

PROJECT SHEET

LELYDORP, SURINAME
BAUXITE MINING

INTRODUCTION

The Boskalis strategy is designed to benefit from the key macro-economic drivers that fuel global demand in our selected markets. One of these drivers is the demand for commodities and global trade. Suralco L.L.C., an indirect joint subsidiary of Alcoa Inc. and Alumina Ltd., has awarded Boskalis a contract for the mining of bauxite in Lelydorp, Suriname. Boskalis is responsible for the entire mining process, from engineering and overburden removal to bauxite mining and ore delivery.

QUICK FACTS

- Area preparation 480 ha
- Wet overburden removal 13.4M m³
- Dry overburden removal 5.7M m³
- Ore reserve 3.8M WMT
- Project duration 2011 - 2015
- Contract value 125M €

MOBILIZATION

One of the most challenging operations of the project involved moving the Boskalis cutter suction dredger Orion from Abu Dhabi to the heart of the Surinam jungle. A semi-submersible vessel took the 74-meter-long vessel to the Suralco plant in Paramaribo.

During the second stage of the mobilization, the 1800-ton dredger was moved 12 kilometers inland. Overcoming bad weather and numerous engineering challenges, Boskalis managed to complete this job safely.

WET OVERBURDEN STRIPPING

The Orion removed the wet overburden – consisting of both soft and stiff clays – prior to the mining operations. Given the prevalence of swamps in the softer clay layers, the use of a cutter suction dredger provides both a safer working environment and higher production rates than would be

FEATURES

Client	Suralco L.L.C.
Location	Lelydorp Suriname
Period	2011 - 2015
Contractor	Boskalis International



- A** Project overview
- B** Mobilization
- C** Dry overburden stripping & mining

achieved with conventional dry overburden removal. The dredging process was centrally controlled and fully automated.

DRY OVERBURDEN STRIPPING & MINING

When the dredging has finished, the remaining overburden will be removed by our dry earth movement fleet, which consists of hydraulic excavators, articulated dump trucks and auxiliary equipment.

Our earthmoving expertise means we will execute the entire production process from pit to plant. This includes activities such as fine stripping, ore sampling, drilling & blasting, ore haulage and ROM pad management.

Given the heavy rainfall, a well-designed water management system was used to keep the mine pit dry.





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ENGINEERING & SURVEYING

The on-site engineering-survey department combines years of experience in the fields of engineering, water management, and geotechnical, environmental and surveying practice with an open mind for new techniques. In this way, it can overcome the challenges of open pit mining in an environmentally sensitive area.

The wet overburden removal is charted using hydrographic single beam measurements; the dry excavation of overburden and mining progress is meticulously monitored by state of the art techniques such as UAV-photogrammetric and laser-scanning surveys.

3D/CAD mine-modeling and slope optimization, GIS database in combination with processing, calculation and presentation modules developed in house ensure one-on-one data exchange with the operational equipment, such as the crane monitoring systems / cutter-dredge positioning displays and the sonic drill positioning system.

SAMPLE DRILLING

To supply the client with valuable information about ore levels and bauxite quality, we use a sonic drill rig. This technology delivers virtually undisturbed

samples by efficiently penetrating almost all geological formations (low friction), with close to 100% sample recovery! Our on-site laboratory conducted core processing, point-load testing, TDS determination and more. The results are registered in our GIS database for further use and reference.

CMS SYSTEM

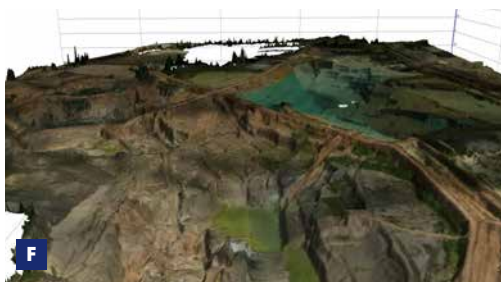
DV-CMS is a Boskalis navigation and production module that is custom tuned to each individual excavator. The CMS system integrates precise 3D positioning, modeling, project design and survey results in real-time graphic displays. These displays allow the operator to excavate accurately to the required design.

SAFETY

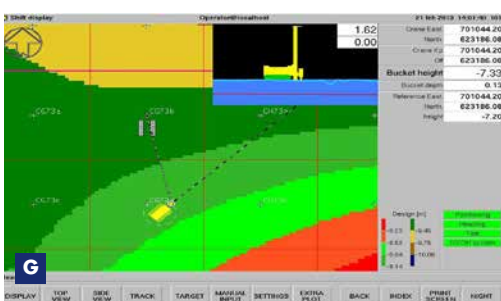
Safety has been a priority at the Boskalis organization for years and this has resulted in a clear improvement of our safety record. To further improve our safety culture and attain our goal of an incident-free working environment, Boskalis has launched the NINA safety program. NINA - No Injuries, No Accidents - sets clear standards and explains what we expect from our people and what they can expect from Boskalis with regard to their safety behavior.

NO INJURIES NO ACCIDENTS

NINA makes people aware of their own responsibility with regards to safety, and encourages them to take action if operations are unsafe and approach others if they are at risk. NINA is supported by an extensive training and workshop program so that all our employees understand the NINA principles and how to lead by example.



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- D** Mobilization
- E** Engineering & surveying
- F** Wet overburden stripping
- G** Sample drilling
- H** Sample drilling



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