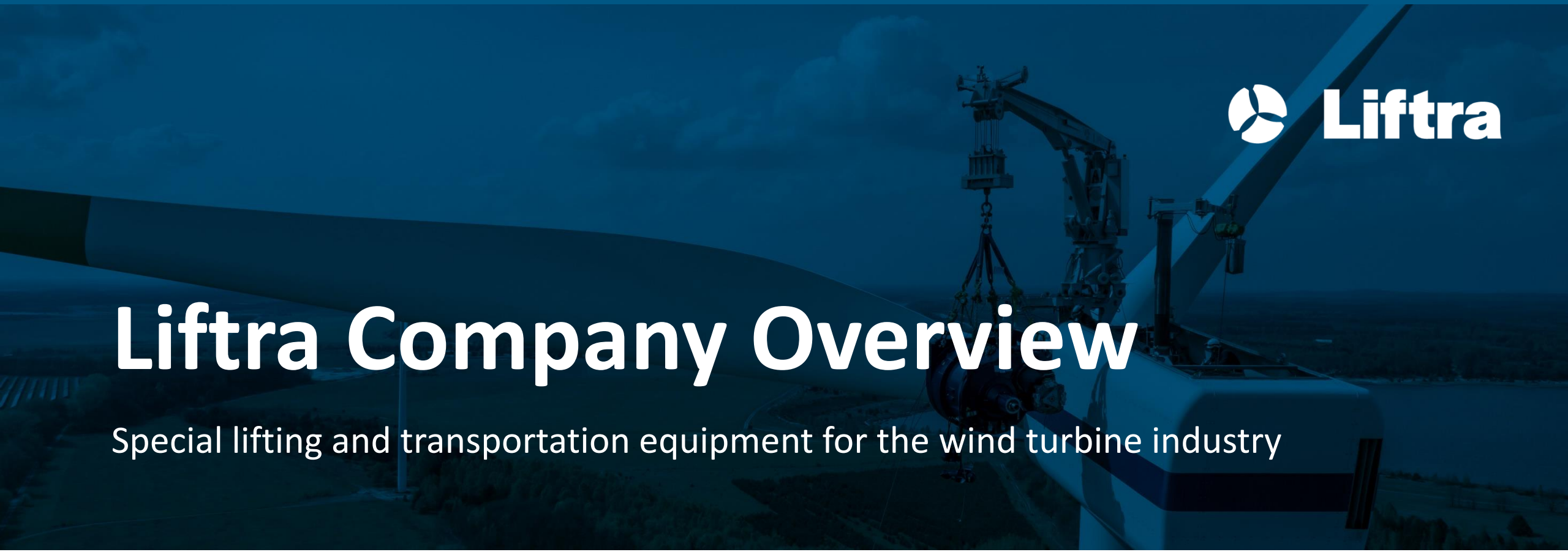


Liftra Company Overview

Special lifting and transportation equipment for the wind turbine industry

LIFTRA PROVIDES TAILOR-MADE SOLUTIONS FOR SPECIAL LIFTING AND TRANSPORTATION TASKS IN THE GLOBAL WIND TURBINE INDUSTRY

Company Overview

LIFTRA AT A GLANCE

Purpose

To expand the use of our technologies in the global wind industry by continuing to set new standards for the lifting and handling of wind turbine parts – all in order to lower the cost of wind energy.

Liftra by the numbers

16
years of industry experience

200
employees across three continents

40+
products with multiple patents and patents pending

700+
projects from small lifting brackets to stand-alone solutions

We are members of

wind denmark

European Crane Standardization Committee in Denmark

DS DANSK STANDARD

S-353: Part of Danish Standard

ENERGY INNOVATION CLUSTER

Management

Per Eske Fenger
Co-founder, owner and CEO

Board member, Wind Denmark

Jens Mortensen
Co-founder, owner and CEO

Liftra Timeline

2003
Liftra is founded in Aalborg.

2003
First project is a Vestas V82 main shaft fixture.

2005
First self-powered equipment, a MAN gantry carrier.

2008
Tianjin office opens.

2008
First patent granted (Tower Stacking Frames).

2008
Bilbao office opens.

2009
Flexifit is developed, first solution for craneless component exchange.

2011
Blade Dragon is launched.

2011
Cincinnati office opens.

2013
Liftra Self-Hoisting Crane is launched.

2015
Blade Eagle is launched.

2017
Promet is acquired.

2017
Blade Way is developed.

2018
LT1200 Liftra Self-Hoisting Crane is launched.

2019
Blade Skylark is launched.

2019
Blade Eagle installs world's longest blades (107 meters).

Clients

TURBINE MANUFACTURERS

SIEMENS Gamesa RENEWABLE ENERGY

Vestas

GE

MHI VESTAS OFFSHORE WIND

NORDEX

acciona Windpower

Envision

SENVION wind energy solutions

SUZLON POWERING A GREENER TOMORROW

GOLDWIND

上海电气 SHANGHAI ELECTRIC

\+

Samsung IMPSA Doosan Hitachi

OWNERS

e·on

DONG energy Ørsted

DUKE ENERGY

NEXTera ENERGY

\+

Centrica EDF Energy Statoil

Kruger Energy Meridian Energy

SUPPLIERS

A2SEA

JCS Jensen Crane Services

moventas

BLADT INDUSTRIES

\+

ATS Wind Energy Services

Bifab

Hochtief

LiftWerx

MT Højgaard

Smulders

Technip Offshore

Win & P.

Demonstrated Excellence

Recognition as an innovative business and developer of novel technologies in the wind turbine industry:

- Over **EUR 10 million** granted in total development funding from 2011 to 2020.
  - H2020 (EU)
  - EUDP (Energy Technology Development and Demonstration Program)
  - The Market Development Fund
- National business and innovation awards
  - **2013**: Liftra Self-Hoisting Crane claims Product Award from *Ingeniøren*, renowned Danish engineering newspaper.
  - **2016**: Liftra named Entrepreneur of the Year in Northern Denmark at *EY Entrepreneur of the Year.*
  - **2017**: Liftra named Most Innovative Growth Company in Denmark at *EY Entrepreneur of the Year.*

LIFTRA INSTALLATION CRANE

LIFTRA SELF-HOISTING CRANE

LIFTRA OFFSHORE CRANE

BLADE WAY

BLADE DRAGON

POWER PACK

TAGLINE SYSTEM

Tailor-made Equipment

TAILOR-MADE SOLUTIONS HAVE BEEN CORE TO OUR BUSINESS SINCE 2003

Blade yoke – horizontal to vertical

Tower and nacelle lifting yoke

Upending of 760 t jackets

Rigging for Winergy gearbox in Siemens 2.3 MW

350-ton nacelle transport frame

130-ton rotor yoke

MORE THAN

700

PRODUCTS DESIGNED OVER

17 YEARS

50-ton lifting yoke

Davit crane with 2.7 m reach

Tailor-made Equipment

OUR EQUIPMENT PORTFOLIO COVERS THE FULL TURBINE LIFECYCLE ON- AND OFFSHORE

TRANSPORTATION

INSTALLATION

MAJOR COMPONENT REPLACEMENT

FOUNDATIONS AND DAVIT CRANES

Blade Installation

STATE-OF-THE-ART BLADE YOKES

BLADE HAWK
HORIZONTAL

LAUNCHED IN 2007

Horizontal installation of 61.5 m blades.

12 m/s mean wind | 18 m/s peak wind

Complete third-party CG3 certification
(Design Verification, Production Survey, Test Survey)

BLADE EAGLE
TILT

LAUNCHED IN 2015
PATENTED IN 2015

No use of turbine turning gear

12 m/s mean wind | 18 m/s peak wind

Complete third-party CG3 certification
(Design Verification, Production Survey, Test Survey)

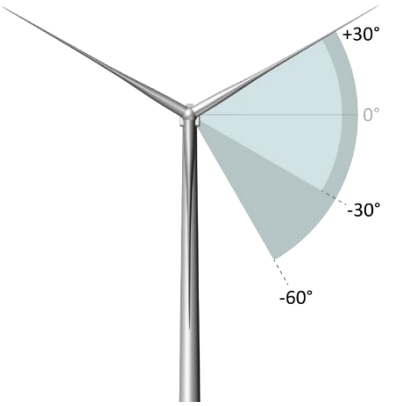
BLADE DRAGON
ALL ANGLES

LAUNCHED IN 2011
PATENTED IN 2011

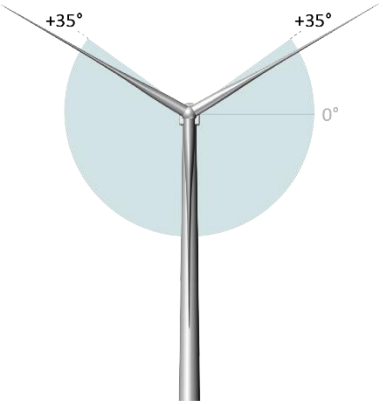
No use of turbine turning gear

12 m/s mean wind | 18 m/s peak wind

Complete third-party CG3 certification
(Design Verification, Production Survey, Test Survey)



Blade Eagle installation chart



Blade Dragon installation chart

Craneless Solutions

- **Innovative engineering** has positioned Liftra as a pioneer in the new paradigm for craneless wind turbine installation and maintenance.
- Liftra's **universal technologies** are easily mobilized and demand no civil works.
- Craneless replacement of major components, including:
  - Gearboxes
  - Generators
  - Transformers
  - Main shafts
  - Single blades
  - Rotors
  - Hubs

LT1000 Liftra Self-Hoisting Crane

LT1200 Liftra Self-Hoisting Crane

LT1100 Blade Way

Liftra Self-Hoisting Crane

INSTALLATION OVERVIEW OF TURBINE INTERFACE AND CRANE

Google Maps view of on-site setup

LSHC is hoisted from its container

LSHC climbing its own lifting wire

LSHC arriving at the nacelle

Liftra Self-Hoisting Crane container

LSHC turning 90 degrees

LSHC turning final 90 degrees

LSHC ready for operation

Liftra Self-Hoisting Crane

CRANE
LT1200 Self-Hoisting Crane

BASE
Turbine interface package

All major component exchanges

Vertical blade exchange

Rotor exchange

Main bearing exchange

Horizontal blade exchange with tailing crane

Gearbox exchange

Exchange of components in all conditions

Roof removal in the mountains

Gearbox exchange in ice

Crane installation in -20 degrees

Blade exchange with the blade way at night

Main shaft exchange at 50 degrees in the dessert

Liftra Self-Hoisting Crane Blade Exchange ”Skylark”

INSTALLATION OVERVIEW OF TURBINE INTERFACE AND CRANE

Lowering of blade vertical

Blade turning 90 degrees

Blade Vertical

Liftra Self-Hoisting Crane

CRANELESS REPLACEMENT OF MAJOR COMPONENTS SINCE 2013

MULTI-BRAND COMPATIBILITY

Turbine-specific adapter sets continually being developed.
24 ton WLL, 18 m/s peak wind.

750+ GEARBOX REPLACEMENTS

Gearbox replacement in 4-5 days.
8 cranes currently operated by independent service providers in the USA and Canada.

MINIMAL MOBILIZATION

Significant savings on mobile cranes.
Only 3 vehicles required on-site: 40-foot crane container, 12-foot tool container and gearbox truck.

Liftra Self-Hoisting Crane

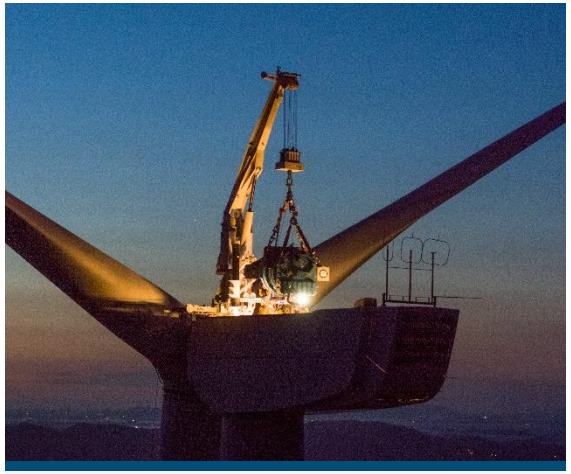
GREAT FLEXIBILITY

CUSTOM MODIFICATION TO ALLOW
OPERATION ON **SOFT SOIL**

PROTECT FARMLAND AND
AVOID PROPERTY DAMAGE

Liftra Self-Hoisting Crane

AVAILABILITY OPTIONS



FULL OWNERSHIP AND OPERATION

Turbine operator purchases a Self-Hoisting Crane and relevant crane bases.

Liftra trains crew for operator to run independently.

CLIENTS USING THIS SETUP

FULL OWNERSHIP, EXTERNAL CREW

Turbine operator purchases a Self-Hoisting Crane and relevant crane bases.

External crew operates the crane.

CLIENTS USING THIS SETUP

INTERFACE ONLY, EXTERNAL CRANE

Turbine operator purchases only relevant crane bases.

Crane and crew are contracted externally.

CLIENTS USING THIS SETUP

FULL OWNERSHIP, SERVICE CONTRACTING

Service provider purchases a Self-Hoisting Crane and relevant bases.

Liftra trains crew for service company.

CLIENTS USING THIS SETUP

CRANELESS REPLACEMENT OF SINGLE BLADES AND BLADE BEARINGS

BLADE WAY

LAUNCHED IN 2017

12 m/s peak wind.

Change 3 blades or
blade bearings in 4 days.

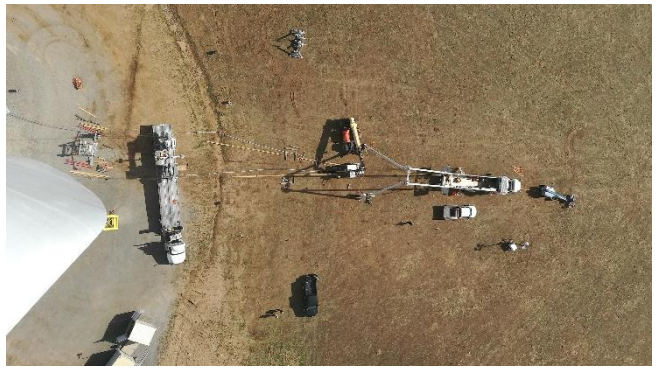
1 standard truck for Blade Way container, 1 for tool container

WLL 14.6 ton per blade or
blade and bearing combined.

Blade Way

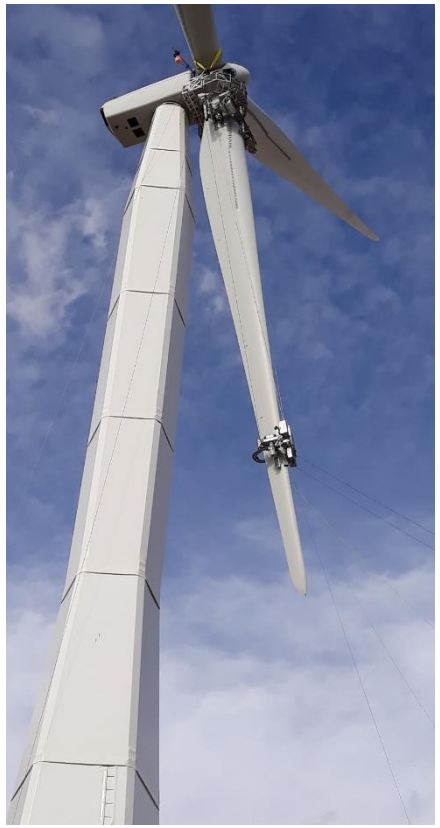
CRANELESS REPLACEMENT OF SINGLE BLADES AND BLADE BEARINGS

Blade Way root yoke and tip yoke

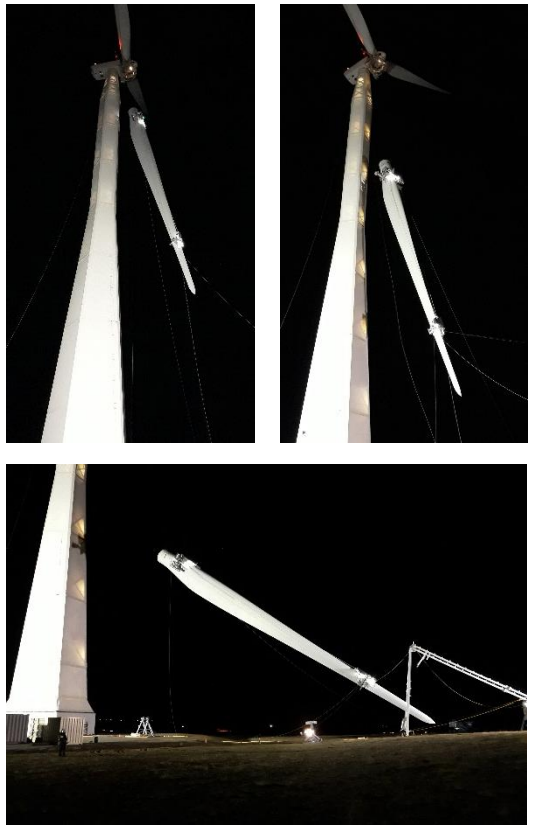


On-site footprint

Root yoke attached



Tip yoke attached



Liftra Self-Hoisting Crane

SELF-HOISTING CRANE COMPATIBILITY MATRIX

Wind Turbine	Installed	LT1000 (WLL 24 t)	LT1200 (WLL 78 t)
Acciona AW3000	1,500		
Gamesa 2 MW platform, G8x G9x	14,000		
GE 1.5 - 70.5 77 82.5 87 GE 1.6 - 77 82.5 87 GE 1.68 - 82.5 GE 1.85 - 82.5 87	20,000		
GE 1.6 - 100 103 GE 1.7 - 100 103 GE 1.79 - 100	6,000		
GE 2.x MW	6,500		
Mitsubishi MWT1000a	2,500		
Nordex 2.5 MW Gamma	4,500		
Nordex Delta4000	-		
Siemens 2.3 MW	10,000		
Siemens 2.625 MW G2-Mk4	240		
Suzlon S88	4,000		
Vestas 2 MW platform	21,000		
Vestas V82 NEG Micon NM72, NM82	4,500		
Vestas V112	9,000		
Total	103,000		

Component can be changed now *Under development*

750+ components replaced worldwide

Energy companies that have had components replaced by Liftra Self-Hoisting Cranes:

USA

Allete Clean Energy	Invenergy
BP	Leeward Renewable Energy
Duke Energy	Mid-American Energy
E.ON	NextEra Energy Resources
EDF Renewables	NRG Energy Inc.
EDPR	Pattern Energy
Enbridge	Portland General Electric
Enel Green Power	RES Americas
Exelon	Transalta
Iberdrola Renewables	Westar Energy

Europe

Aquila Capital	Eurowind	Statkraft

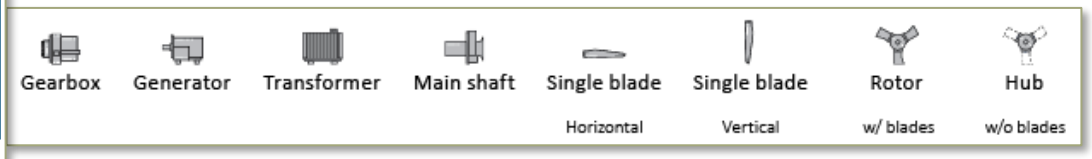
OEMs that have ordered development of and purchased crane base equipment :

SIEMENS Gamesa RENEWABLE ENERGY

NORDEX acciona Windpower

Vestas

GE



Thank you

Liftra

Liftra

ESTABLISHED 2003

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