From Polders to Palm Island

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Joep Athmer, Managing Director
Van Oord Offshore
Some personal data…

- Married, 4 children, no dog (yet)
- 30 years experience, living 22 years abroad (Saudi Arabia, U.A.E., U.K., Canada, South Korea and Hong Kong)
- From Mud to Management
- Achieving successes with people

Love my job and……..
Some personal data…

….. my Triumph Vitesse…. 5 13:44
In the Netherlands we had extensive discussions on the Dutch Identity when the Scientific Council for Government Policy published a report called “Identificatie met Nederland “

The Dutch identity is closely linked with excellence in dredging and marine engineering & construction and water management.
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Van Oord Dredging and Marine Contractors

Van Oord Offshore

Excellence in Dubai

Environmental engineering
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Van Oord in 2007

- Specialists in dredging, offshore, coastal construction, and marine infrastructure – *Dredging is High Tech!*  
- Independent, non listed company, worldwide presence  
- Reputed for creative ‘design & construct’ solutions and innovative partnering  
- Mission is ‘to be the best in the business’  
- > 3000 well trained professionals  
- Turnover 2006 C$ 2.0 billion  
- Order portfolio > C$ 5 billion  
- Global leader in dredging and marine contracting
I am in control!
Installation of Offshore Windmills

Windpark Northsea, UK
This is -some of- our equipment
These are our People
These are our projects
How Safe are You?

Let’s talk about attitudes and behavior, because quotes like this still exist:

- “Who cares as long as we don’t get caught”
- “HSE meetings are a waste of time”
- “I accept that injuries are unavoidable in this kind of work”
- “I dislike when HSE officers go on about HSE”
- “I think we have so many Client audit and inspections, I’ll never get the work done”
- “It’s all about paper work”
What *can I do personally* to improve our Environment?

Change your Mindset!
What we have achieved: 2000-2006

![Graph showing LTI fr and Hours Worked from 2000 to 2006]
Initiatives to enhance HSE in Van Oord:

- Mandatory near-miss reporting (is linked to the individual bonus system)
- Bi-monthly safety flash
- Commitment of director & management team to regularly audit Project & Vessels
- Evaluation of major incidents by Top Management
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- Subsea Rock Installation
- Pipeline Shore Approaches
- Trenching and Backfilling
- SPM / PLEM Installation
Ormen Lange

- water depths between 20 and 890 metres
- sea currents of 2.5 knots
- harsh winter weather conditions, causing wave heights >20m
- extremely uneven seabed conditions
- a wide variety of soil conditions along the pipeline route, varying from rock to soft clay
- > 1000 vessel days, 4 years,
  > 2,5 mio tonnes of rock,
  > 100 mio Euro turn-over
Subsea Rock Installation

Pre-Lay Supports & Counterfills
Ormen Lange SubSea Rock Installation

Project location:
Norway, 120km off the coast of Kristiansund

Client:
Norsk Hydro

Year of Execution:
2004 - 2007

Scope of Work:
Installation of rock for support and protection of Ormen Lange’s pipelines and umbilicals from shore at Nyhamna in Mid-Norway to the field development area in water depths to 850m
Engineering (Ormen Lange)

Installation of Pre-lay supports with counterfills

Design
Installation of Pre-lay supports with counterfills
Post-survey (as installed on Ormen Lange project)
Pipeline Shore Approaches

Offshore Construction and Installation works include landfall construction, drilling & blasting, trenching and backfilling and near shore pipeline installation

- Besos Outfall, Spain
- South Pars Phase 2 & 3, Iran
- Blue Stream Turkish shore approach, Turkey
Sakhalin 1 EPC 2 – Tatar Strait pipeline

Project location:
Sakhalin Island, Russia

Client:
ExxonMobil/ Nippon Steel Corporation

Year of Execution:
2004 - 2005

Scope of Work:
20km pipeline crossing for 24" pipeline from Sakhalin island to Russian mainland. Two landfalls, including pipelash, of 3500m and 800m. Post-trenching and Installation and burial of 20km fibre optic cable
Goldeneye and Atlantic Cromarty

Project location:
St. Fergus, N.E. Scotland

Client:
Shell U.K. Exploration and Production

Year of Execution:
September 2002 – October 2003

Scope of Work:
Construction of landfall and pull ashore of two piggybacked pipelines, onshore pipeline installation and post-trenching of 1200m offshore pipelines. Environmentally sensitive area.
Project location:
Canada, Country Harbour (Goldboro), Nova Scotia

Client:
Sable Offshore Energy Inc.
Allseas Canada Ltd.

Year of Execution:
1998

Scope of Work:
Trenching, backfilling and pulling of 1400m 26” pipeline to shore
Outfalls Water discharge
Water Injection Dredging

Cost effective technique, which removes sediment with the help of gravity, suitable for:
• Levelling of the sea bottom for pipelines
• Increasing the depth of cables and pipelines
• Large scale Maintenance dredging & Mud removal

Kochi Project, India (2007)
Water Injection Dredging

Mumbai, India
Large amounts of water are pumped through the nozzles in the jetframe. The flow of water thus created, reaches the seabed with high velocity and moves the sand or gravel in a controlled manner to the side.
The “ripping” technique has been successfully applied during recent projects in the Middle East.

Further improvements on the design will be made.

Efficient and economic way to remove hard/compacted soils.
Offshore Construction

Installation of flexibles and offshore support
SPM (Single Point Mooring) installation works include pipe pull to buoy location, installation of PLEM (Pipeline End Manifold) and SPM system, subsea & floating hoses, anchor chains.
Hibernia GBS ballasting

**Project location:**
Canada, 300km off the coast of Newfoundland

**Client:**
Hibernia Management and Development Company (HMDC)

**Year of Execution:**
1997

**Scope of Work:**
Ballasting of the Hibernia Gravity Base Structure with 411,000 tonnes of iron ore
Project location: Canada, Beaufort Sea

Client: Dome Petroleum
Gulf Canada Resources Inc.

Year of Execution: During 1980’s

Scope of Work:
Construction of artificial islands to construct a stable working platform for the drill rigs. The islands are able to withstand the ice loads and other forces of the Arctic enabling a year-around drilling program.
Tar Sands

Project location:
Onshore Canada (Alberta)

Clients:
Various major oil and gas operators

Scope of Work:
Dredging of overburden before refining process) and dredging of tailings (after refining process)

Challenges:
-Purpose-built equipment
-Environmental requirements
-Management of Basins
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Environmental Know How and Experience

- Consultancy
- Equipment development
- Sustainable Solutions
  Environmental Monitoring & Management
- Research
Auger Dredger HAM 291 - ....2 inches
Cooking Pot – Underwater controlled....
Environmental Valve – Minimum Turbidity
Ketelmeer Project – Large scale safe storage
Contaminated

SILT, clayey 13-15 kN/m³  [1-5 kPa]

Holocene

CLAY, with peat 13-15 kN/m³  [3-7 kPa]

PEAT, with clay 10-12 kN/m³  [5-15 kPa]

Pleistocene

SAND 19-20 kN/m³
Ketelmeer Project

• Construction of depot for contaminated materials
• All polluted materials to stay inside project area with minimal dispersion
• Cleaning of Ketelmeer, contaminated materials to be disposed in depot
• Construction of nature areas
Most Important Quantities:

- Sheet Pile Walls: 8,700 m³
- Contaminated Materials phase 1: 2,000,000 m³
- Holocene materials: 3,000,000 m³
- Pleistocene materials: 15,000,000 m³
- Armour stone: 200,000 ton
- Total capacity of depot: 23,000,000 m³
- Contaminated Materials phase 2: 6,000,000 m³
Responsible in a Sensitive Environment

Environmental Management: Caucedo Project

Figure 1 Dredge and reclamation areas

- Dredge area
- Reclamation area
- 24 hour continuous turbidity monitoring station
- 24 hour continuous monitoring station at C0 and C3
- In situ measurements combined with water sample collection for SS analysis at C0 to C4, P1 to P4 [3 times per week, once per day]
Responsible in a Sensitive Environment
Environmental Monitoring & Management


24 Hrs continuous on-line monitoring:
- Turbidity
- Current speed and direction
- Wind speed and direction
- Temperature
- Salinity
- Suspended sediments
Responsible in a Sensitive Environment
Environmental Management: Øresund Project

Scope of Work

Dredging:
- Tunnel Trench (Limestone): 2,230,000 m³
- Dredging for Temporary Facilities: 303,000 m³
- Navigation Channels: 890,000 m³
- Compensation Dredging: 630,000 m³

Reclamation:
- Island: 4,150,000 m³
- Peninsula: 800,000 m³
Main concern:

Mussel Beds and Eel Grass close to the project area damaged due to increased turbidity and sedimentation.

- Max 5% spill
- Weekly and daily limits
Responsible in a Sensitive Environment
Environmental Management: Øresund Project

Øresund Project (1995-2000)

In-house developed Monitoring Vessels:

• ADCP
• Streamer with Turbidity and Depth Sensors
• Water Sampler
• Echo Sounder
• Positioning
Øresund Project

Øresund Project, Denmark (1995-2000)

• 24 / 7 Spill monitoring system
• Early Warning System
• Detailed work methods to minimize sediment loss
• In-house developed Monitoring Vessels
Penny’s Bay Project

Penny’s Bay, Hong Kong (2000-2002)

• Monitoring at pre-defined locations
• Production limitation based on sediment loss per dredger
• Detailed work method statements to comply with EMP
Dredging of approximately 45 million m³ of mud/clay
Reclaiming approximately 70 million m³ of sand

Environmental issues:
• The reclamation site located in the vicinity of fish farms areas with coral habitat.
• Marine borrow areas were located near environmental sensitive areas
• Execution under Environmental Management System (EMS) and Environmental Monitoring and Auditing Manual (EM&A)
### Reclamation site Monitoring Requirements Summary

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>No. of stations</th>
<th>Frequency</th>
<th>Parameters to be measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marine Water Quality</strong></td>
<td>19</td>
<td>3 times per week twice per day</td>
<td>Temperature, Salinity, Dissolved Oxygen, Turbidity, Suspended Solids, Total Inorganic Nitrogen and Un-ionised Ammonia</td>
</tr>
<tr>
<td></td>
<td><strong>19</strong></td>
<td><strong>3 times per week twice per day</strong></td>
<td><strong>Temperature, Salinity, Dissolved Oxygen, Turbidity, Suspended Solids, Total Inorganic Nitrogen and Un-ionised Ammonia</strong></td>
</tr>
<tr>
<td>This number was increased to 30 during the development of the project</td>
<td>6</td>
<td>3 times per week twice per day</td>
<td>TBT, PAHs and PCBs</td>
</tr>
<tr>
<td><strong>Marine Mammals</strong></td>
<td>Fixed transect being sailed through the monitoring area</td>
<td>Twice per month</td>
<td>Dolphin sighting</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Fixed transect being sailed through the monitoring area</td>
<td>Twice per month</td>
<td>Dolphin sighting</td>
</tr>
<tr>
<td><strong>Sub-tidal ecology</strong></td>
<td>2</td>
<td>Once every 6 months</td>
<td>Presence of sub-tidal species, depth distributions and mortality</td>
</tr>
</tbody>
</table>
Responsible in a Sensitive Environment

Research

- Quality dredging process water
  Public Works Department & Hydraulic Consultant (Alkyon)

- Predicting turbidity caused by TSHD operations
  HR Wallingford & U.S. Corps of Eng.

- Remote Sensing as tool for turbidity monitoring dredging
  Delft Hydraulics & Aerospace Institute of the Netherlands (NLR)
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The Netherlands, build by nature and men

- Three European rivers form low lying delta
- People start to live on - man made - higher grounds
- From the 11th century construction of dikes
- From 17th century ‘polders’
- In 20th century Delta Plan
- Without defences 65% of the country would be subject to flooding
- 70% of our GDP is generated ‘under water’
17th century construction of ‘polders’
Water, an everlasting challenge

- We suffered from many disastrous floods
- Flood of 1953 shocked the world (1835 casualties)
- Additional protection needed more than ever
- Massive investments to close ‘Zuyder Zee’ (€ 50 mln. In 1930) and ‘Delta Plan’ (€ 9 bln. in 20 years)
- Total of 1000 km of sea defences, shortening the coast by 700 km
- One of the world’s largest engineering challenges
If there were no defences

1932

1993 & 1995

1997

flooded
Closure ‘Zuyder Zee’ (1927-1932)
Flooded area in 1953
Flood (1953)
Fighting the sea (1953)
Delta Plan
Reclamation of IJsselmeer polders
River flooding scenario (1995)
Recent flooding in Northern NL (2007)
• Delta Plan fosters *continuous* technological development in dredging and marine construction
• As a country we have learned to adapt to climate challenges
• Recent floods show that permanent vigilance is required
• Expected future climate changes require additional protective measures
…..to Palm Island

• Clear vision of leadership of Dubai to
  – develop a sustainable economy
  – become one of the most attractive tourist
destination
  – become a leading commercial and trading ‘hub’
• Determination to implement vision
• Realisation of projects unprecedented in terms of
design, planning, speed and size
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Van Oord Dubai Key Numbers

- Original coast line 60 km
- Palms add 130 km – 650 Ha
- World adds 257 km – 500 Ha
- Deira Corniche adds 67.5 km – 1350 Ha
- Palm Deira adds 360 km – 2650 Ha
- Dubai Water Front adds 850 km
Palm Jumeirah

Size: 5 X 5 km incl crescent

Sand volume: 110 million m$^3$

Rock volume: 9 million tonnes (3rd party)

Start execution: Aug. 2001
Completion: Oct. 2003
Palm Jumeirah

Breakwater: 13 km

Trunk: 2,000 x 500 m wide

17 fronds:
500 m to 2,500 m long
88 m wide

Adds 65 km of coastline
Extra works

Extension fronds

Atlantis hotel

Widening trunk
Logo Islands Design and Construct

Size: 200 X 1000 m
Sand volume: 4.4 million m³
Rock volume: 1 million tonnes
Quay wall: 270 m

Start execution: June 2003
Completion: February 2005
Palm Jumeirah, Dubai
The World

Cluster of 300 artificial islands in the shape of the continents

Size: 9 X 7 km
Island size: 1,6 - 5,4 ha
Sand volume: 325 million m³
Rock volume: 32 million tonnes
Size breakwater: 25 km

Start execution: August 2003
Completion: End 2007
The World, Dubai
The World’s quantities

• In total 320 million m³ of sand and 40 million tons of rock
• Sand volume equals a ‘Chinese Wall’ of sand, 2 metres wide, 4 metres high, ……… all around the globe !!
• We fill each week,………. 70 soccer fields with a 10 meter layer of sand
• Each week we empty………. a Feyenoord soccer stadium filled to the top with rock
Dubai Maritime City – Quay Wall

Sand volume: 6 million m³
Rock volume: 2 million m³
Start execution: February 2006
Completion: November 2007
Palm Deira, Dubai
Deira Corniche

Size: 13 km2
Sand volume: 250 million m3
Rock volume: 26 million tonnes
Start execution: September 2003
Completion: End 2009
Deira Corniche, Dubai
Palm Deira

Size: 16.5 x 9 km
Sand volume: 1 billion m³
Rock volume: 45 million tonnes

Start project: end 2005
Completion: end 2013
Partnering: new approach to contracting, increasingly used in the UK and Internationally

- Long-term agreement between all parties involved (client, engineer, contractors) carrying out the execution as One Team – Frame Agreements
- Pro-active approach to problem solving as a project team – most valuable on high-risk construction projects – Risk Register and Risk Sharing
- Joint ownership of common objectives and commitment – Target Sums and pain/gain
- Project Board
Contracting

Pro-active management of risk as one team

1. Identify Risks
   - What could go wrong?

2. Assess Risks
   - Quantify
   - Rank

3. Identify Control Measures
   - Mitigation
   - Management
   - Control

Review Options

Residual Risk Acceptable?

Yes

No

Risk Register

Implement Control Measures

Monitor

Update risk register
Nation and company branding
Spin off Dubai projects

- World wide attention for outstanding developments in Dubai – Recognition that Dredging is a modern High Tech industry with optimum Process and Environment control
- Dutch identity (excellence in dredging and marine engineering) found it’s way in Dubai’s Vision
- Van Oord’s involvement in Dubai projects strengthened its identity and,....
- In turn supports the Dutch Identity
Our profession and remediation

We remove, place, compact, cover and shape.....
You treat, contain and protect.....

Your business ?
Our business ?
Two sides of the same coin !
Van Oord: a Sea of Opportunity

www.vanoord.com
Questions?

Thank you for your kind attention