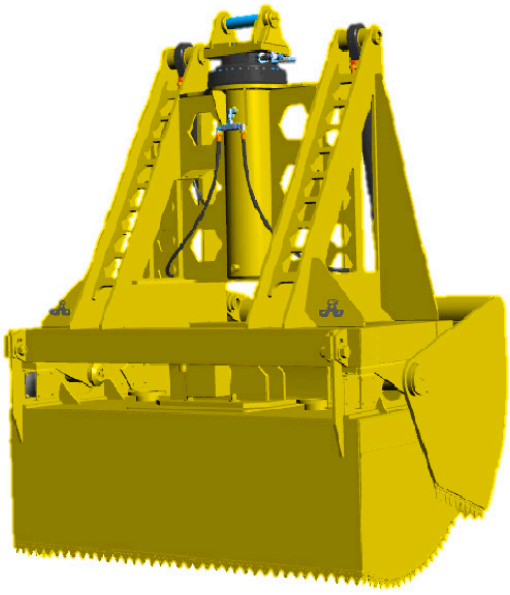
Boskalis

CAPABILITY SHEET

TRANSPLANTER
A NOVEL METHOD TO RELOCATE VEGETATION



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PURPOSE

Sensitive vegetation, such as seagrass, is often found within the perimeter of a prospective project area. If other management measures (i.e. footprint adaptation) prove insufficient, translocation of vegetation can be considered as a last option.

Translocation of vegetation is environmentally complex and labor-intensive. Efforts are characterized by high costs and low vegetation survival rates. Using proven technology, Boskalis has overcome these obstacles by upscaling and mechanizing the translocation effort. The innovative TransPlanter can efficiently translocate large areas of sensitive vegetation and its associated soil.

The TransPlanter is also capable of initiating vegetation growth by introducing sods to an area.

FEATURES

To handle and preserve vegetated soils, the TransPlanter penetrates the soil vertically. A rotator enables precise positioning, while a vibrator has been installed for operation in stiffer soils. When the desired depth is reached, for instance below the rooting zone of seagrass, a horizontally cutting visor is closed using hydraulic cylinders. After closing, the bucket holds a rectangular sod (vegetation + soil) which can be transported to the desired location. Multiple options for transportation are possible (e.g. barges), depending on the transport distance and other site-specific parameters.

CURRENT PROTOTYPE

Designed for 60+ tons excavators. Larger units are envisioned, for which production estimates are available upon request.

Current footprint	3.9 m² (1.34 x 2.88 m)
Empty weight	7.7 t
SWL	5.4 t

Other sizes available upon request.

BENEFITS

SAFETY

The sods can be taken from the seabed without the use of divers. Labor-intensive work is reduced.

VALUE

Conventional methods involve divers/workers taking out the plants and bringing them to the surface for transport. Recovering large areas at once using equipment already in place reduces the need for costly and labor-intensive (diver) operations.

ENVIRONMENT

Picking up large areas at once, reduces the percentage of the area that is affected. The touched outer rim of the transplanted sod is relatively small compared to the undisturbed middle of the sod, especially when compared to conventional diver-based methods. This increases the survival potential of transplanted vegetation.

A The bucket design and work method are patented.

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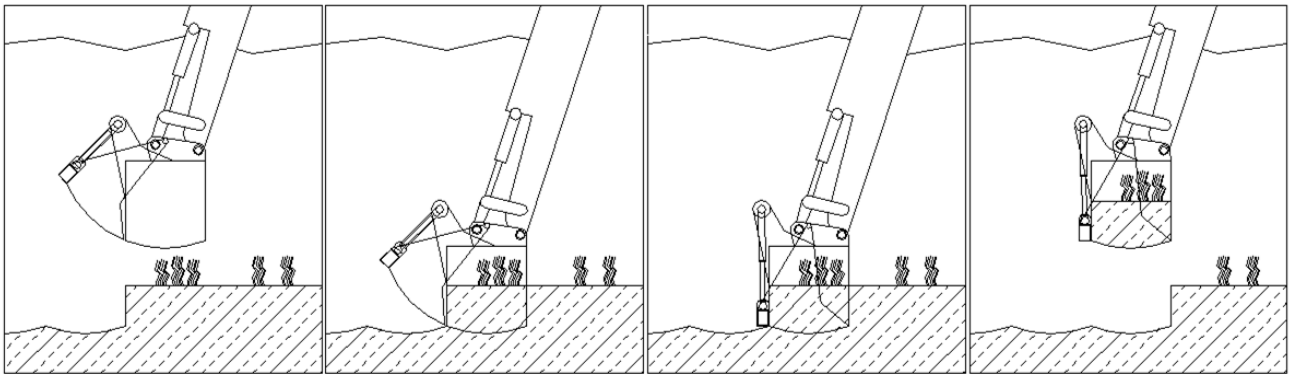

TRANSPLANTATION PROCESS

1. TransPlanter penetrates the soil, closes the visor and extracts a large sod. Each sod is 50-75 cm of soil containing the root bed and has enough clearance on top for the plants to survive.
2. Place sod on (floating) transportation platform.
3. Transport to new location and place the sods individually or grouped at the desired area.

INNOVATIVE DESIGN

The area disturbed by the cutting blade is relatively small compared to the footprint of the sod, which leaves a large area in the middle undisturbed.

Currently designed for use with hydraulic excavators, modifications for wire cranes/backhoes can be made.

Vibrating knifes on edges are capable of penetrating through thick roots and stiff soil.

Accurate, easy positioning due to Crane Monitoring System (CMS) and hydraulic rotator.

Safe, diver-less operation.

CONDITIONS

Soil strength	Designed for up to 80 kPa Tested in 30 to 70 kPa
Vegetation	Designed for Reed/Seagrass/Root growing vegetation Tested at Reed
Excavator	Designed for 90 t/CAT385 class Tested with 52 t H194 – CAT352F 6.9 m boom 3.4 m stick

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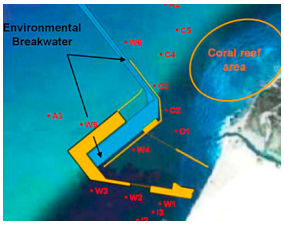
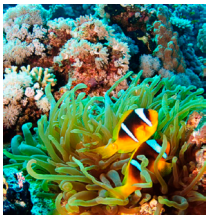
TRACK RECORD BOSKALIS

In the past, Boskalis has proven to be able to successfully complete many complicated environmentally challenging jobs.
As part of the continuous search for improvement in this area, the request for a better method for relocating sea-bottom root growing vegetation lead to the development of the TransPlanter tool. This enable Boskalis to provide a suitable alternative if no other option is found and vegetation has to be relocated.

2009 – 2010 Jamaica, Falmouth: the handling and re-location of corals and seagrass, by divers. At the time, the largest coral relocation plan in the world.

2008 – 2010 Abu Dhabi, Khalifa: extensive marine environmental monitoring program. A mix of permanent monitoring stations, mobile monitoring stations and (coral) reef surveys in combination with additional water sampling showed that the impact on the sea grass and the coral reef has been minimal.





2008 – 2009 Australia, Melbourne: dredging in an environmentally sensitive area. To be able to execute this project, an entirely new draghead has been designed and new unconventional dredging methods were used.

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