

# Equipment for Offshore Wind Turbine Installation



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**Hogeschool AVANS**

**'s-Hertogenbosch , 2010**

# Equipment for Offshore Wind Turbine Installation

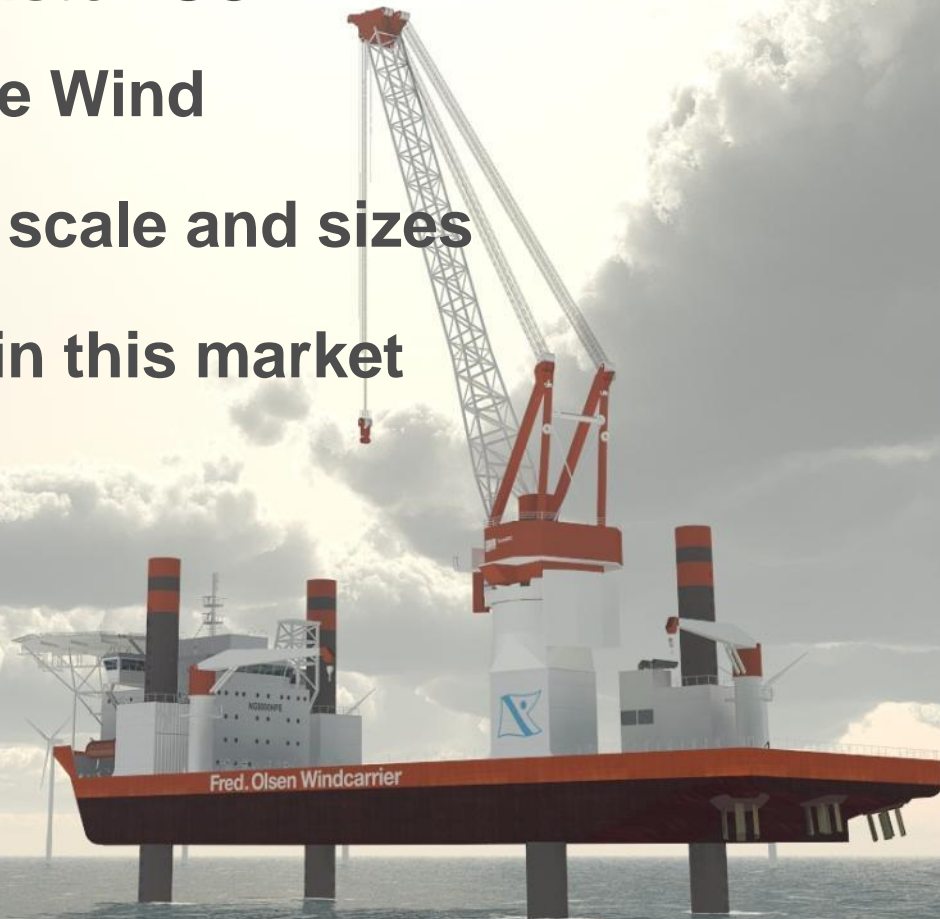
## Goal of Presentation

**Brief introduction of GustoMSC**

**Introduction to Offshore Wind**

**Create a feeling for the scale and sizes**

**Position of GustoMSC in this market**



## Contents of Presentation

- **Introduction**
- **Offshore Wind**
- **Installation of Wind Turbine**
- **GustoMSC Design & Construction**
- **Developments in WTI Equipment**

# History GustoMSC

- 1862 Start of Gusto shipyard (The Netherlands)
- 1977 Start of Marine Structure Consultants B.V. (Sliedrecht)
- 1978 Start of Gusto Engineering (Schiedam)
- 2003 Start of GustoMSC alliance



# SBM Offshore Group



**Total number of employees:  
over 5100 representing 38 nationalities**

# SBM Offshore Group

## Business approach

Exploration

Construction

Production



Jack-up



Semi-submersible



Vessel

# Equipment for Offshore Wind Turbine Installation

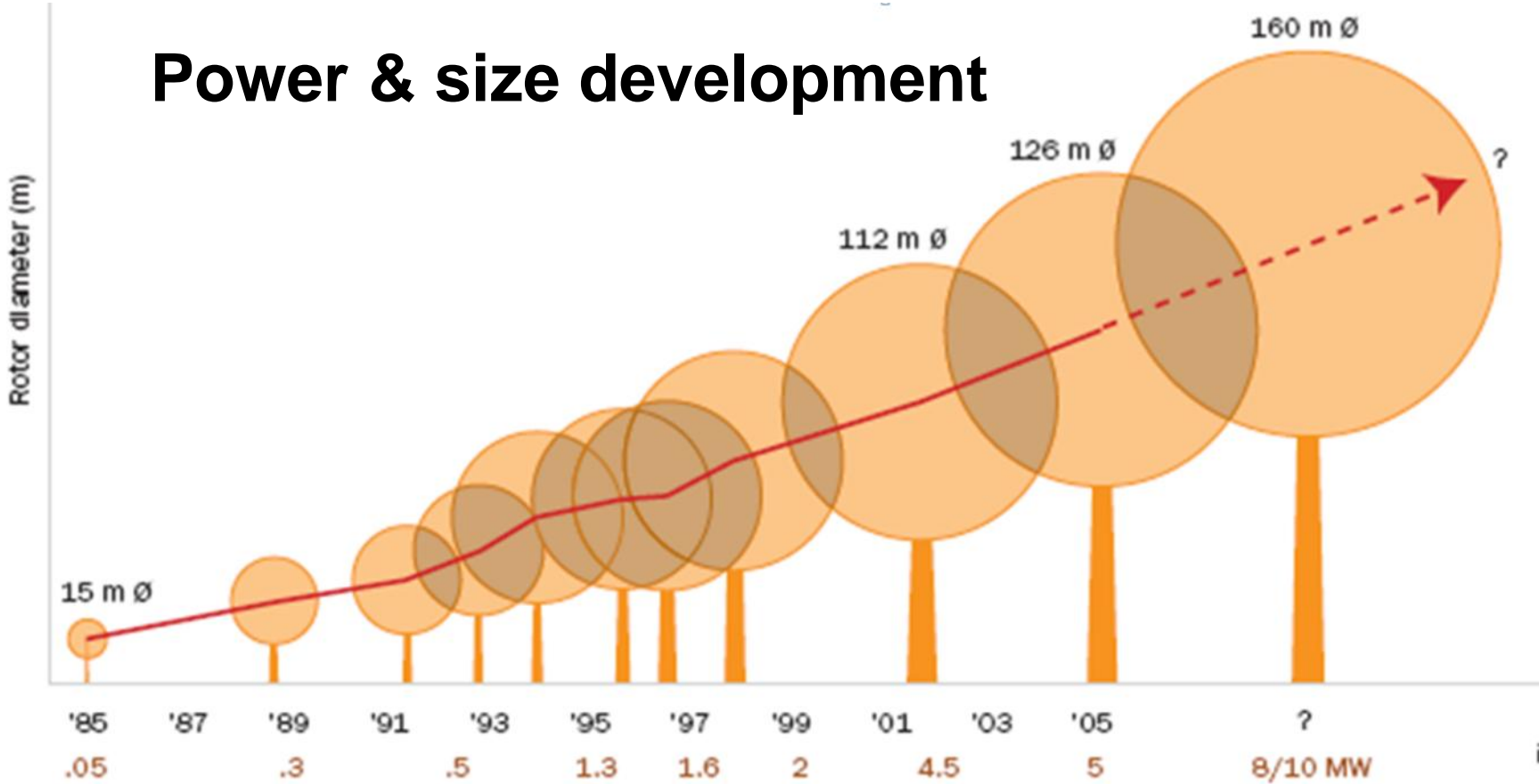
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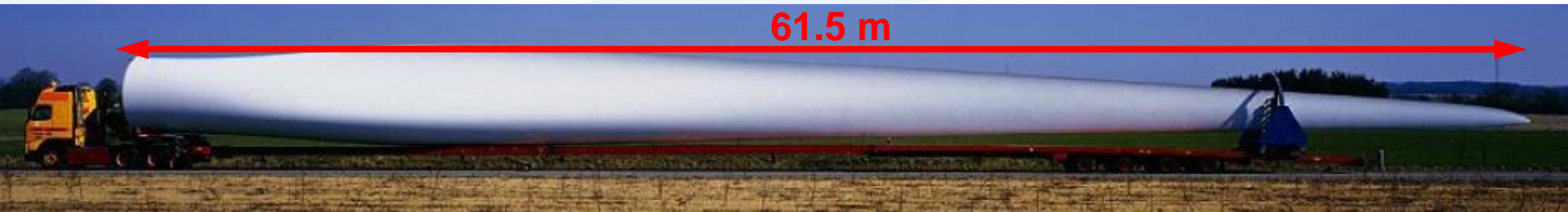
# Offshore Wind

## Power & size development



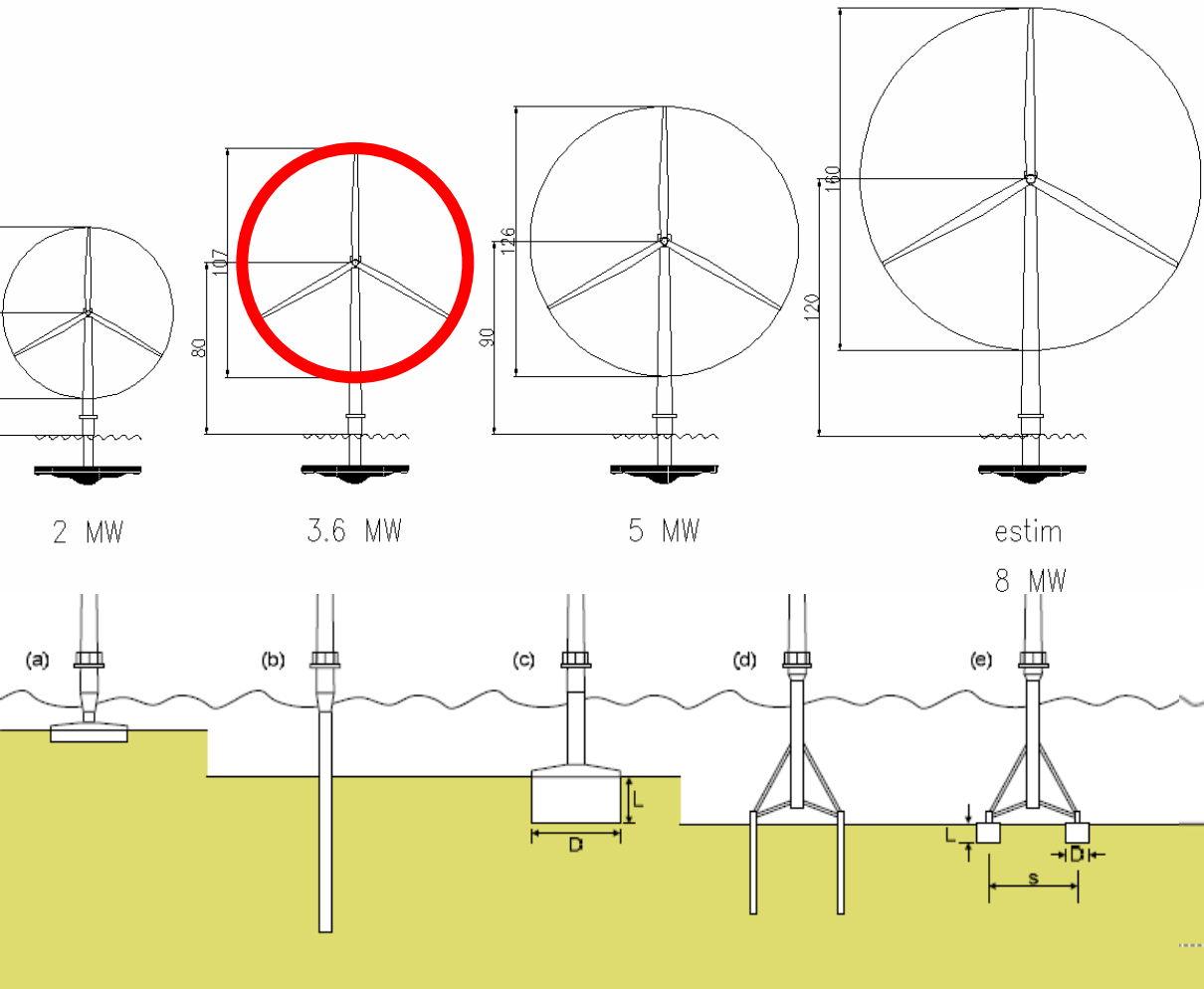
RePower 5 MW blade

61.5 m





# Offshore Wind

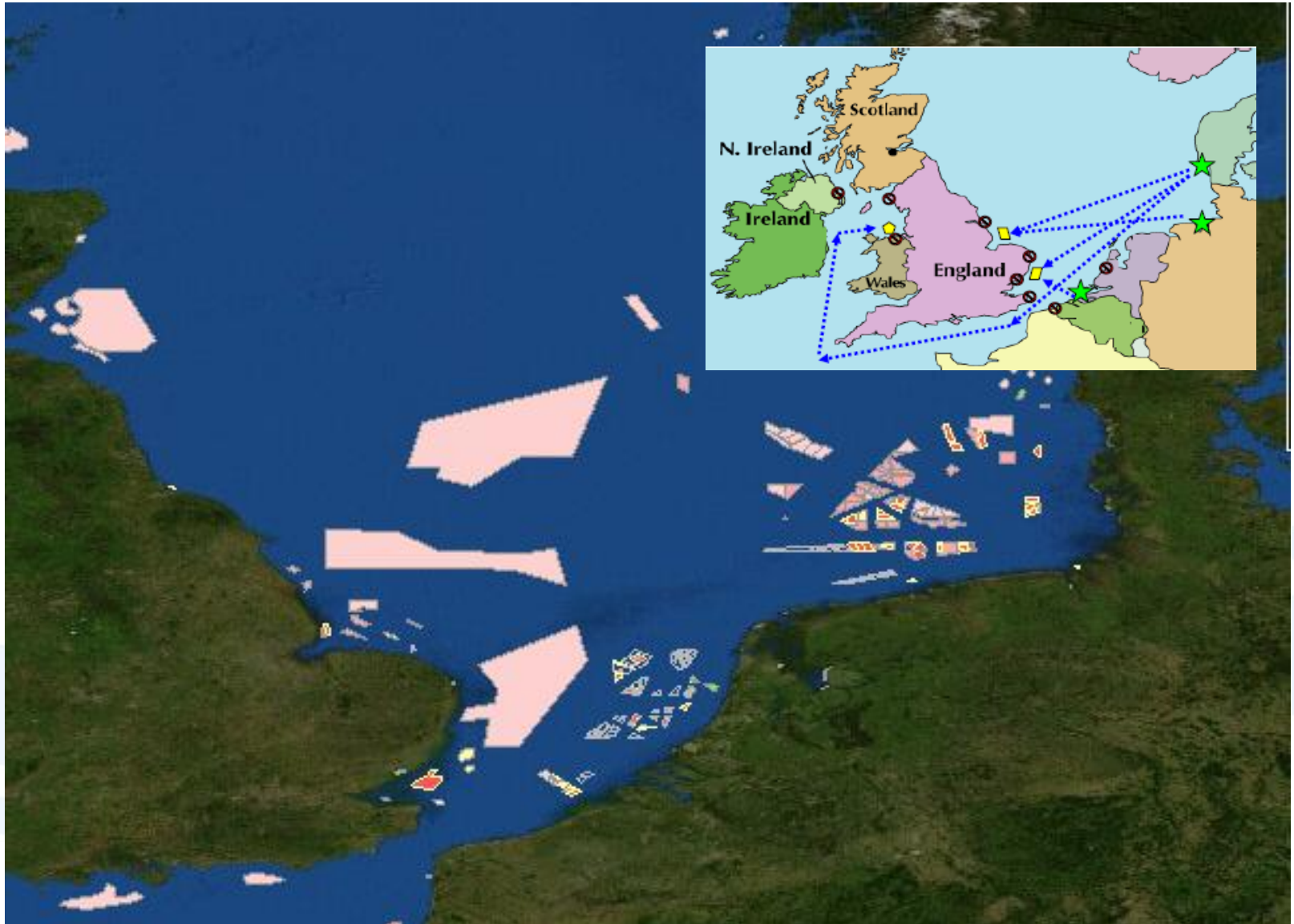


Boeing 747-400



GE 3.6 MW

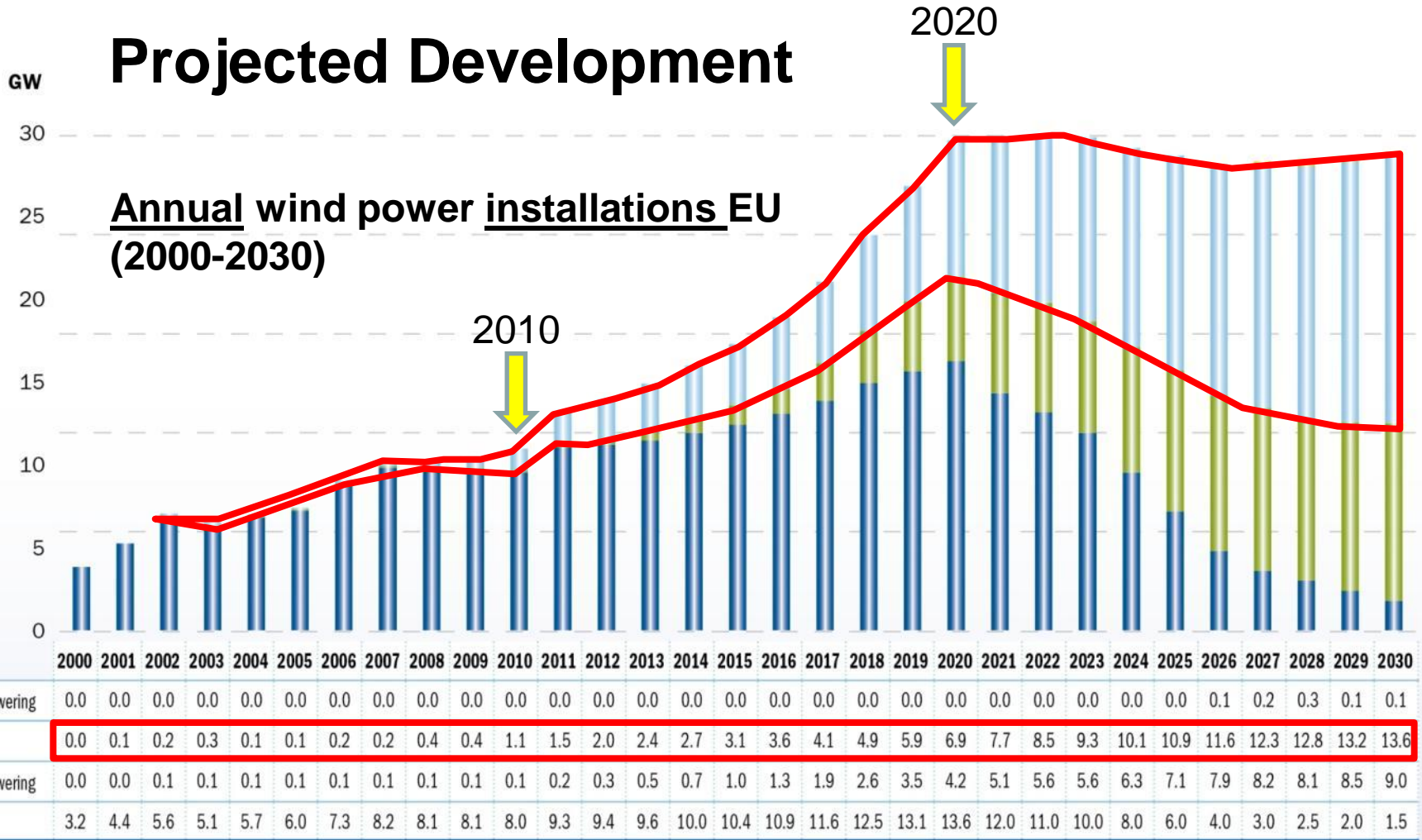
# North Sea Wind Farms



# Offshore Wind

## Projected Development

### Annual wind power installations EU (2000-2030)



Data collected in February 2010 Source: EWEA, European Wind Energy Association, Pure Power, p.47

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# Present Installation Methods

**This is the result of serious work**



# Present Installation Methods



**JB-114**



**Buzzard and Vagant**



**Seajacks Kraken and Leviathan**



**Goliath**



**Svanen**



**Sea Worker**



**Stanislav Yudin**

# Present Installation Methods

## Hammering Monopiles



# Present Installation Methods

## Transition piece



Photo's courtesy Mammoet



Jack-up Wind



# Present Installation Methods

## Transition piece (grouted)



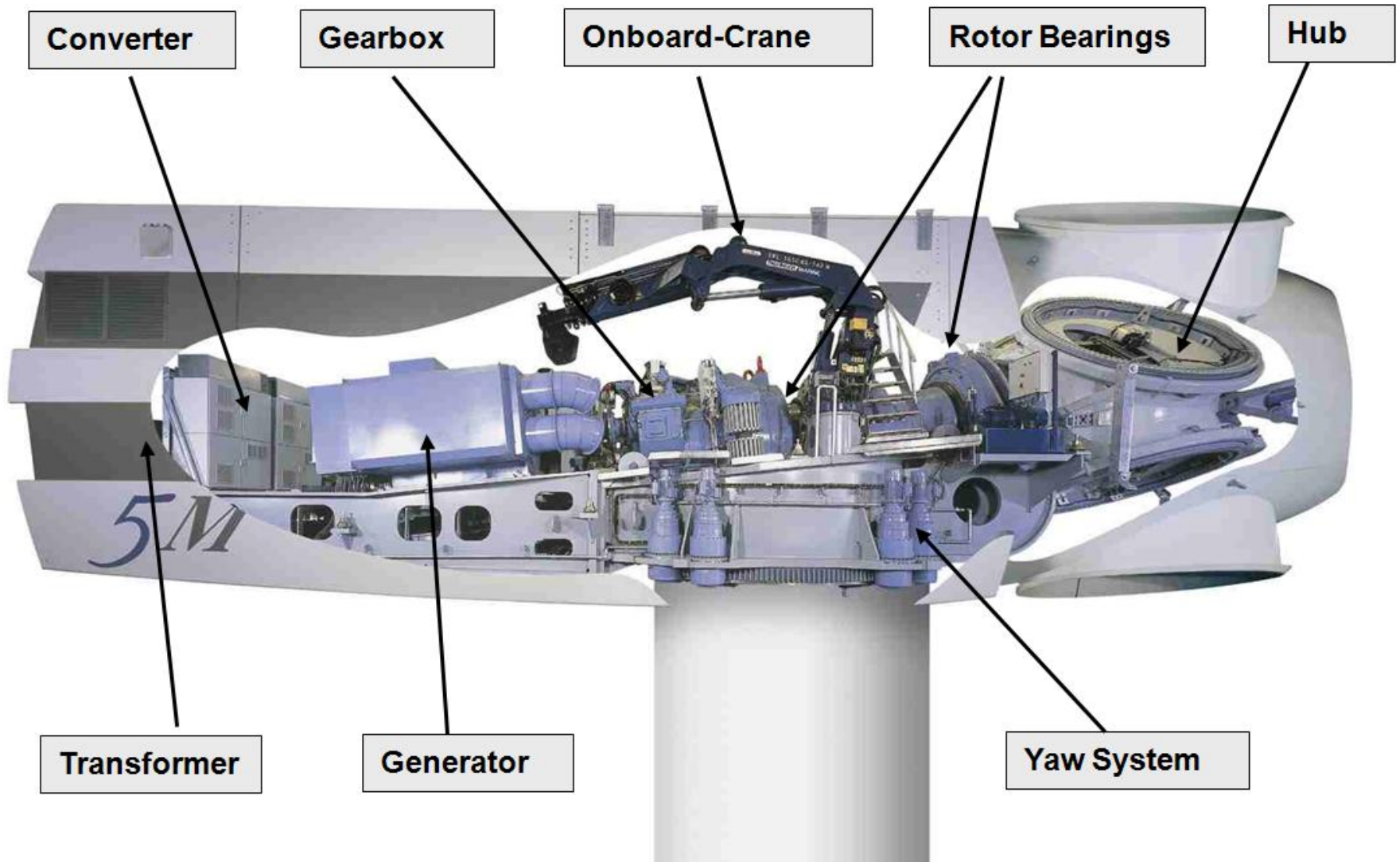
# Present Installation Methods

## Steel tower (bumpers & guides?)



# Present Installation Methods

## Nacelle



# Present Installation Methods

## Nacelle



# Present Installation Methods

## Nacelle installation



# Present Installation Methods



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# GustoMSC WTI vessel

Film

GustoMSC's Wind Turbine  
Installation Jack Up Vessel



**SBM**  
OFFSHORE

**GustoMSC**

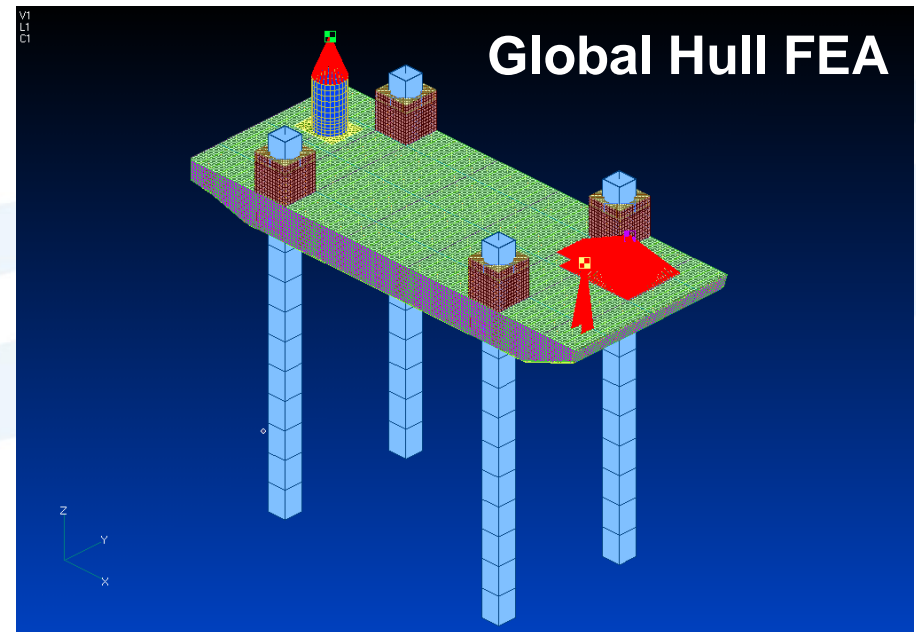
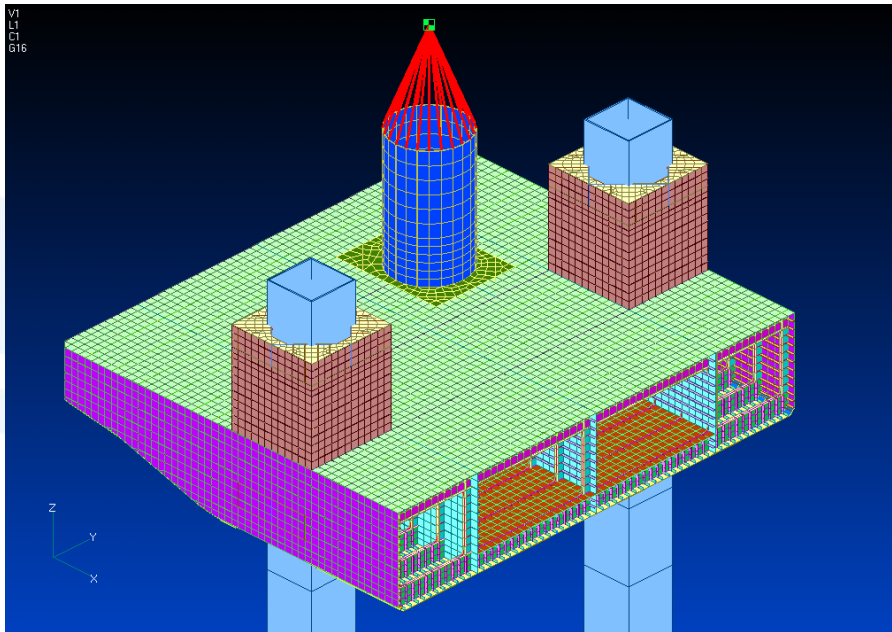


# Design process

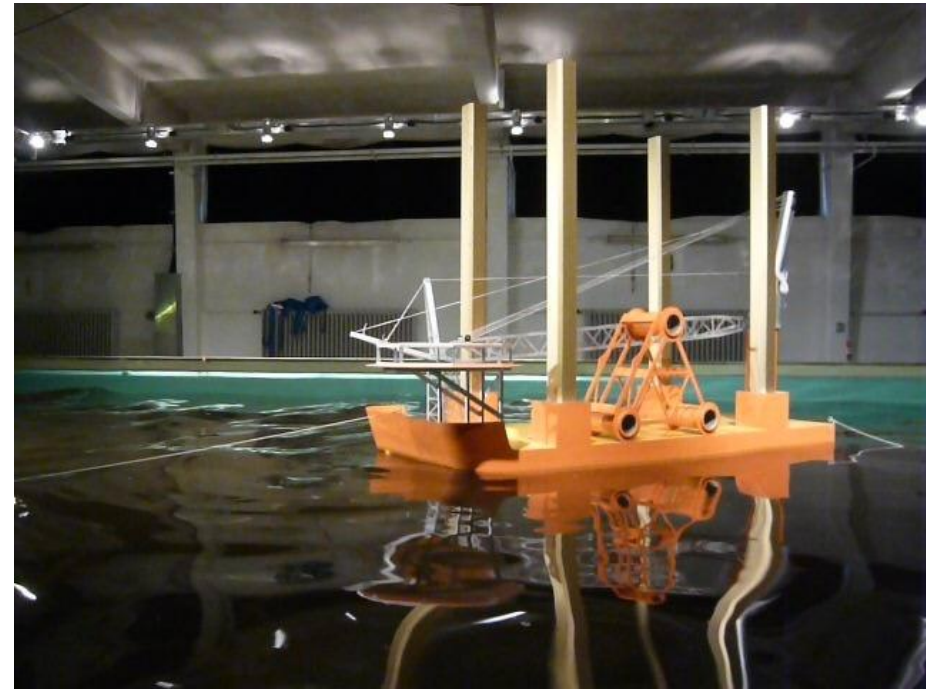
## Basic Design

Basic Design Class Approved package:

- A.** Arrangements of all relevant spaces
- B.** Hull Basic Construction Plans
- C.** Jacking System Basic Construction Plans
- D.** Marine Principle Diagrams
- E.** Key one line and short circuit calculations
- F.** Specifications and supporting calculations

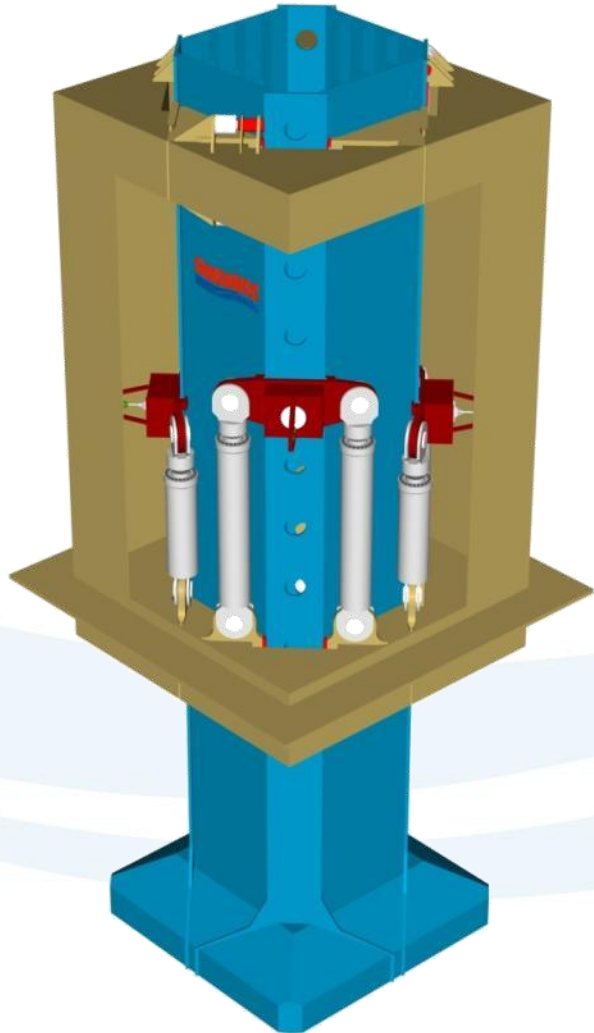


# Design process



**Possible Tank tests if required**

# GustoMSC Jack Up Technology



## Jacking System

‘High speed double acting system’

Leg square	4 x4 m
Cylinder	700 mm
Rod	300 mm

## Performance

	speed	leg load
Leg handling	2 m/min	-
Jacking	1 m/min	3750 ton
Holding	-	7500 ton

# GustoMSC Jack Up Technology

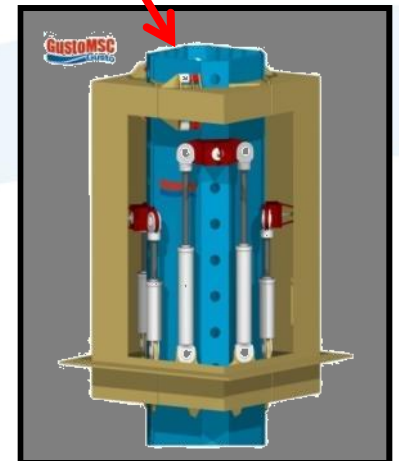
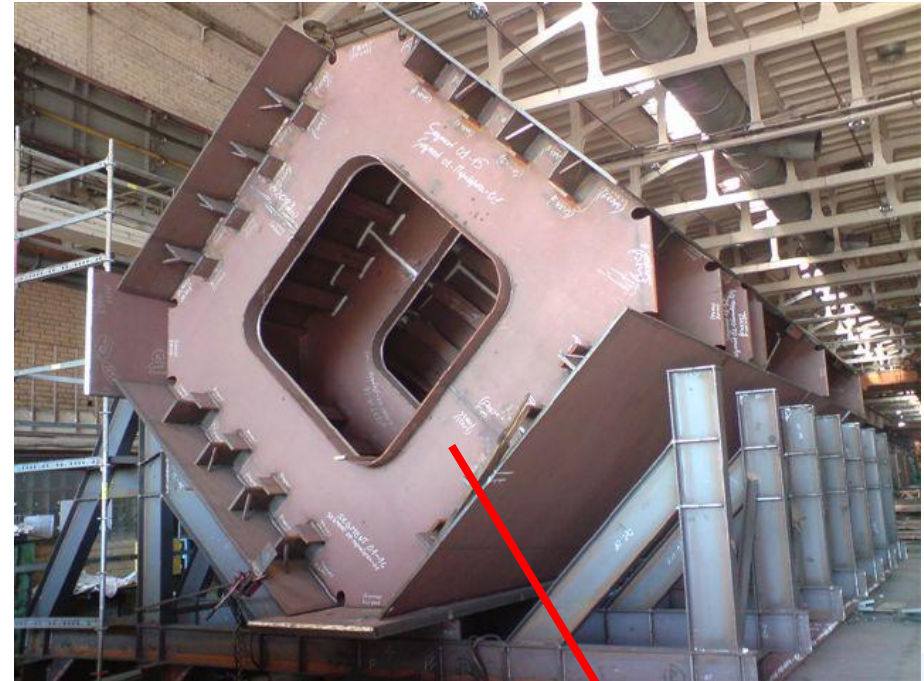
## Hydraulic Cylinders



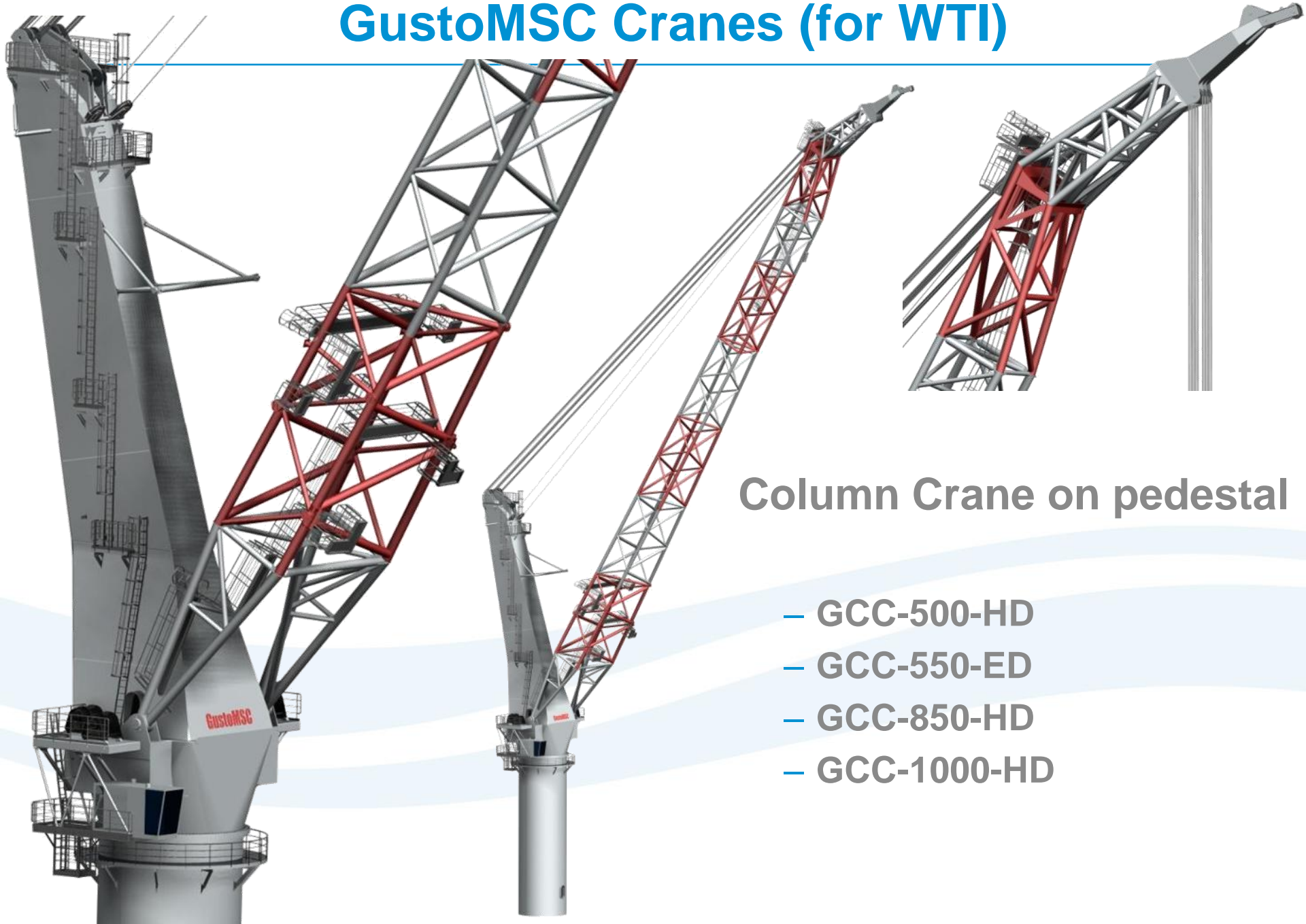
Hydraulics by Bosch Rexroth

# GustoMSC Jack Up Technology

Leg construction



# GustoMSC Cranes (for WTI)



Column Crane on pedestal

- GCC-500-HD
- GCC-550-ED
- GCC-850-HD
- GCC-1000-HD

# GustoMSC Cranes (for WTI)

**Boom assembly**



# GustoMSC Cranes (for WTI)



Crane tub section



# GustoMSC Cranes (for WTI)



Winches & Slewing gear





WIND LIFT I  
CUXHAVEN  
IMO 9516886

WIND LIFT I





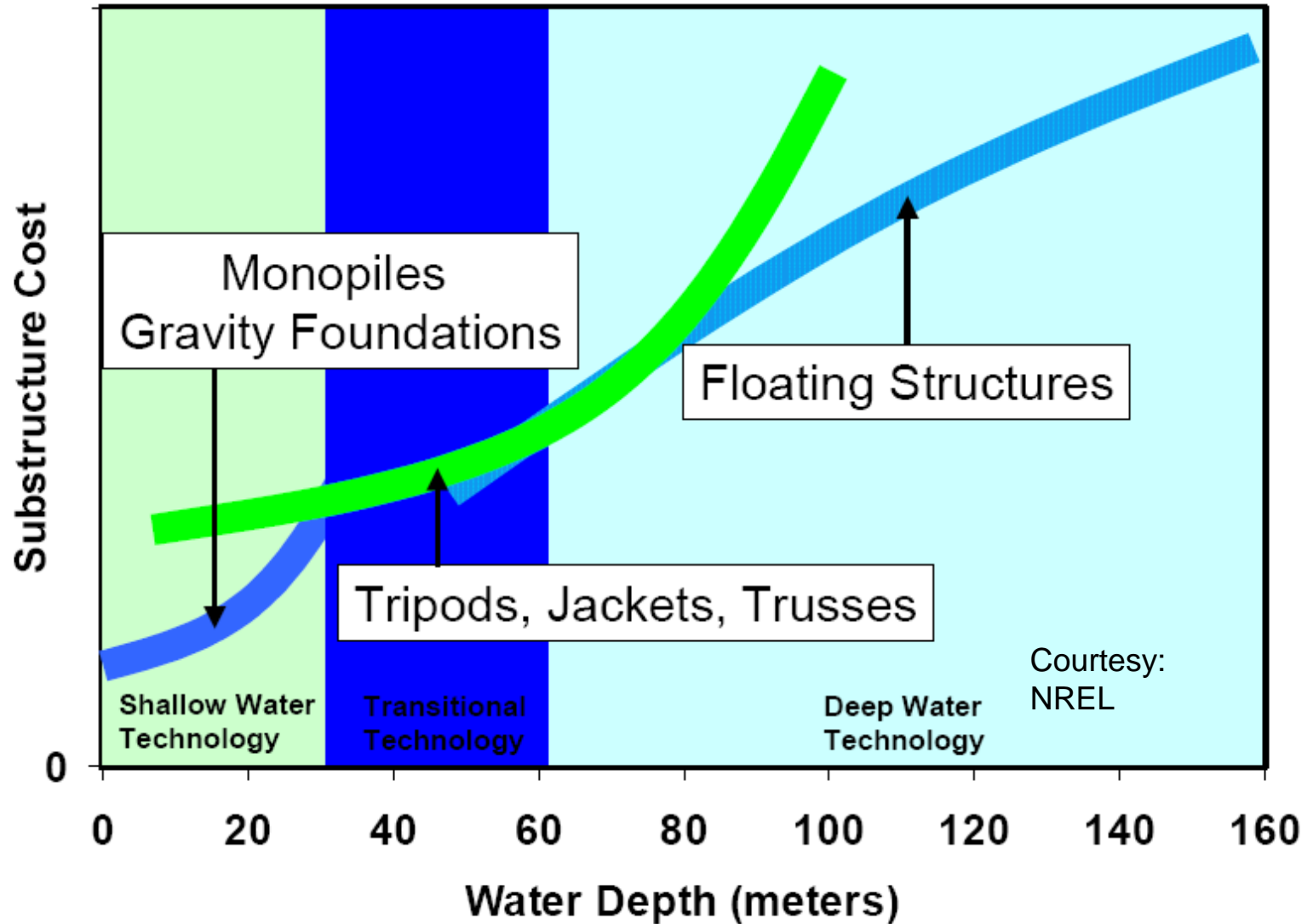
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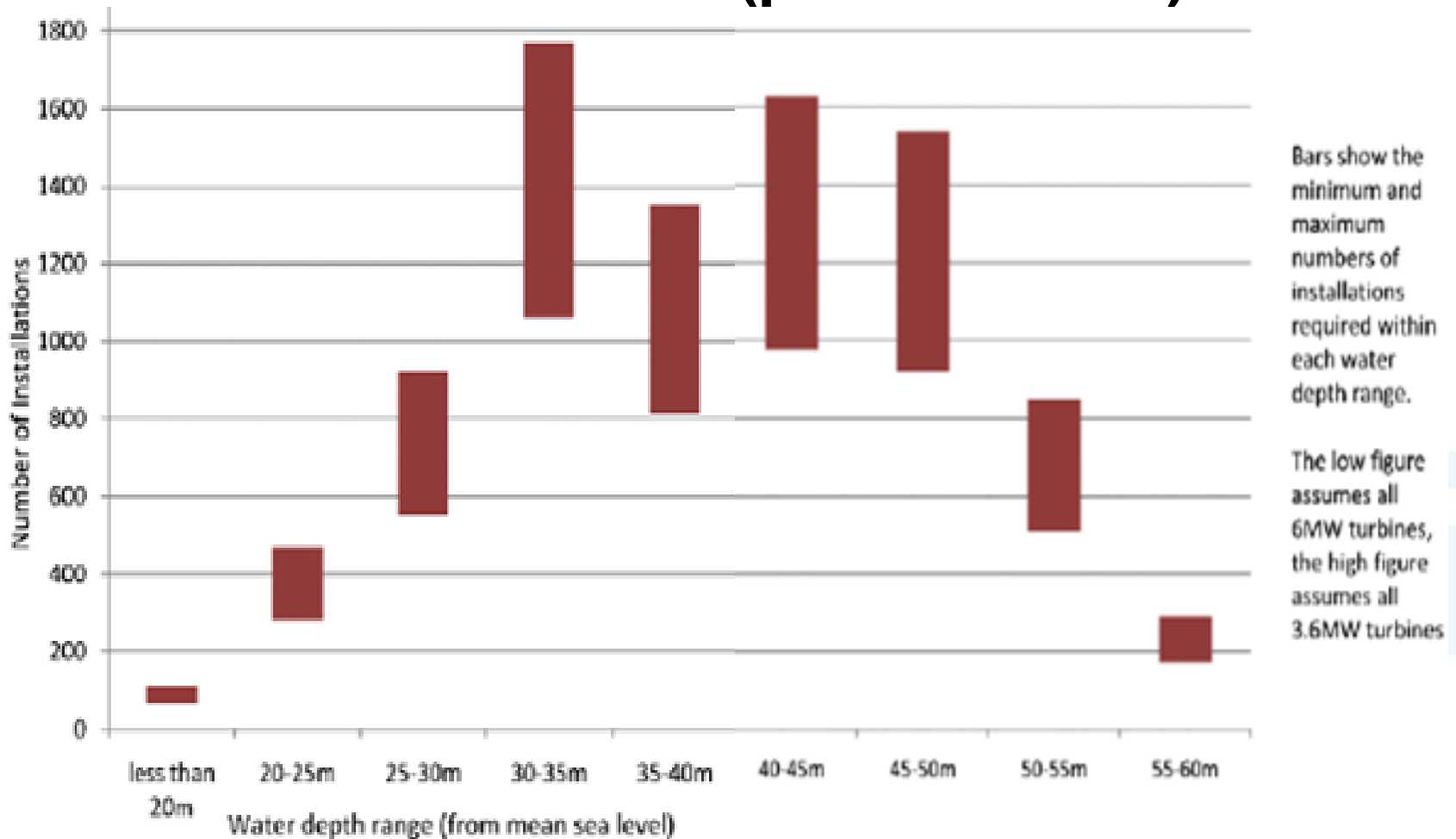
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# Future development



# North Sea Wind Farms

## UK Round 3 (planned 2020)



# GLC-800-ED Offshore Crane

## New GLC design

(5 are being built at present)

Lift capacity 800 ton

Water depth 40 - 45 m



# Future development

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## CHALLENGES for installations:

- **cost reduction (€/kWh)**
- **handling larger turbines**
- **faster and safer installation**
- **deeper water / future foundations**



# Equipment for Offshore Wind Turbine Installation

Questions?

