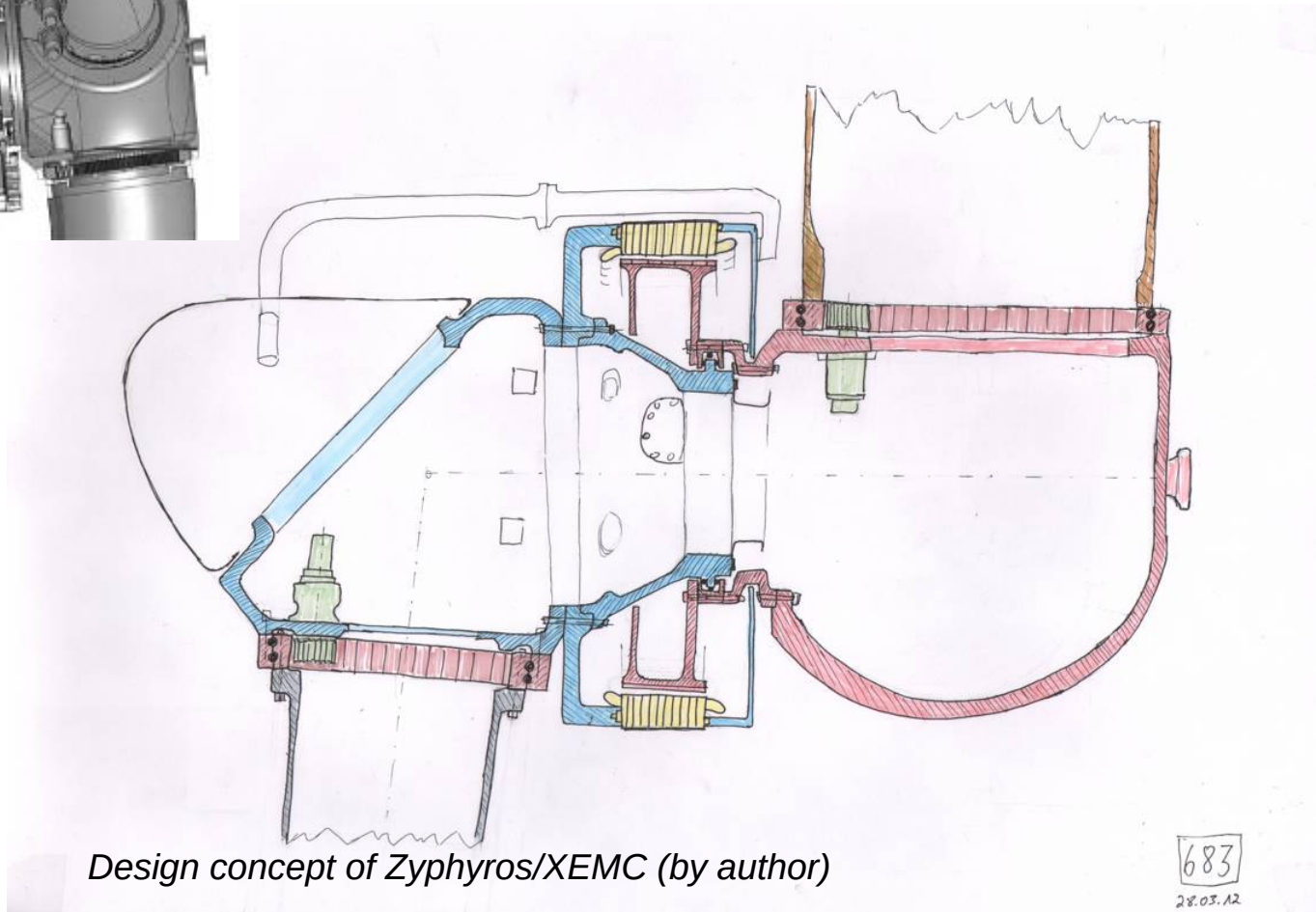
Manufacturer	Power [MW]	Rotor Arrangement	Number of blades
Siemens	3	External	3
Alstom	6	Internal	3
XEMC Darwind	5	Internal	3
Envision	3,6	Internal	2
Sway	10	External	3
Innowind	3,2	External	3
(The Switch)	3	External	-

examples of future DD concepts in development or prototype phase

GENERATOR DESIGN - FUTURE CONCEPTS



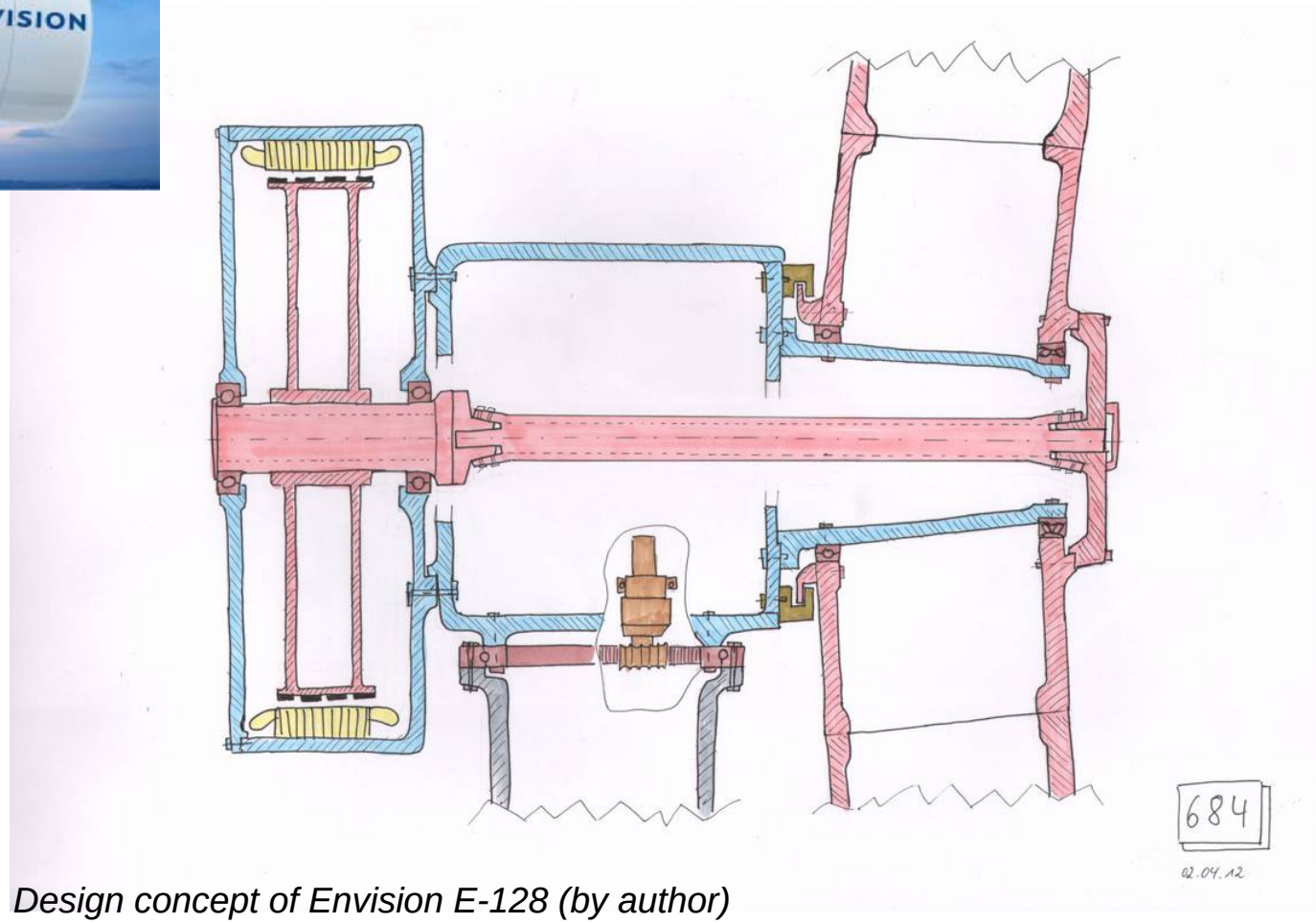
XEMC Darwind (Origin: www.xemc-darwind.com)



Design concept of Zyphyros/XEMC (by author)

GENERATOR DESIGN - FUTURE CONCEPTS

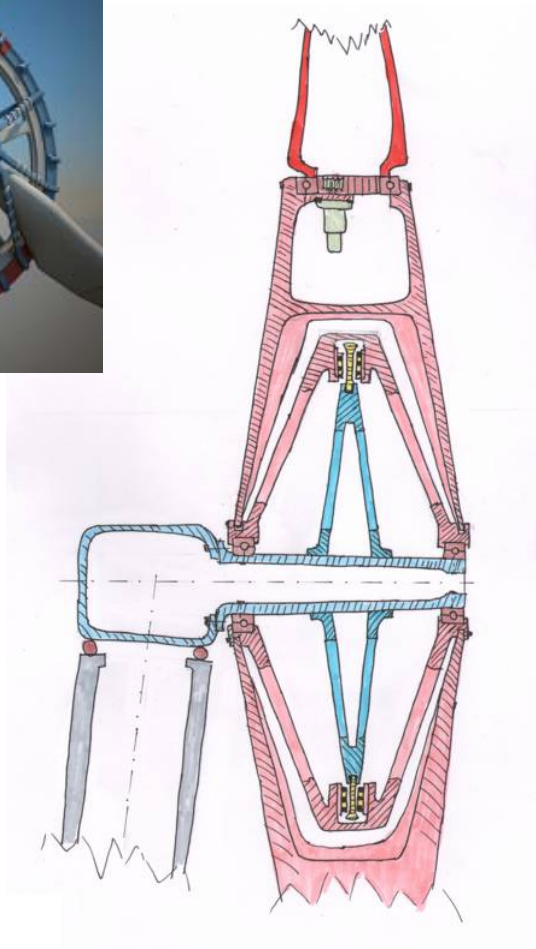
Envision (Origin: Envision brochure)

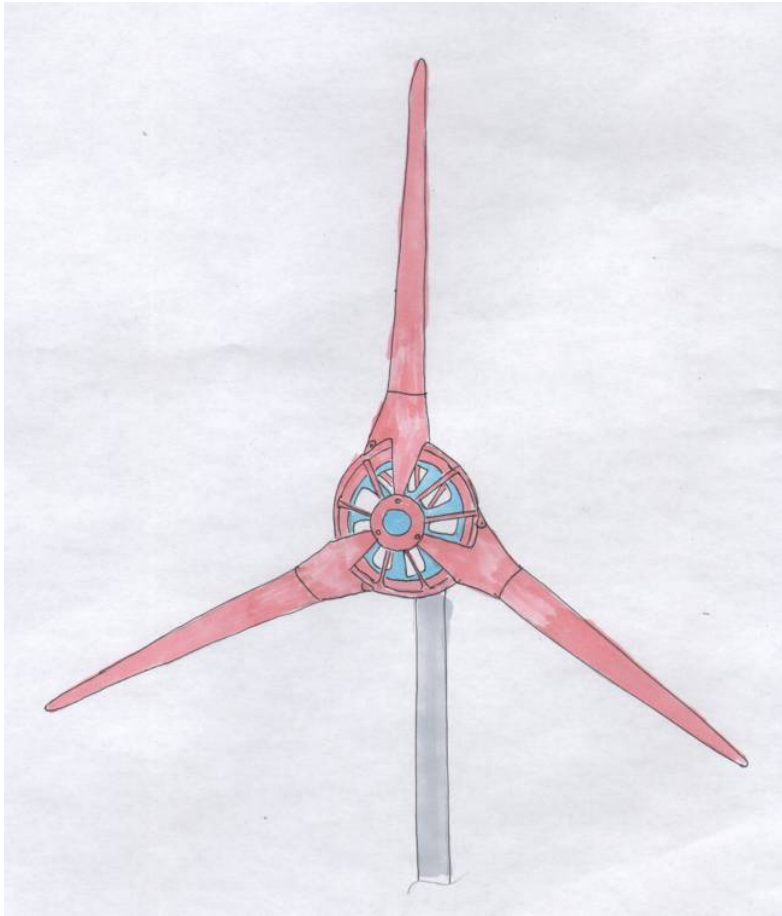


Design concept of Envision E-128 (by author)

GENERATOR DESIGN - FUTURE CONCEPTS

Sway AS (Origin.: www.turbosquid.com/3d-models/3d-model-sway-wind-turbine/563463)

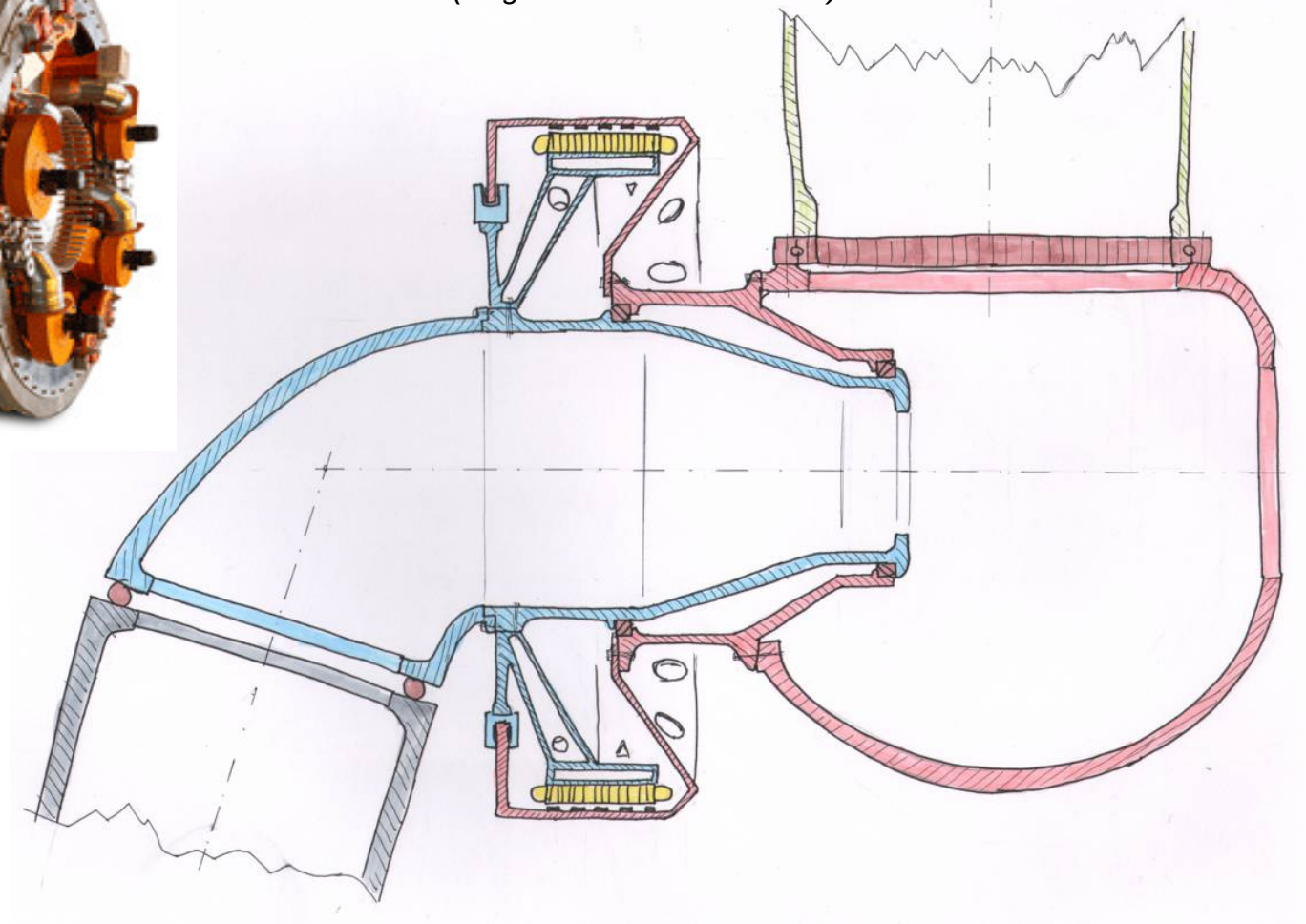




Sway perspective and cross-sectional view (by author)

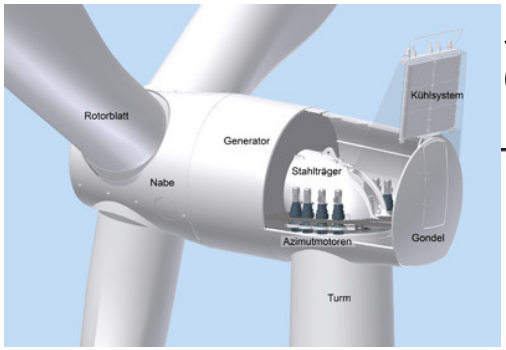
GENERATOR DESIGN - FUTURE CONCEPTS

The Switch PMG3200-12 (Origin: www.theswitch.com)

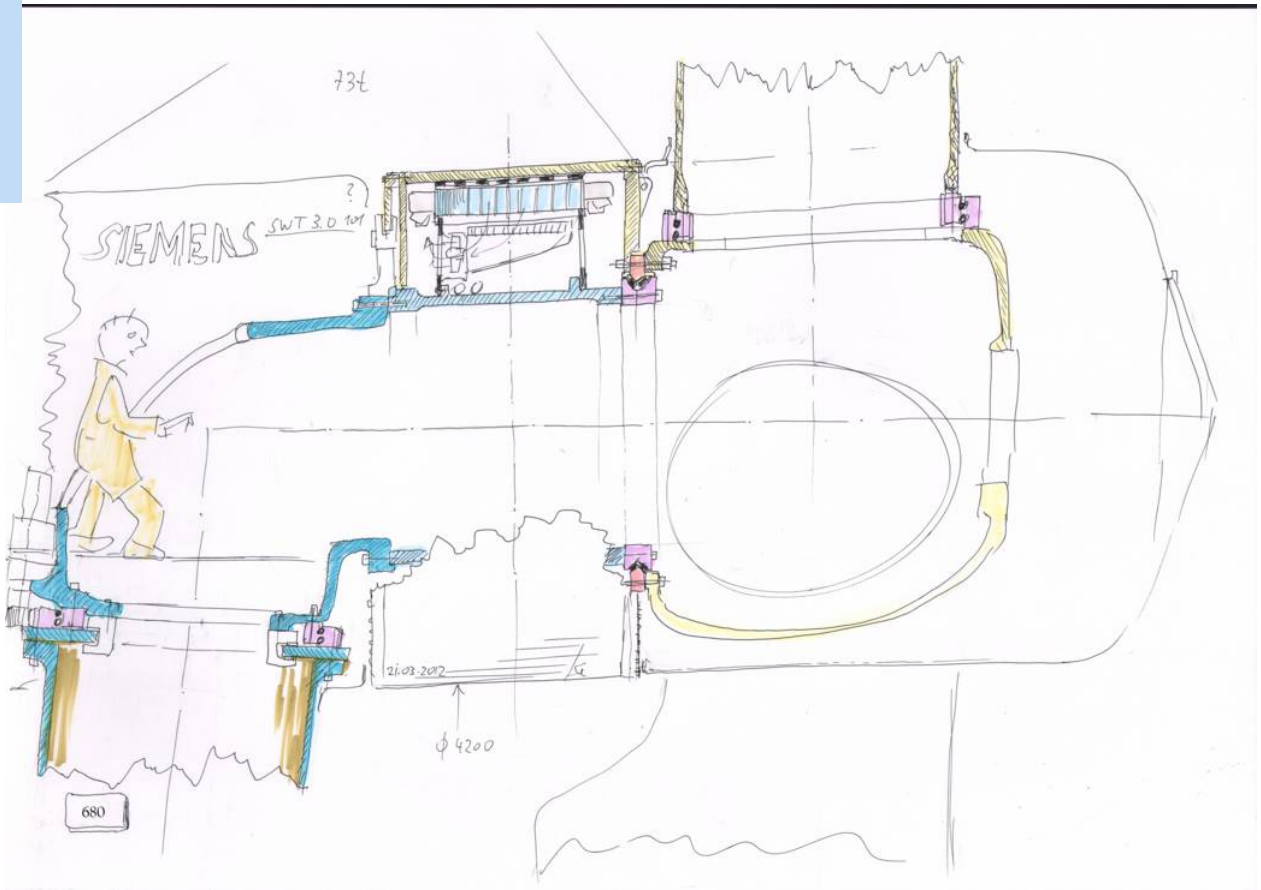


The Switch PMG3200-12 Generator integrated (by author)

GENERATOR DESIGN - FUTURE CONCEPTS



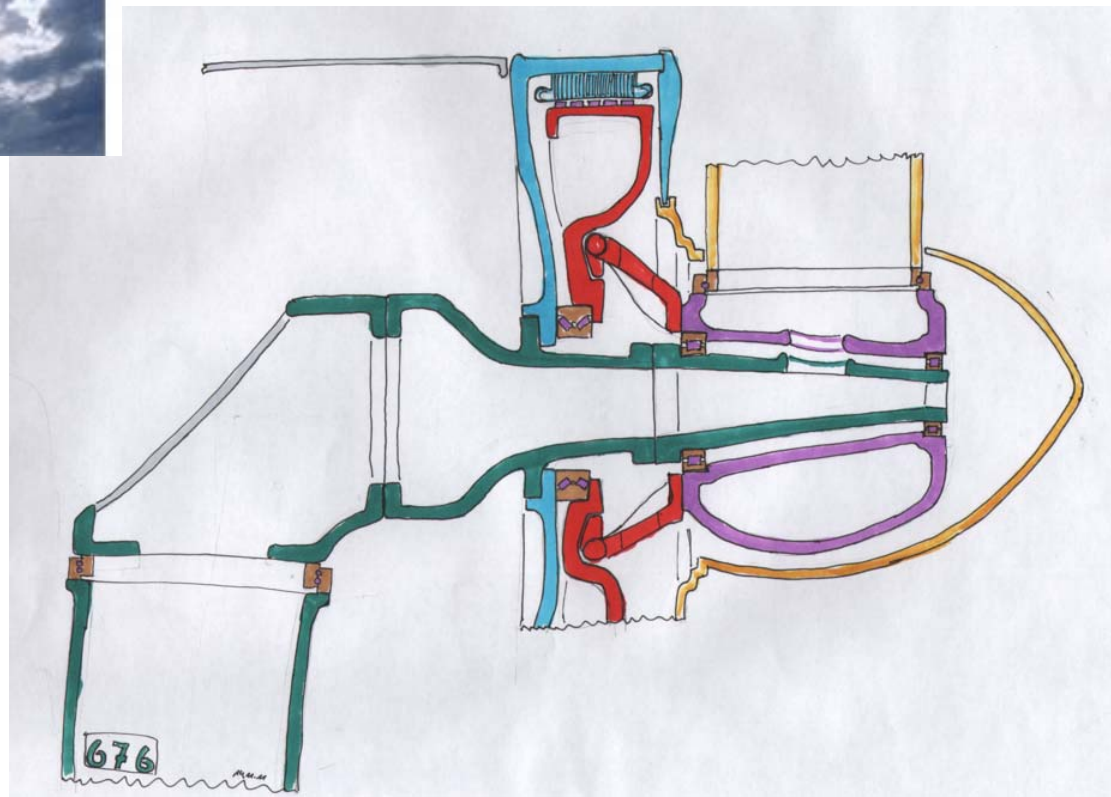
Siemens SWT-3.0-101
(Origin: www.energy.siemens.com/hq/en/power-generation/renewables/wind-power/)



Design Concept of Siemens SWT-3.0-101 (by author)

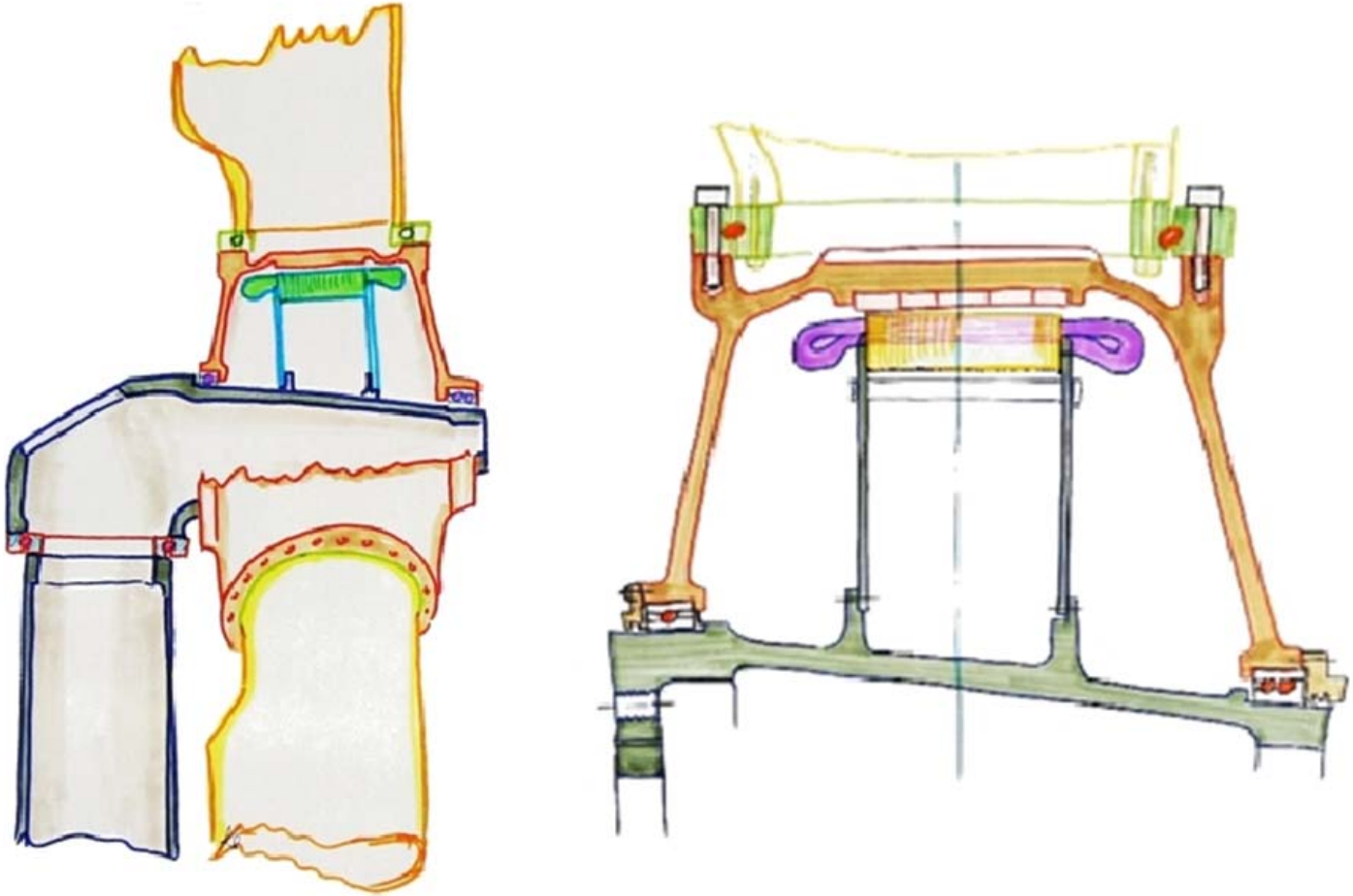
GENERATOR DESIGN - FUTURE CONCEPTS

Alstom (Origin.:www.alstom.com)



Design Concept of 6 MW Haliade 150 (by author)

GENERATOR DESIGN - FUTURE CONCEPTS



In-Hub-Generator concept for direct drive wind turbine (by author)

THANK YOU
FOR YOUR ATTENTION

f.klinger@wind-energy-research.de