

# Final report

## 1.1 Project details

|  |  |
|--|--|
| <b>Project title</b>   | <b>EUDP 2016 Liftra Offshore Self-hoisting Crane</b> |
| <b>Project identification (program abbrev. and file)</b>       | <b>Journalnr.: 64016-0100</b>                        |
| <b>Name of the programme which has funded the project</b>      | EUDP16   |
| <b>Project managing company/institution (name and address)</b> | Liftra Aps   |
| <b>Project partners</b>  | none   |
| <b>CVR</b> (central business register)                         | 10110122   |
| <b>Date for submission</b>                                     | 30-06-2020   |

## 1.2 Short description of project objective and results

English:

The goal of the project is to develop a self-hoisting crane that can change gearboxes, generators and transformers offshore from a ship (CTV). The goal was not reached in full. The crane is 80% developed but not produced since there has not been a customer yet to finalize the project with. Liftra has fully developed and produced an on-shore version that is tested with success and 4 cranes has been produced.

Danish:

Projektets formål er at udvikle en selvhejsende kran, der kan skifte gearkasser, generatorer og transformere offshore fra et skib (CTV). Målet blev ikke nået i fulde. Kranen er 80% udviklet, men ikke produceret, da der ikke er fundet en kunde og lave de sidste dele sammen med. Der er udviklet og produceret en on-shore udgave, som er testet med succes og 4 kraner er blevet produceret.

## 1.3 Executive summary

The goal of the project is to develop a self-hoisting crane that can change gearboxes, generators and transformers offshore from a ship (CTV). The goal was not reached in full. The crane is 80% developed but not produced since there has not been a customer yet to finalize the project with. Liftra has fully developed and produced an on-shore version that is tested with success and 4 cranes has been produced.

Even though the goal has not been reach the project has made a strong foundation for Liftra to in the near future (1-2) years to succeed with the project. With an on-shore version in operation and an offshore version almost developed it is possible to convince the customers that this is possible and it is mainly a matter of time. The project has already ensured that Liftra has been able to develop an on-shore version.

On short term the project has ensured the on-shore version success and there has already been sold 1 crane for Vestas and 1 for RWE and we expect 3-5 more cranes sold for onshore use this year.

An interface has also been made to Nordexes Delta 4000 turbine for gearbox exchange and for Siemens SWP2,3MW for rotor exchange. There has also been developed an interface for GE 1,5 and 1,6 t for rotor exchange.

In September Liftra will change the first gearbox on a lake from a barge with the onshore version of the crane. This will prove that it is possible to do offshore and Liftra expects that this will remove the last scepticism in the industry.

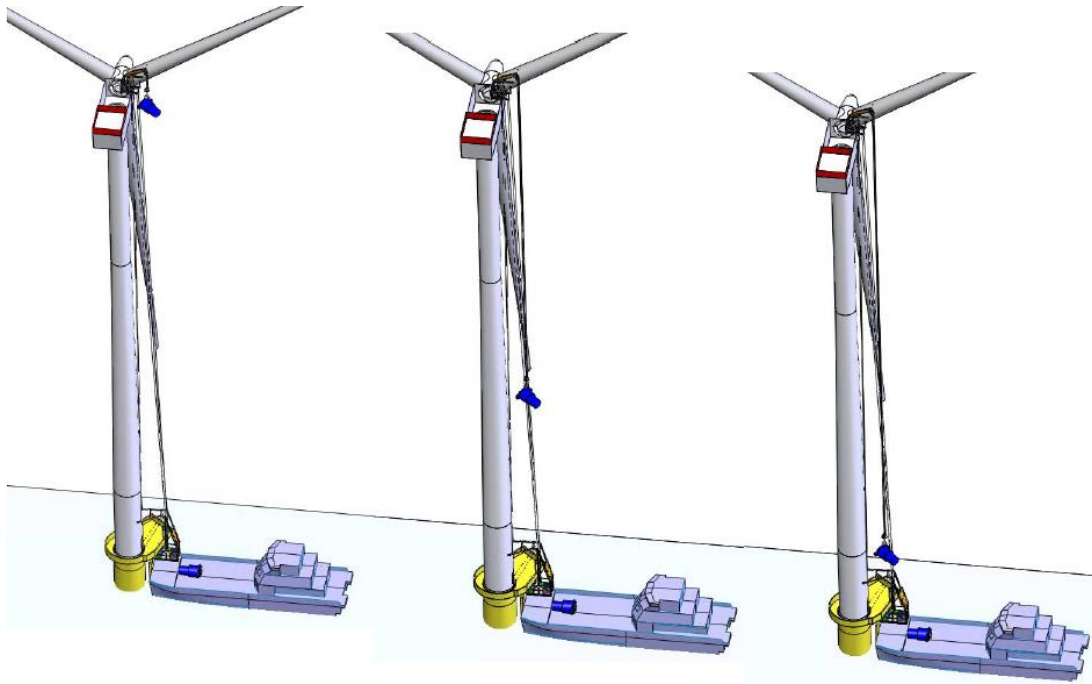
For offshore we are in negotiation with 3 companies in Denmark, 1 in Germany 1 in Japan and 2 in China. Liftra expect to have closed the first contract offshore within 1 year and delivery of the first crane within 2 years from now.



#### **1.4 Project objectives**

The objectives of the project was to develop an offshore crane that is able to change a gearbox, generator or transformer from a ship (CTV). On the engineering side the project developed as expected. In the first engineering phase Liftra did the calculations and design that showed that it was possible to do an offshore gearbox exchange. The first storyboard and calculation brought Liftra in to serious talks with Ørsted, RWE and SiemensGamesa. SiemensGamesa decided to move on and do a fully storyboard including a close time study of how long time it would take to change a gearbox. On the basic of the storyboard and the time study SiemensGamesa did a business case on the Liftra offshore crane with a positive result. Unfortunately, SiemensGamesa decided to put the project on hold do to external reason. The project is only stopped until the LT1200 version onshore is proven then the offshore version will be reopened.

From the beginning Liftra saw that customer commitment would be the biggest risk, and the risk that had the biggest risk to occur. Unfortunately this ended up being the case that Liftra was not able to finish the project within timeline. Liftra still see the project as successful and we still expect that we will have a full offshore crane in operation with the next 2 years.



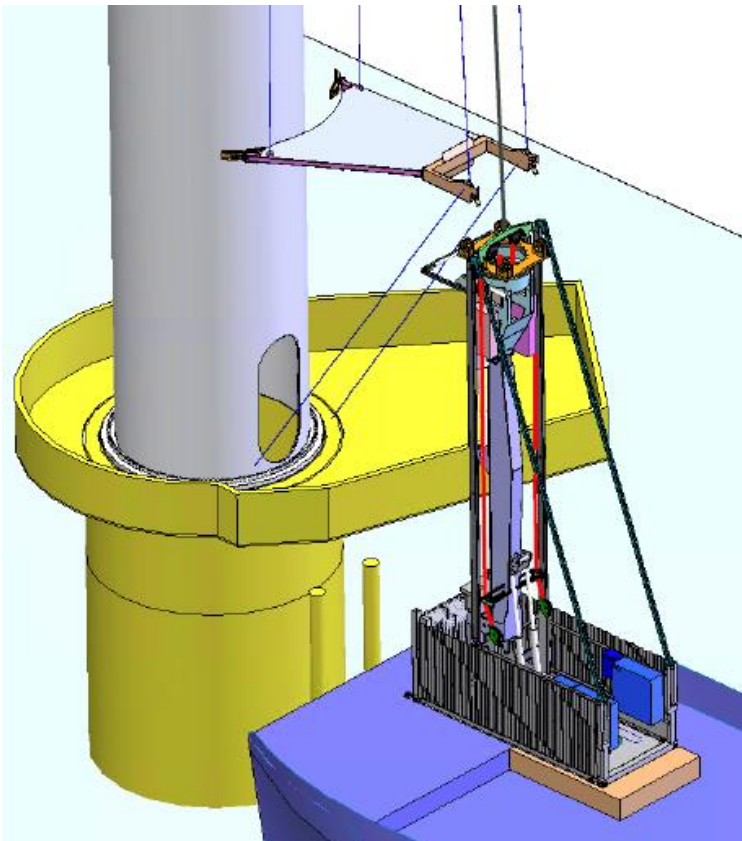
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### 1.5 Project results and dissemination of results

The main activities for this project have been to develop the Liftra offshore crane. Under the development of the crane a series of tasks has been made. The following tasks were the same for the onshore and offshore version of the Liftra crane:

- Development of the crane itself.
- Development of the winch system.
- 80% of the control system.
- 80% of the interface to the turbine.
- 80% of the processes for installing the crane is the same

The only part that has not been developed is the container for the crane since that has to be developed to fit the ship and the ship can't be chosen without a customer since the customer has to supply the ship.



Offshore container for the crane



Onshore version of the container.

The objective of develop an offshore crane has not been reached. The main reason for this was that Liftra did not manage to find a customer that was ready to buy a crane within the time of the project.

Even though the objective of develop an offshore crane was not reach Liftra still see the project as a result and one of the secondary goal on the project was to develop and test an onshore version. This goal was reach in full and have had a significant impact on Liftra's turnover, export and employment.

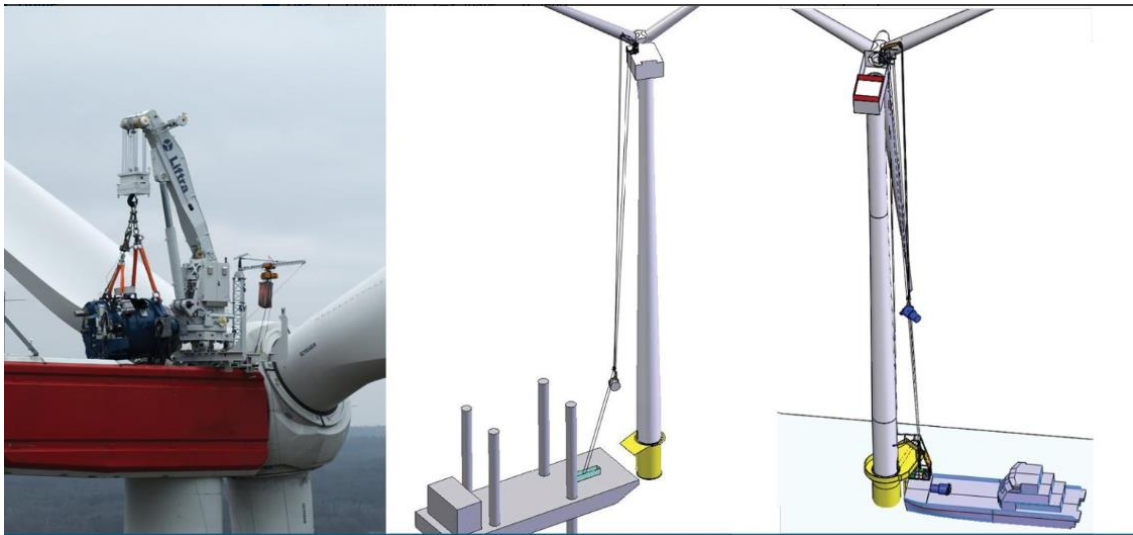
On export the crane has created a turnover of more than 70 million DKK where 65 millions has been export. Liftra has also employed more than 10 new people in Denmark and more than 15 new people outside Denmark.

### **Marketing**

The following is some of the feeds there has been on LinkedIn about our onshore and off-shore crane. Liftra has more than 4000 followers and Per Fenger has more than 4500 followers as vast majority is people from the global wind turbine industry.

The off-shore crane and how gearbox exchanges can be done from a jack-up barge or a CTV ship.

[https://www.linkedin.com/posts/liftra-aps\\_liftra-self-hoisting-crane-is-operating-offshore-activity-6679681675414290432-5GwO](https://www.linkedin.com/posts/liftra-aps_liftra-self-hoisting-crane-is-operating-offshore-activity-6679681675414290432-5GwO)



The different post is generally viewed 2 - 7000 times and has between 30 and 100 reactions / likes. The postes are in all majority viewed by people from the Wind turbine industry. Please see below for details.

Your post posted on June 21, 2020

92 reactions · 4 comments

7,441 views

2 reshares

SG

191 people from Siemens Gamesa viewed your post

|                          |     |
|--------------------------|-----|
| Vestas                   | 172 |
| FairWind                 | 73  |
| MHI Vestas Offshore Wind | 70  |
| Siemens                  | 56  |
| GE Renewable Energy      | 51  |
| Ørsted                   | 41  |
| Nordex Group             | 35  |
| Liftra                   | 8   |



382 people who have the title Salesperson viewed your post

|                                       |     |
|---------------------------------------|-----|
| Project Manager                       | 321 |
| Engineer                              | 261 |
| Executive Director                    | 208 |
| Technician                            | 188 |
| Mechanic and Maintenance Tradesperson | 136 |
| Operations Specialist                 | 120 |
| Business Strategist                   | 116 |
| Business Owner                        | 114 |

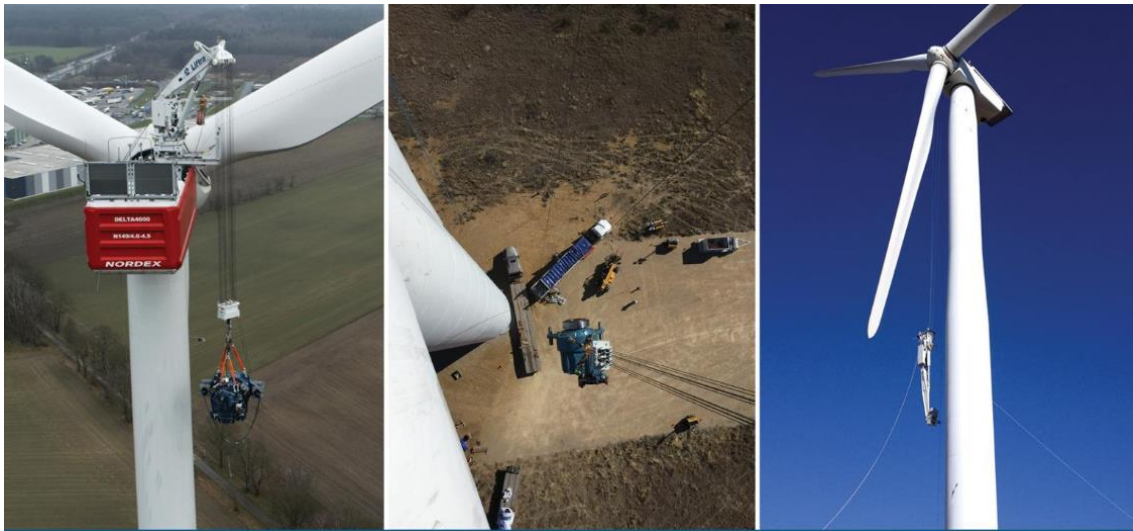


537 people viewed your post from Central Region, Denmark

|  |     |
|--|-----|
| Northern Region, Denmark                 | 347 |
| Southern Region, South Jutland, Denmark  | 344 |
| Copenhagen Area, Capital Region, Denmark | 252 |
| Southern Region, Funen, Denmark          | 102 |
| Hamburg Area, Germany                    | 98  |
| Newcastle upon Tyne, United Kingdom      | 82  |
| Sealand Region, Denmark                  | 50  |

The onshore crane used to show how to change gearboxes on tall turbines

[https://www.linkedin.com/posts/liftra-aps\\_new-taller-towers-in-the-industry-put-higher-activity-6681078013519515648-4jvJ](https://www.linkedin.com/posts/liftra-aps_new-taller-towers-in-the-industry-put-higher-activity-6681078013519515648-4jvJ)



First gearbox exchange with the Liftra LT1200 on-shore crane done for Nordex-acciona in Germany.

[https://www.linkedin.com/posts/liftra-aps\\_a-new-milestone-the-first-gearbox-was-exchanged-activity-6634029333830873088-FmyG](https://www.linkedin.com/posts/liftra-aps_a-new-milestone-the-first-gearbox-was-exchanged-activity-6634029333830873088-FmyG)



First test of the on-shore version of the crane

[https://www.linkedin.com/posts/liftra-aps\\_we-are-so-excited-to-announce-the-arrival-activity-6560430030382604288-Ox96](https://www.linkedin.com/posts/liftra-aps_we-are-so-excited-to-announce-the-arrival-activity-6560430030382604288-Ox96)

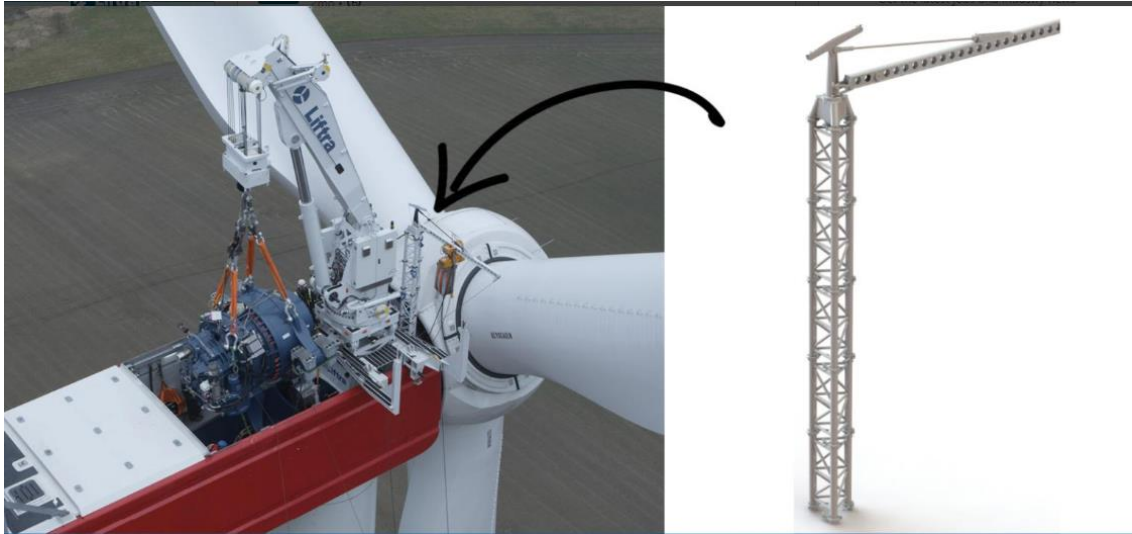
**LT1200 SELF-HOISTING CRANE**

CRANELESS REPLACEMENT OF MAJOR COMPONENTS

- LIFTS ALL MAJOR COMPONENTS, INCLUDING GEARBOXES, GENERATORS, TRANSFORMERS, MAIN BEARINGS, AND EVEN ROTORS UP TO 78 TONS
- CHANGES BLADES & BLADE BEARINGS UP TO 35 TONS WITH THE BLADE SKYLARK
- TRANSPORTED IN A SINGLE 40 FT CONTAINER
- COMPATIBLE WITH LT1000 CRANE BASES
- DEFAULT REACH OF 7 M - CAN BE EXTENDED TO 10 M FOR LIGHTER COMPONENTS
- PLUG-IN HYBRID BATTERY, WITH OPTION TO HOOK INTO TURBINE
- OPERATES AT WIND SPEEDS UP TO 18 M/S
- HUB HEIGHTS UP TO 170 M
- REDUCES MOBILIZATION SCOPE AND COSTS
- SEE MORE AT WWW.LIFTRA.COM

The small crane (Next to the big crane) enables Liftra to install the big crane in turbines with no crane in the nacelle. This crane is also part of the EUDP project.

[https://www.linkedin.com/posts/liftra-aps\\_next-generation-liftra-light-weight-crane-activity-6656839670032404480-CCdI](https://www.linkedin.com/posts/liftra-aps_next-generation-liftra-light-weight-crane-activity-6656839670032404480-CCdI)



The Crane was used as showcase on how to solve exchange of major components on high turbines

[https://www.linkedin.com/posts/liftra-aps\\_wind-turbines-get-taller-with-very-large-activity-6648367880570314754-LGS2](https://www.linkedin.com/posts/liftra-aps_wind-turbines-get-taller-with-very-large-activity-6648367880570314754-LGS2)



The Crane was used as a showcase for 80 technical students on HTX (technical high school)

[https://www.linkedin.com/posts/liftra-aps\\_this-week-liftra-headquarters-played-host-activity-6608620675294986241-v7qR](https://www.linkedin.com/posts/liftra-aps_this-week-liftra-headquarters-played-host-activity-6608620675294986241-v7qR)



The Crane was our main attraction on the offshore exhibition in Copenhagen last year. Below link describes TV2 morning news informing that the crane is funded by EUDP.

[https://www.linkedin.com/posts/liftra-aps\\_dkvind-activity-6605005732712714240-AvrN](https://www.linkedin.com/posts/liftra-aps_dkvind-activity-6605005732712714240-AvrN)



On below link Per Fenger explains to Kristian Jensen and Jakob Elleman-Jensen about the crane and how it is funded by EUDP. This was also done on the offshore exhibition in Copenhagen.

[https://www.linkedin.com/posts/liftra-aps\\_with-all-eyes-on-offshore-wind-in-copenhagen-activity-6605043652135911425-qjTC](https://www.linkedin.com/posts/liftra-aps_with-all-eyes-on-offshore-wind-in-copenhagen-activity-6605043652135911425-qjTC)





### 1.6 Utilization of project results

The project results have already been a success for Liftra's on-shore version of the crane, and we are confident that it will clear the way for the offshore version. Commercially the project has been a success on the onshore version and Liftra still expect to get a commercial success with the next 2 years with the offshore version of the crane.

On export the crane has created a turnover of more than 70 million DKK where 65 millions has been export. Liftra has also employed more than 10 new people in Denmark and more than 15 new people outside Denmark.

Liftra's business plans has not changed on the short term 1-2 years, but on the long terms the success for the onshore crane and the innovation done in the project has cleared the way for Liftras installation crane that we received grant of 9.357.513 DKK over the next 2 years.

The project names is:

EUDP 2019-II Liftra Installationskran - LT1500 J.nr. 64019-0564.

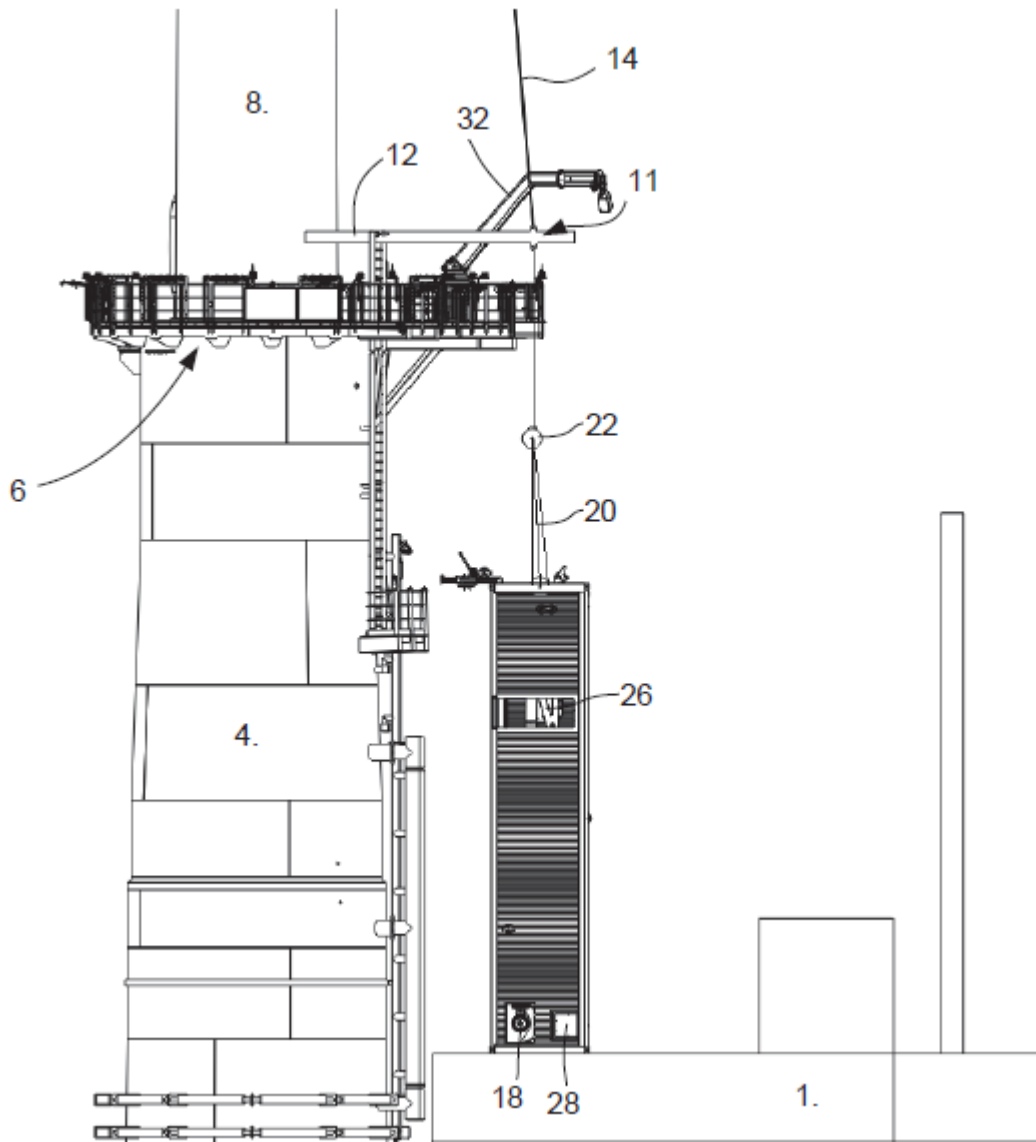
### Patents

Doing the project the following patents has been applied for and is now patent pending

#### 1<sup>st</sup> patent:

LT1200-1 Suspended Crane system

Pending applications: PCT (PCT/DK/2018050196), To be decided

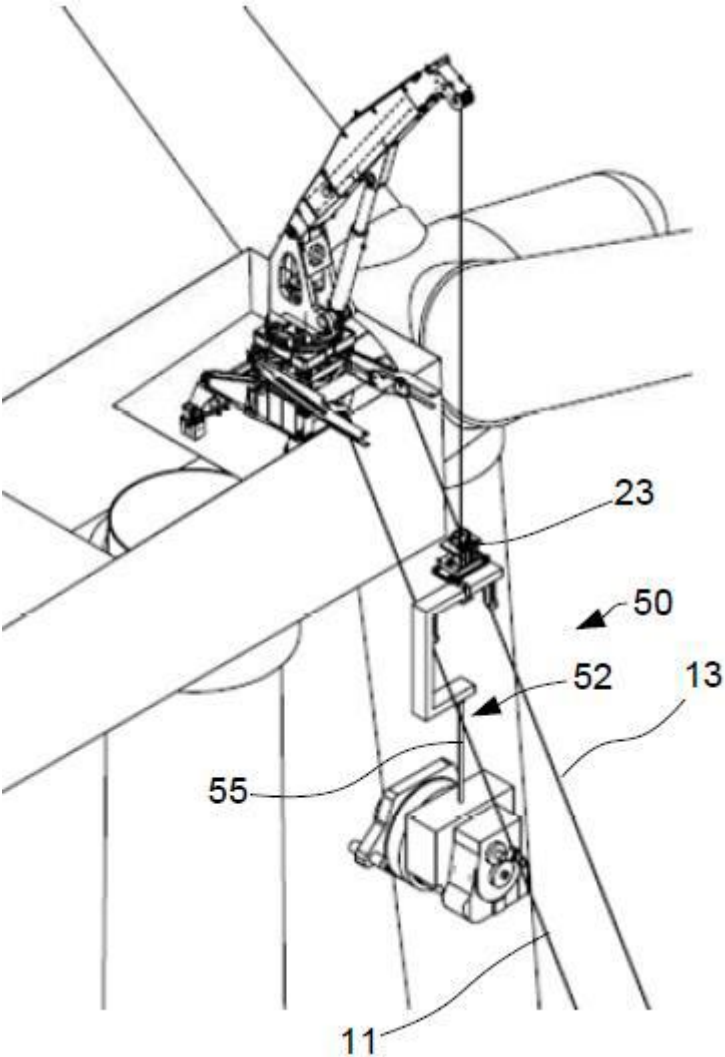


The patent describes a system for installing a LSHC on an off-shore wind turbine site.

**2nd Patent:**

LT1210-0 C-hook

Pending applications: DK (DK201970143), To be decided

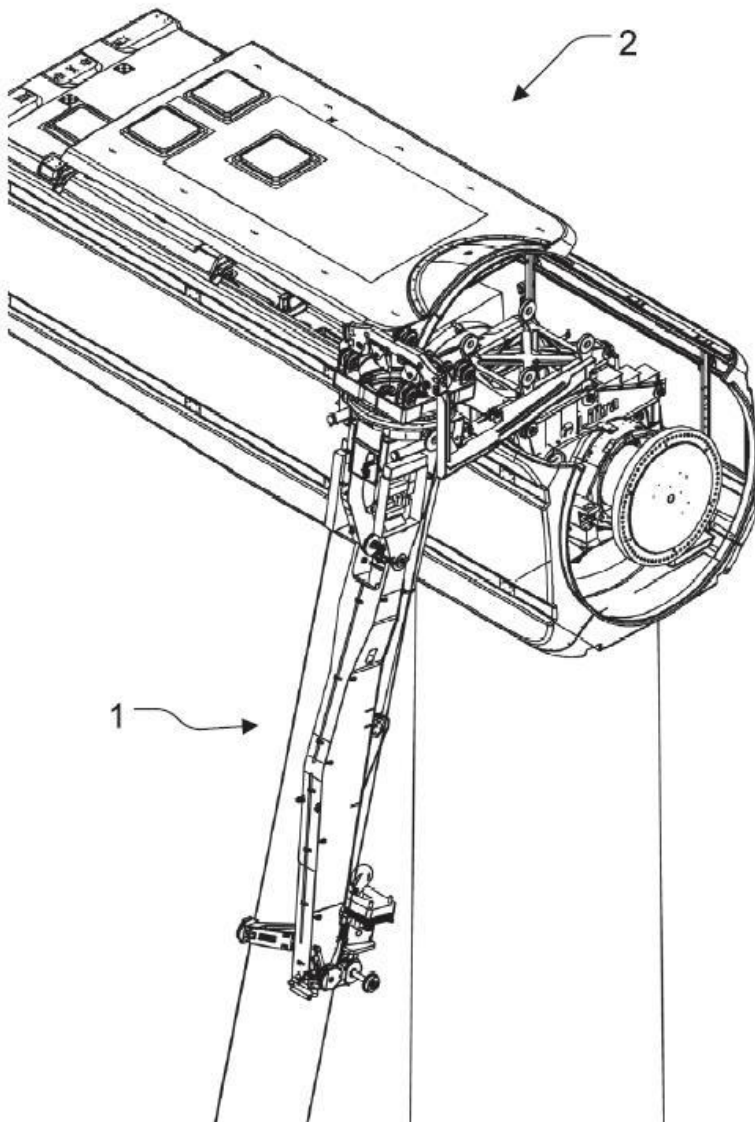


The patent describes a system for handling burdens LSHC when it is required to move the burden horizontally.

**3<sup>rd</sup> Patent:**

LT1200-1 Main crane

Pending applications: DK (DK201970211), To be decided



The patent describes a method for installation of a self-hoisting crane, particularly the part near the nacelle.

#### 4<sup>th</sup> Patent:

LT1200-1 Container

Pending applications: DK(DK201970284), To be decided

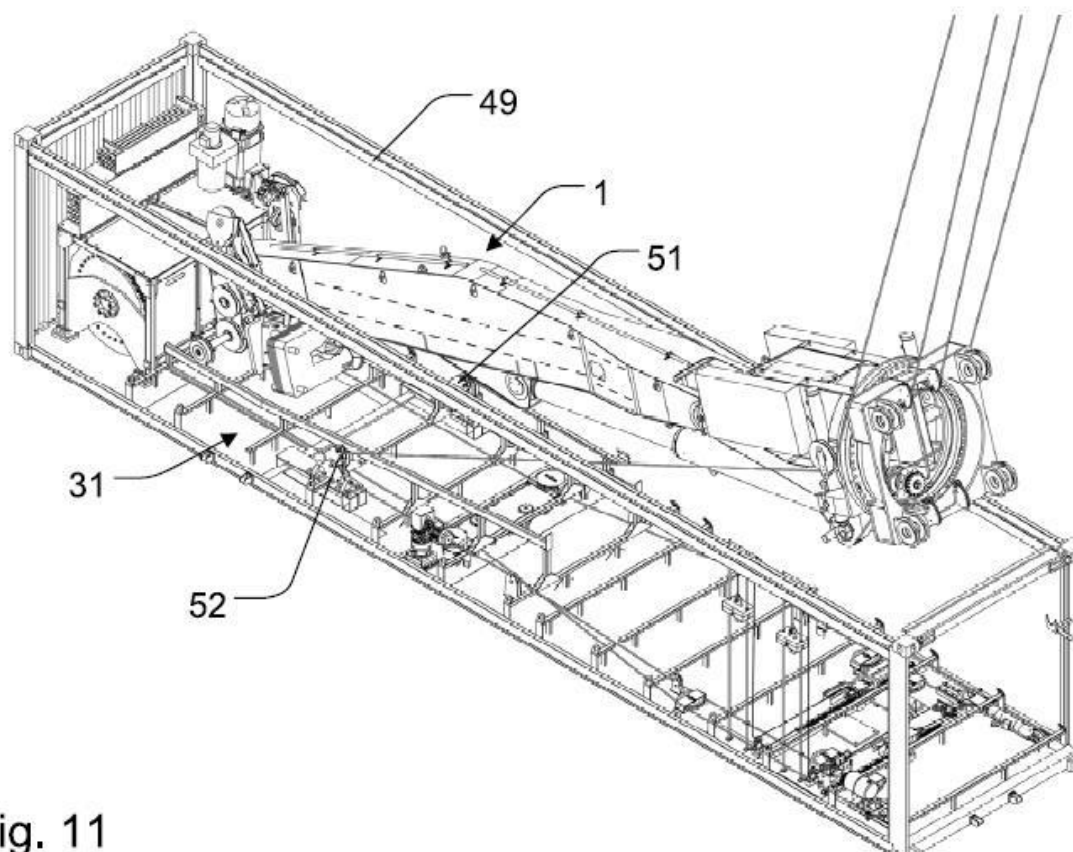


Fig. 11

The patent describes a self-hoisting crane system, particularly focusing on the details improving the LT1200 container compared to the LT1000 container.

One additional patent I expected to be filled with the next month so in total Liftra has applied for 5 patents that was invented doing the EUDP project for the Liftra offshore crane.

#### Marked potential

The marked potential for the on-shore crane is very big and Liftra expect that the LT1200 crane onshore will generate 50-100 million in turnover in 2020 and from 2021 and forward the crane will generate more than 100 million DKK in revenue per year.

Liftra expect that the off-shore version in 2021 will generate a revenue a 20-50 million in DKK from 2022 the crane will generate a revenue of +50 million DKK per year.

#### Competitions

When Liftra receive the first grant from EUDP back in 2011 for the first Self-hoisting crane Liftra was the first company in the world that succeeded in developing a self hoisting crane that got commercial success. Now there is 3-5 other companies in Europe and China that are trying to make similar products and eventually they will succeed. Therefore it is crucial that Liftra continues to develop the Liftra self-Hoisting product line and that we stay ahead of the competition. This EUDP project has ensured that Liftra is in the absolute forefront on new development on this product area even though Liftra has not yet got commercial success off-shore. The project has ensured that our customers now that Liftra is world leading on the technology for exchange of major components with the self-hoisting technology also off-shore.

## **1.7 Project conclusion and perspective**

Liftra sees the projects as a big success even though the original goal was not achieved. The project ensured that Liftra got the onshore self-hoisting crane developed and is getting a commercial success with that.

The project also created 5 new patents that Liftra sees as crucial in keeping the competitors behind both onshore and offshore.

The project also helped Liftra in staying in the absolute forefront in development on the self-hoisting technology both onshore and offshore.

Finally this has been a big stepping stone for Liftra to start the development of the installation crane both technically and commercially.

## **Annex**

<https://liftra.com/product/l1200-liftra-self-hoisting-crane/>

[https://www.linkedin.com/posts/liftra-aps\\_liftra-self-hoisting-crane-is-operating-offshore-activity-6679681675414290432-5GwO](https://www.linkedin.com/posts/liftra-aps_liftra-self-hoisting-crane-is-operating-offshore-activity-6679681675414290432-5GwO)

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