Contracting Liftra to replace gearboxes with the LT1000-2 Self-Hoisting Crane.

GEARBOX REPLACEMENT
OUTLINE OF TASKS, RESPONSIBILITIES

LIFTRA SELF-HOISTING CRANE
ADVANTAGES

REDUCED MOBILIZATION
SAVE COSTS FOR LARGE MOBILE CRANES

MINIMAL FOOTPRINT
IDEAL FOR REMOTE LOCATIONS

OPERATIONAL AT HIGH WIND SPEEDS
WITHSTANDS GUSTS UP TO 18 M/S DUE TO REDUCED OSCILLATION

SIMPLIFIED LOGISTICS
COMES IN A 40 FT CONTAINER WITH ACCESSORIES IN A SEPARATE 12 FT CONTAINER
LIFTRA GEARBOX REPLACEMENT

ON-SITE FOOTPRINT
Everything necessary on-site to install the Self-Hoisting Crane and replace the gearbox.

LIFTRA SELF-HOISTING CRANE
MOBILIZATION

1. 40 FT CRANE CONTAINER
   Contains the Self-Hoisting Crane

2. 12 FT ACCESSORY CONTAINER
   Contains the Crane Base

3. TRUCK FOR THE GEARBOX
CREW AND SCHEDULE
Planning an efficient work schedule.

CREW CONFIGURATION
A crew of six is needed to install and operate the Self-Hoisting Crane and replace gearboxes. Liftra brings two certified Self-Hoisting Crane operators. The site provides four service technicians.

As a rule of thumb, Liftra personnel lead operation of the Self-Hoisting Crane, and site personnel lead site management and turbine-related activities.

LIFTRA PERSONNEL
2x CERTIFIED SELF-HOISTING CRANE OPERATORS

SITE PERSONNEL
4x SERVICE TECHNICIANS

SAMPLE SCHEDULE
A single gearbox replacement can be done in about 5 days.

When multiple turbines require service, deploying three crews and one additional crane base is an option.

A schedule can be planned so that each additional gearbox replacement extends the total duration by only 3 days.

As a rule of thumb, Liftra personnel lead operation of the Self-Hoisting Crane, and site personnel lead turbine-related activities.
LIFTRA GEARBOX REPLACEMENT SERVICE

SEQUENCE OF EVENTS
Process outline of a gearbox replacement.

INITIAL PREPARATIONS

SELF-HOISTING CRANE INSTALLATION

NACELLE AND GEARBOX PREPARATION

GEARBOX REPLACEMENT

SELF-HOISTING CRANE UNINSTALLATION

NACELLE AND SITE CLEANUP
SEQUENCE OF EVENTS

INITIAL PREPARATIONS
Getting the site and nacelle ready for service.

SITE PREPARATION
Liftra personnel may preview the site at the specific turbine and determine whether preparation is necessary.

If necessary, site personnel prepare the site. This may include partially flattening a surrounding cornfield and laying down driving mats. Liftra personnel assist.

ENGAGE ROTOR LOCKS
Site personnel take care of necessary clearances and engage high and low rotor locks up-tower.

SITE PREPARATION
Liftra personnel may preview the site at the specific turbine and determine whether preparation is necessary.

NACELLE PREPARATION, SITE CREW
Given the state of the old gearbox, site personnel prepare it for uninstall by e.g. draining its oil.

PREPARE GEARBOX
Given the state of the old gearbox, site personnel prepare it for uninstall by e.g. draining its oil.

CONNECT BREAKER BOX
Given the turbine model, site personnel may need to hook up a Liftra breaker box to the nacelle top box. Liftra personnel assist.

INTERNAL STRUCTURES
Given the turbine model, certain internal structures in the nacelle may need to be removed.

DECOUPLE GEARBOX
Site personnel decouple the gearbox from the generator and shim up the gearbox if necessary. Liftra personnel assist.
SEQUENCE OF EVENTS

SELF-HOISTING CRANE INSTALL

Installing the turbine-specific crane base and the Self-Hoisting Crane.

NACELLE PREPARATION, LIFTRA

Liftra personnel make final preparations in the nacelle for the installation of the turbine-specific crane base. Given the turbine model, this may include installing a cabriolet system for retracting the nacelle top cover. Site personnel assist as necessary.

INSTALL CRANE BASE

Liftra personnel install the crane base in the nacelle, which for most turbine models includes a main shaft fixture to keep the rotor in place. This is usually done before the Self-Hoisting Crane arrives on-site. Site personnel assist in accordance with instructions by Liftra.

INSTALL SELF-HOISTING CRANE

Liftra personnel lead the installation of the Self-Hoisting Crane with one certified operator up-tower and one down-tower. Site personnel assist as instructed by Liftra. Tasks may include assembly of the crane, handling taglines, etc.
SEQUENCE OF EVENTS

FINAL PREPARATIONS
Further preparations of the nacelle and the two gearboxes.

REMOVE NACELLE TOP COVER
For most turbine models, Liftra personnel remove and lower the nacelle top cover with the Self-Hoisting Crane. Site personnel assist. Liftra can provide the cover yoke if necessary.

PREPARE NEW GEARBOX FOR INSTALL
If necessary, Liftra personnel use the Self-Hoisting Crane to lift the new gearbox, allowing site personnel to reposition it on its stand. The site provides the gearbox rigging.
Site personnel prepare the new gearbox for installation, which may include filling with oil and preparing the shrink disc. If necessary, Liftra personnel assist.

OTHER NACELLE OPERATIONS
Site personnel perform any remaining operations necessary in the nacelle to prepare for the gearbox replacement. This may include uninstalling the generator fan and dismounting the high-speed brake assembly. Liftra personnel assist when necessary.
SEQUENCE OF EVENTS

GEARBOX REPLACEMENT

Performing the gearbox replacement.

EJECT OLD GEARBOX

Site personnel eject and slide the old gearbox clear of the main shaft.

LOWER OLD GEARBOX AND HOIST NEW GEARBOX

Liftra personnel lower the old gearbox with the Self-Hoisting Crane and place it on the truck down-tower. Liftra personnel then hoist the new gearbox from its stand into the nacelle. Site personnel assist.

PREPARE GEARBOXES

Site personnel lead the installation of the new gearbox in the nacelle, assisted by Liftra. Operations typically include torquing the shrink disc and mounting the high-speed brake assembly. Site personnel also prepare the old gearbox for transport.
SEQUENCE OF EVENTS

SELF-HOISTING CRANE UNINSTALL
Uninstalling the Self-Hoisting Crane and the turbine-specific crane base.

REASSEMBLE NACELLE
Site personnel reinstall and reassemble certain components within the nacelle, such as the generator fan.

If the nacelle top cover was removed, Liftra personnel lift it back up with the Self-Hoisting Crane.

UNINSTALL SELF-HOISTING CRANE
Liftra personnel lead the uninstallation of the Self-Hoisting Crane with one certified operator up-tower and one down-tower. Site personnel assist with disassembly and taglines.

UNINSTALL CRANE BASE
Liftra personnel uninstall and lower the turbine-specific crane base. Site personnel assist.
SEQUENCE OF EVENTS

SITE AND NACELLE CLEANUP

Getting the nacelle and site ready for continued operation.

RETURN NACELLE TO OPERATING CONDITION

INTERNAL STRUCTURES
If any internal structures were removed as part of initial preparations, site personnel reinstall these.

COUPLE UP GEARBOX
Site personnel shim the new gearbox down into place and couple it with the generator. Liftra personnel assist.

DISCONNECT BREAKER BOX
If a breaker box was installed, site personnel disconnect it from the nacelle top box. Liftra personnel assist.

PREPARE GEARBOX
Site personnel hook up the new gearbox electrically and hydraulically as necessary for correct operation.

RELEASE ROTOR LOCKS
Site personnel obtain necessary clearances and release the high and low rotor locks up-tower.

CLEAN UP SITE
Site personnel clean up the site, tower and turbine. Necessary tasks can include arranging shipping of any driving mats used.
MORE FROM LIFTRA

MAIN SHAFT FIXTURES

When using an external crane, a Main Shaft Fixture eliminates the need to remove the rotor when replacing the gearbox.

AVAILABLE FOR A NUMBER OF TURBINE MODELS

SIEMENS 2.3 MW

VESTAS V82

GE 1.5 MW