



KIVI-NIRIA | WELCOME
BERT VAN DER VELDEN | SMIT SUBSEA



SMIT'S WORLD

SUBSEA & SALVAGE

"CHALLENGES OF THE DEEP"

"SUBSEA DEVELOPMENTS & INNOVATIONS"

12 JANUARY 2012 | DELFT



CONTENT

SMIT'S WORLD

❏ Part 1:

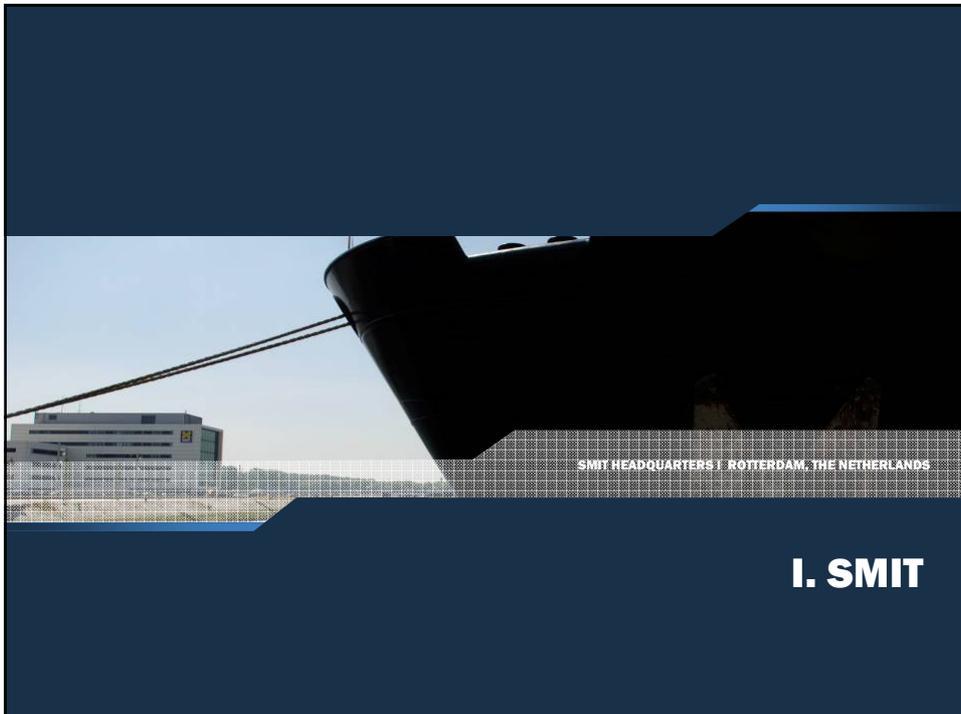
- Introduction on SMIT
- SMIT Subsea
- Case 1 – North Sea Diving Operation

❏ Part 2:

- Deep water Oil Recovery
- Methods and developments
- Cases:
 - 'Ice Prince', Remote Operated Operation
 - 'Haven' pollutant recovery, SAT
 - 'Kyungshin' Oil Recovery, SAT



SMIT SALVAGE | PRESENTATION | SLIDE 3



SMIT HEADQUARTERS | ROTTERDAM, THE NETHERLANDS

I. SMIT



SMIT HARBOUR TOWAGE



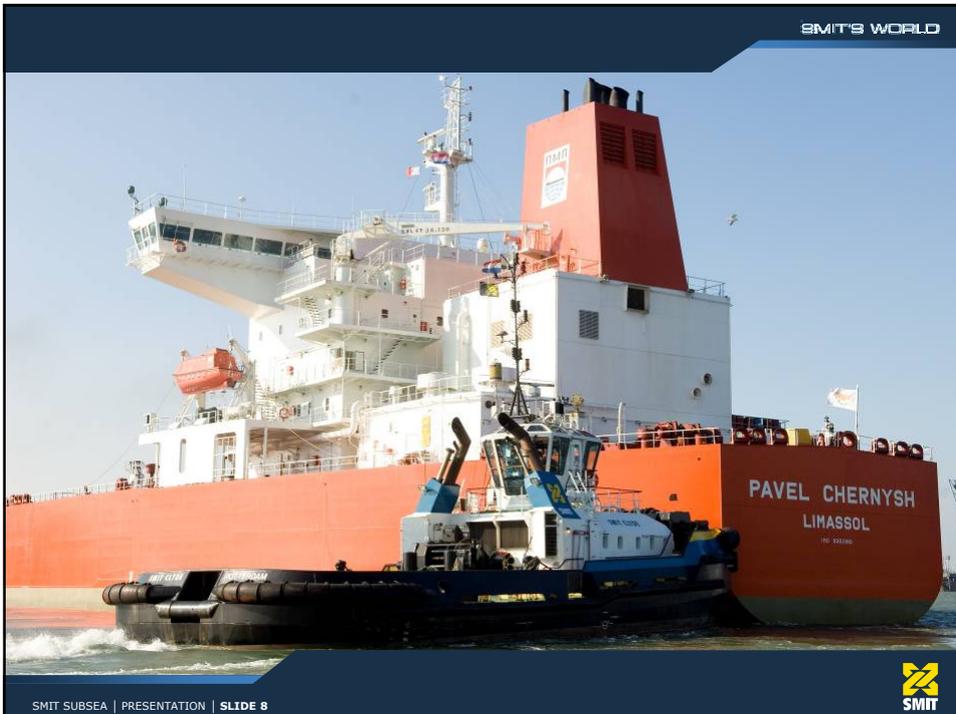
Berthing & unberthing of seagoing vessels

Assistance special objects

Standby services

Port services

- Pilotage
- Launches
- Line handling
- Fire fighting
- Maintenance
- Beaconing etcetera





SMIT TERMINALS



SMIT TERMINALS SERVICES

- **Onshore terminals**
 - LNG
 - Mineral
 - Chemical
- **Offshore terminals**
 - SPM import/export terminals
 - Shallow water/deepwater F(P)SO
- **Subsea services**
 - Inspection, repair and maintenance
 - Survey, diving, ROV,
 - Offshore oilfields exploration, construction & production support





SMIT SALVAGE



SMIT SALVAGE SERVICES

SMIT'S WORLD

- ✘ **Emergency response 365 days 24/7**
 - Groundings, drifters, explosions/marine firefighting, collisions, ship-to-ship transfers, dangerous cargo
 - Lloyd's Open Form [LOF], Daily Hire, caretaking contracts
- ✘ **Wreck removal:**
 - Shallow & deep water
 - Port clearance projects
 - Tendering process, Daily hire vs Lumpsum contracts
- ✘ **Environmental care:**
 - Pollutants removal & recovery from casualties
 - Consultancy & contingency planning
 - Emergency Preparedness [vessel modeling]
- ✘ **Managing Marine Emergencies Course**

SMIT SUBSEA | PRESENTATION | SLIDE 13



SMIT SALVAGE EQUIPMENT

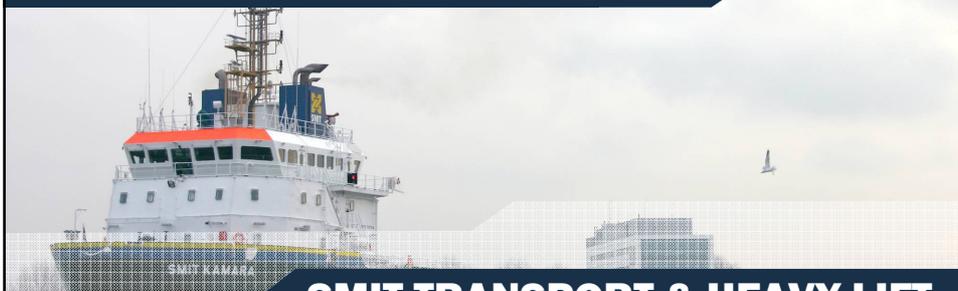
SMIT'S WORLD

- ✘ **Chainpullers 16 x 200 tons**
- ✘ **Debris Grabs (3x) up to 650 tons cap.**
- ✘ **Mobile FiFi equipment**
- ✘ **Dyneema towing lines**
- ✘ **Diving spreads, SAT system**
- ✘ **Wire cutting system (Kursk/Tricolor)**
- ✘ **Pumps, generators, hoses**
- ✘ **Hot taps (oil recovery)**
- ✘ **SMIT Cyclone sheerleg**
- ✘ **4 Warehouses at strategic locations**



SMIT SUBSEA | PRESENTATION | SLIDE 14





SMIT TRANSPORT & HEAVY LIFT



SMIT TRANSPORT & HEAVY LIFT SERVICES

Horizontal: transport

- Ocean, Coastal & River Transport
- Chartering out of marine assets for transport and marine support + added value services [AHTS, ETV]
- Commercial ship management services

Vertical: heavy Lift

- Heavy lifting of large/voluminous loads
- Marine projects: activity that combines SMIT's core strengths of towage, transport, lifting, engineering & project management
- Subsea services





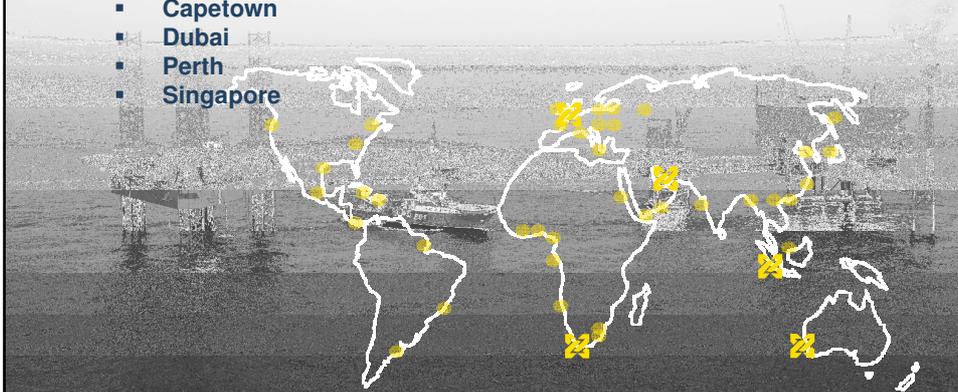
SMIT SUBSEA



GLOBAL OPERATIONS

SMIT'S WORLD

- SMIT Operations worldwide ●
- SMIT Subsea offices ☒
 - Rotterdam
 - Capetown
 - Dubai
 - Perth
 - Singapore

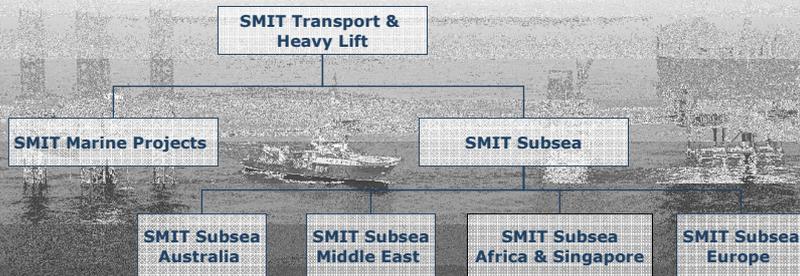


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SMIT SUBSEA ORGANISATION

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 20



SERVICES

SMIT'S WORLD

- Surface demand diving services (air/nitrox/mixed gas)
- Saturation diving services
- Remotely operated vehicle services (ROV-WROV)
- Associated services:
 - Project management & engineering
 - Procurement
 - Vessel management
 - Innovation

SMIT SUBSEA | PRESENTATION | SLIDE 21



EQUIPMENT RESOURCES

SMIT'S WORLD

- 25 Modular Air Diving spreads
- 3 Modular SAT systems
- 9 ROV systems
- 2 WROV systems
- DP3 DSV - surface demand
- DP2 DSV - SAT



SMIT SUBSEA | PRESENTATION | SLIDE 22



SAFETY HEALTH ENVIRONMENT QUALITY

SMIT'S WORLD

- SHE-Q Policy: NINA: No Incidents, No Accidents
- Compliant to the most stringent laws, regulations and client requirements.
- Certification standards:
 - ISO 9001:2008
 - OHSAS 18001:2007
 - IMCA
- Supplier evaluation and registration
 - FPAL
 - Achilles



SMIT SUBSEA | PRESENTATION | SLIDE 23



GLOBAL CLIENTS

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 24





SMIT SUBSEA DSVs



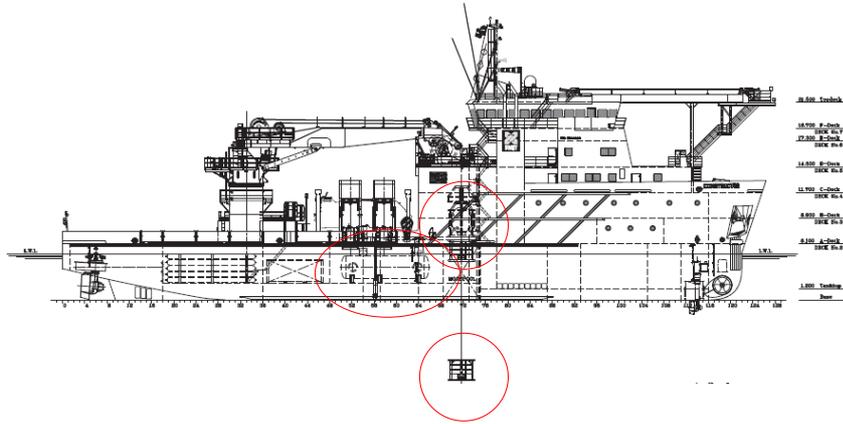
DP II - DSV CONSTRUCTOR "SAT"

- Diving Support Vessel
- DP-II
- 100 tonnes Offshore Crane
- 12 Man SAT System (200 msw)
- Double Air/Nitrox diving spread
- Deck Area 685m²
- Accomodation for 70 people
- Survey support & ROV systems
- Helideck



DP II - DSV CONSTRUCTOR "SAT"

SMIT'S WORLD



SMIT SUBSEA | PRES | SLIDE 27



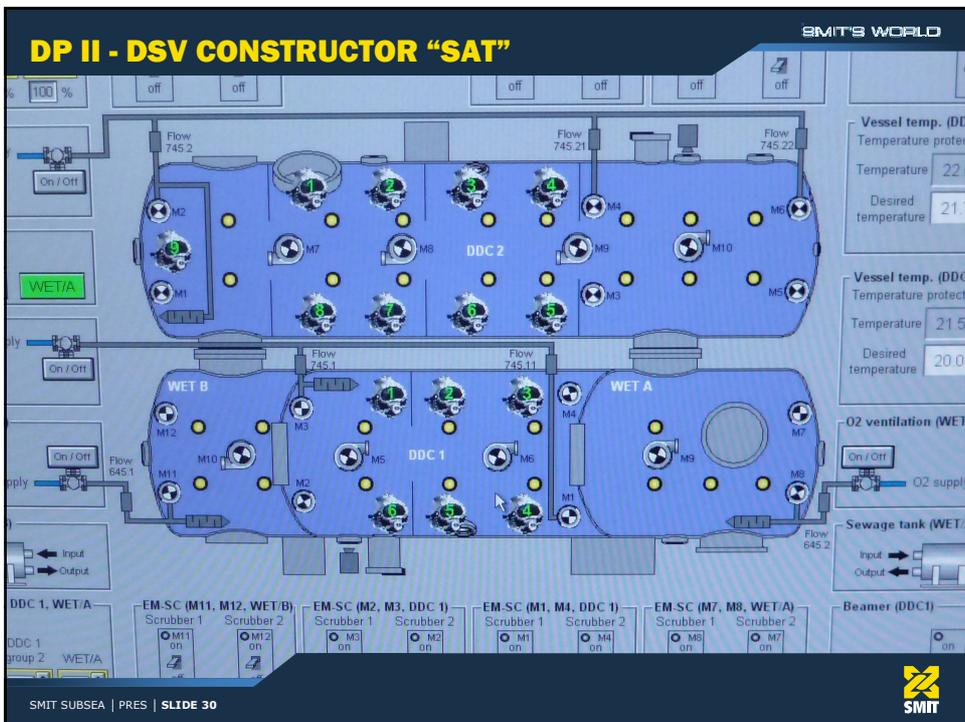
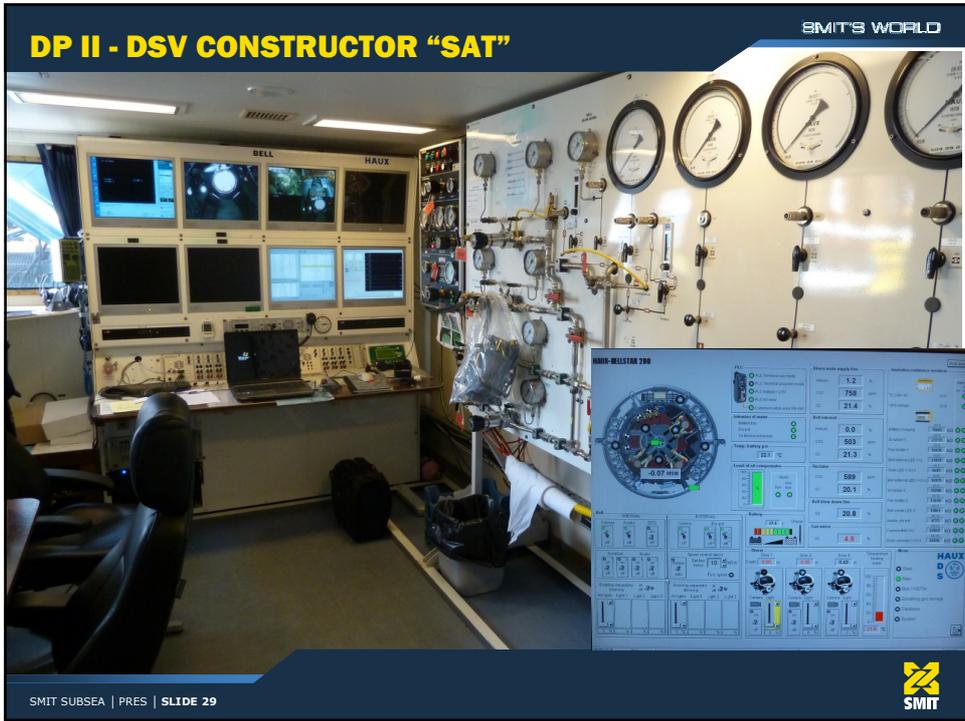
DP II - DSV CONSTRUCTOR "SAT"

SMIT'S WORLD



SMIT SUBSEA | PRES | SLIDE 28





DP II - DSV CONSTRUCTOR "SAT"

SMIT'S WORLD

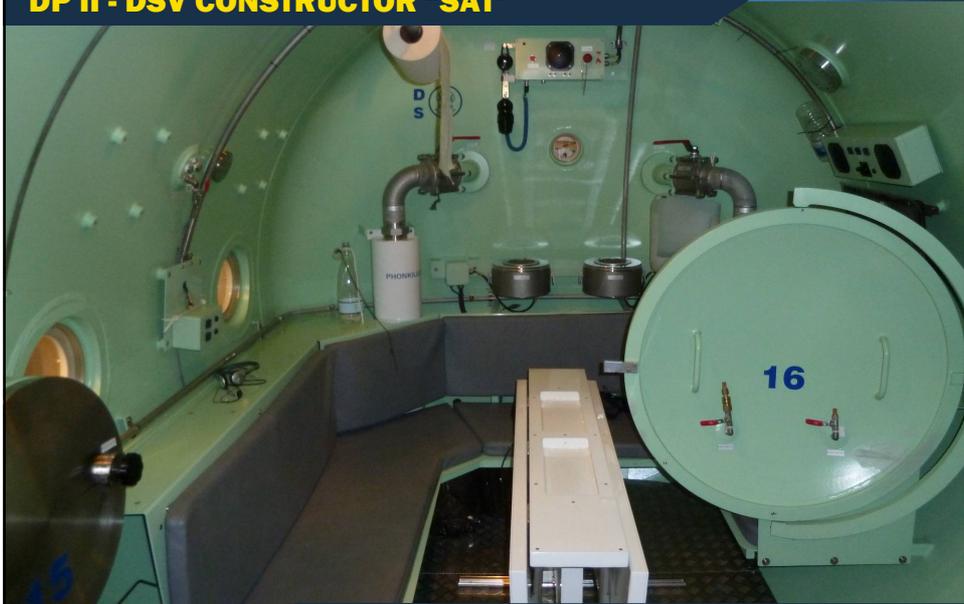


SMIT SUBSEA | PRES | SLIDE 31



DP II - DSV CONSTRUCTOR "SAT"

SMIT'S WORLD



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DP II - DSV CONSTRUCTOR "SAT"

SMIT'S WORLD



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TYPICAL CREWING CONFIGURATION DSV

SMIT'S WORLD

- Marine Crew 25-30
- Diving Team 32
 - Superintendent 1
 - Dive Supervisors 4
 - SAT Divers 9 (3x3)
 - Life Support Supervisor 2
 - Life Support Assistants 2
 - Life Support Technicians 2
 - Dive Technicians 3
 - Standby SAT divers 3
 - Standby Air divers 5
 - Medic 1
- ROV Team 4-6
- Engineers/Subcontractors 4-6
- Total 65-74



to have 2-3 divers in the water per shift

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DP III – DSV EDT PROTEA

SMIT'S WORLD

- Diving Support Vessel
- DP-III
- 50 tonnes AHC Offshore Crane
- Surface demand Air/Mixed Gas/Nitrox
- Wet Bell diving spread
- Remote Video capabilities
- Deck Area 500m²
- Accomodation for 88 people
- Survey support & ROV systems
- Helideck



SMIT SUBSEA | PRESENTATION | SLIDE 36



DP III – DSV EDT PROTEA

SMIT'S WORLD



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NEW ASSETS



NEW ASSETS – WORK CLASS ROVs

- 2 Schilling Heavy Duty “HD” WorkClass ROV systems
- Pipeline survey / inspection tooling package (camera’s / sensors / pipe detection / multi beam) for 1 ROV
- Data capturing & reporting software
- Additional Personnel



CAEE PROJECT 2011 – MAERSK OIL

SMIT'S WORLD

- Extensive Inspection, Construction & Removal Scope
- Working at close vicinity of the Platforms
- Multiple Diving Stations, Extended umbilical Diving
- Dedicated Diving RIB and manriding Boatlift
- Diamond Wire Cutting
- Rope Access Platform Rigging



SMIT SUBSEA | PRESENTATION | SLIDE 42



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD

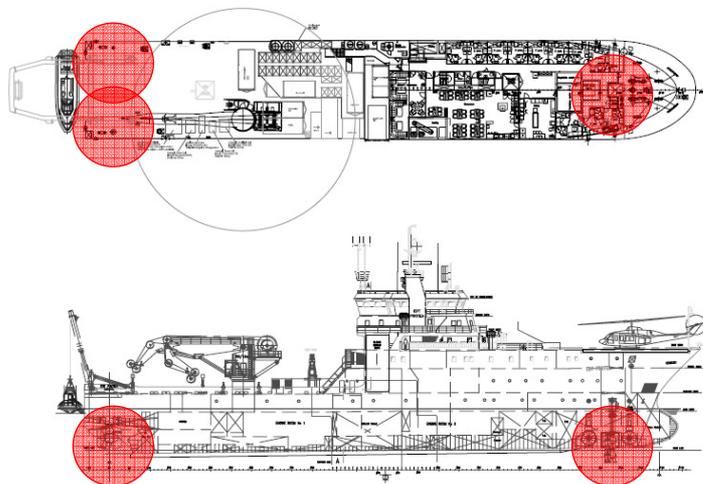


SMIT SUBSEA | PRESENTATION | SLIDE 43



DIVING UMBILICAL - THRUSTERS

SMIT'S WORLD

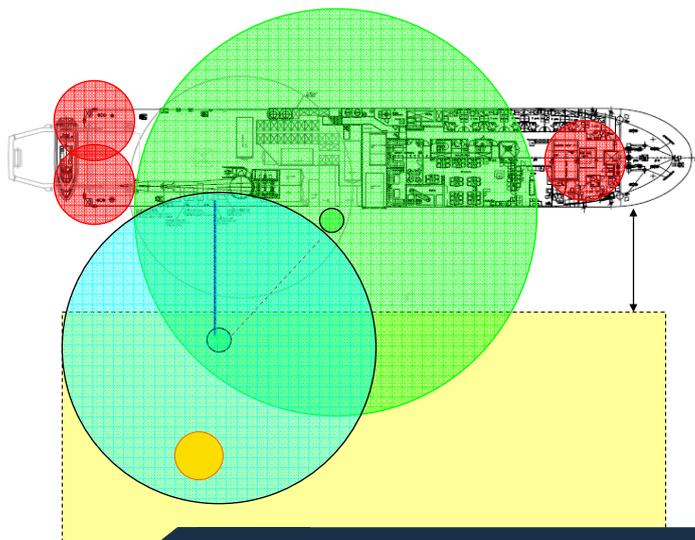


SMIT SUBSEA | PRESENTATION | SLIDE 44



EXTENDED UMBILICAL PRINCIPLE

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 45

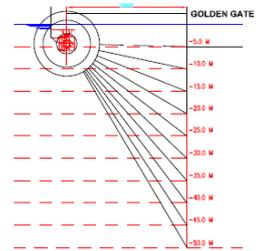
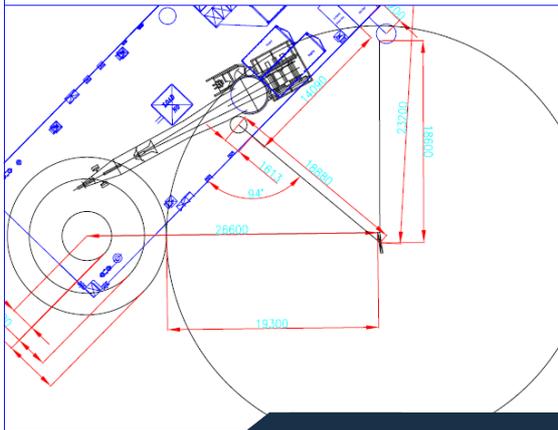


EXTENDED UMBILICAL PRINCIPLE

SMIT'S WORLD

EXTENDED UMBILICAL DIVING WITH GOLDEN GATE AND MELCAL CRANE ON STARBOARD SIDE

- EXCURSION LENGTHS IN TABLE ARE FROM GOLDEN GATE
- SWIM WIRE WETBELL TO CENTRE GOLDEN GATE IS 18.6M
- STANDBY DIVER TO GOLDEN GATE IS 23.2M
- POSITION OF CRANE CENTRE IS 1.6M FROM BULLWARK AND 14M FROM WETBELL
- ROOM LENGTH IS 19.8M
- MAX EXCURSION LENGTH STANDBY DIVER = DISTANCE TO NEAREST HAZARD + 3M
- MAX EXCURSION LENGTH WORKING DIVER = DISTANCE TO NEAREST HAZARD - 5M



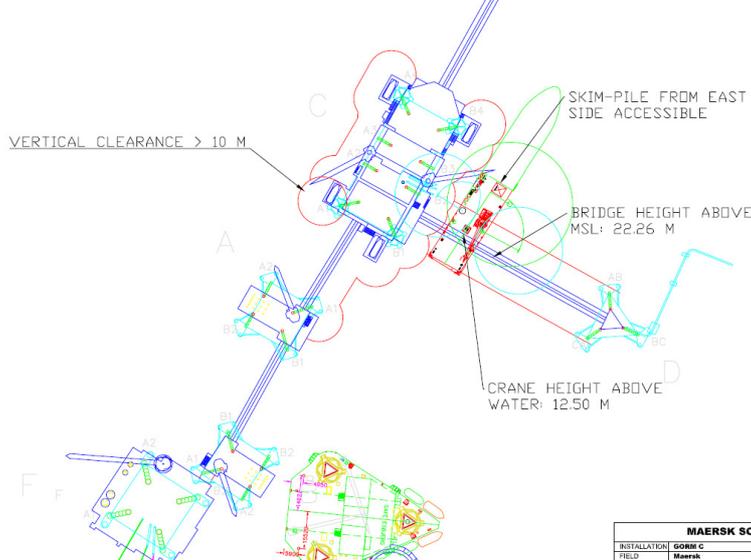
MAX. EXTENDED UMBILICAL STARBOARD			
DEPTH	MAX. LENGTH WORKING DIVER (M)	MAX. LENGTH IN-WATER STANDBY DIVER (M)	MAX. LENGTH STANDBY DIVER (M)
-5 M	19.3	21.3	21.3
-10 M	19.9	21.9	21.9
-15 M	21.4	23.4	23.4
-20 M	23.6	25.6	25.6
-25 M	26.4	28.4	28.4
-30 M	29.6	31.6	31.6
-35 M	33.2	35.2	35.2
-40 M	37.1	39.1	39.1
-45 M	41.2	43.2	43.2
-50 M	45.4	47.4	47.4

DWG5005 - EXTENDED UMBILICAL LENGTH	
INSTALLATION	"EDT PROTEA"
FIELD	Offshore Diving
SUBJECT	Umbilical Length
SECTION	Diver & Standby Diver Hazards
CLIENT	SMIT Subsea Europe
DWN BY	BV



EXTENDED UMBILICAL PRINCIPLE

SMIT'S WORLD



MAERSK SOW 2964	
INSTALLATION	GORM C
FIELD	Heerak
SUBJECT	SKIM Pile removal



MAERSK OIL – SKIM PILE REMOVAL

SMIT'S WORLD

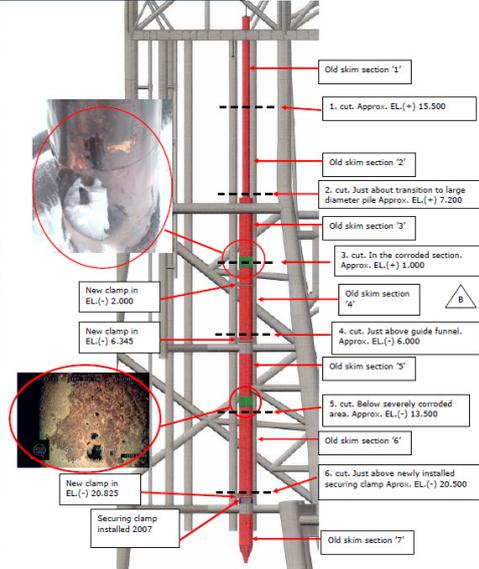


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MAERSK OIL – SKIM PILE REMOVAL

SMIT'S WORLD

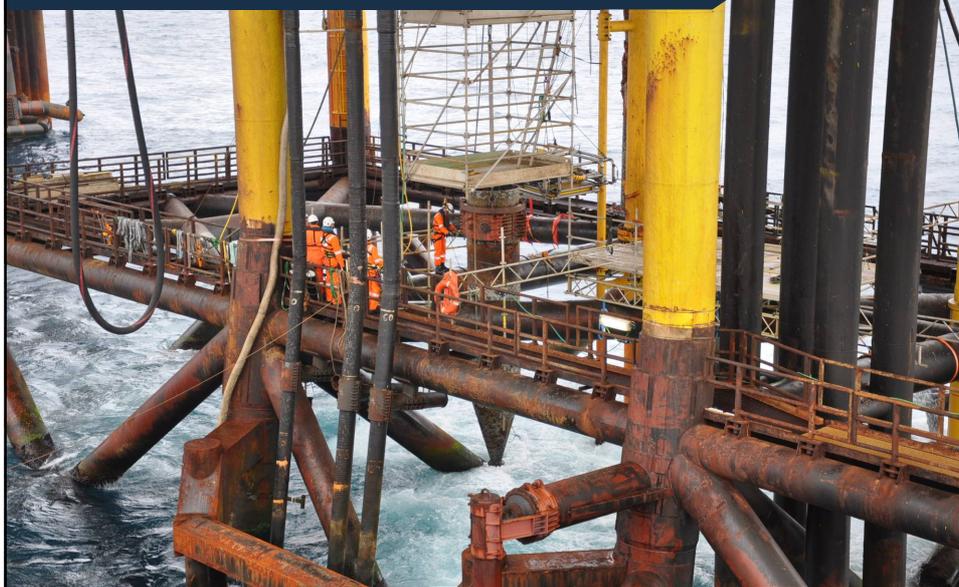


SMIT SUBSEA | PRESENTATION | SLIDE 49



MAERSK OIL – SKIM PILE REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 50



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 51



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 52



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 53



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 54



MAERSK OIL – BOATLANDING REMOVAL

SMIT'S WORLD



SMIT SUBSEA | PRESENTATION | SLIDE 55





MSC NAPOLI, LYME BAY, UK

DEEP WATER OIL RECOVERY

SMIT & THE ENVIRONMENT

SMIT'S WORLD

- ❑ SMIT Salvage has been instrumental in developing new solutions for the safe, pollution-free removal of cargo and bunkers from wrecks
- ❑ Salvage consultancy & contingency planning
- ❑ Almost every SMIT Salvage operation starts with a bunker/oil recovery operation
- ❑ Hundreds of successful hot tap operations performed



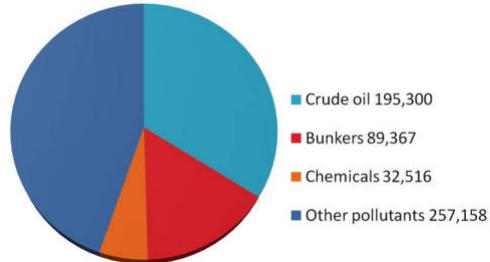
SMIT SALVAGE | PRESENTATION | SLIDE 58



SALVAGE AND THE ENVIRONMENT

SMIT'S WORLD

Breakdown of pollutants - tonnes



ISU statistics: 2010

Pollutants recovered:
574,386 tons

Number of casualties 166:

In 15 years time almost
16 Mio tons of pollutants
recovered

2009: 1,018,872 tonnes.

Source: ISU, International Salvage Union

SMIT SALVAGE | PRESENTATION | SLIDE 59



SALVAGE AND THE ENVIRONMENT

SMIT'S WORLD



Exxon Valdez Spill: 37,000 tonnes (1989)



Salvage operations: 166 (204 in 2009)

Pollutants recovered: 574,386 tonnes (1,018,872 in 2009)

Source: ISU, International Salvage Union

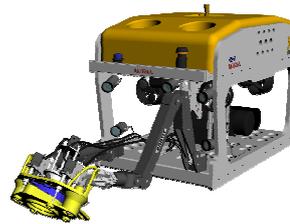
SMIT SALVAGE | PRESENTATION | SLIDE 60



WATERDEPTH

SMIT'S WORLD

- ❌ **Shallow Water Operations**
 - 0-50m water depth
 - Diver assisted Hot Tap Operations with riser
- ❌ **Medium water depth Operations**
 - 50-200m water depth
 - SAT Diver assisted Hot Tap Operations with riser
 - Remote operated systems with riser
- ❌ **Deep Water Operations**
 - +200m
 - Beyond diving limits
 - Remote operated with shuttle system (no riser)
- ❌ **Complexity increases greatly with Depth**



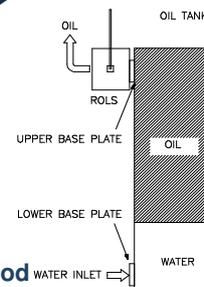
SMIT SALVAGE | PRESENTATION | SLIDE 63



WORKING PRINCIPLES

SMIT'S WORLD

- ❌ **Survey of Wreck Condition**
 - Survey, Scanning Techniques
 - Orientation and structural integrity of Wreck
 - Oil Sampling Operation (intrusive/non intrusive)
- ❌ **Preparations, Salvage Plan**
 - Calculation of amount of pollutants
 - Tank Plan engineering, need for special tools/method
 - Risk assessment, contingency Plans
- ❌ **Operations**
 - Mobilisation to site, survey (obstacles/mark tank positions)
 - Install lower base plate ,create aperture, for water inlet
 - Install upper base plate, create aperture and start pumping
 - Close valve, base plate remains on hulls
 - Tank empty certificate
 - Post operational survey

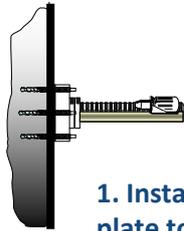


SMIT SALVAGE | PRESENTATION | SLIDE 64

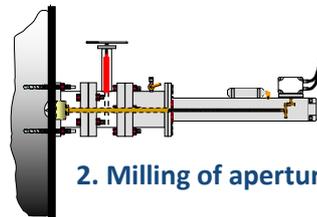


PRINCIPLE ON HOTTAPPING (FROM OIL-GAS)

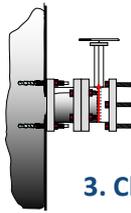
SMIT'S WORLD



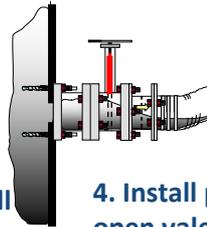
1. Installation of fixed base plate to hull with valve



2. Milling of aperture in hull



3. Close valve, Remove drill/mill



4. Install pump/hose and open valve to start pumping

SMIT SALVAGE | PRESENTATION | SLIDE 65



DIVERLESS POLLUTANT RECOVERY SYSTEM

SMIT'S WORLD

Diver less pollutant recovery system

Medium to high viscous substances

High efficient modular system

Simultaneous drilling/pumping

Operating depth up to 200 msw

Potential up to 1500 msw

Leak-proof concept

Minimal risk of spillage

Proven Technology



SMIT SALVAGE | PRESENTATION | SLIDE 67





ICE PRINCE

ENGLISH CHANNEL, EUROPE



SALVAGE TEAM MOBILISED BUT VESSEL WAS UNSTABLE



VESSEL SANK IN CHANNEL AT 65M DEPTH

SMIT'S WORLD



SMIT SALVAGE | PRESENTATION | SLIDE 70



ICE PRINCE

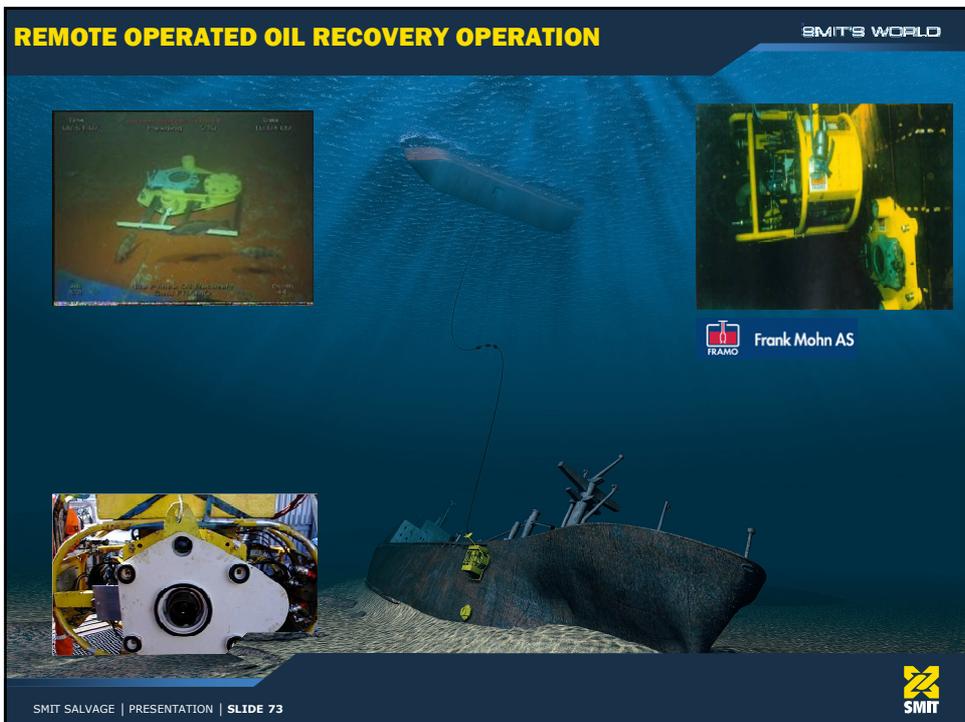
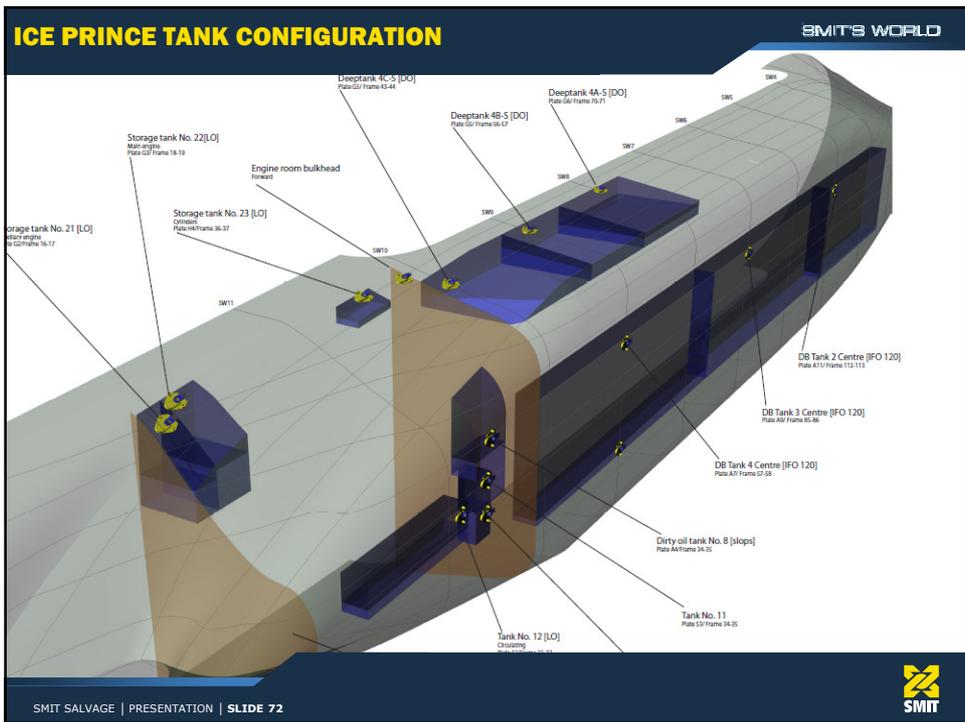
SMIT'S WORLD

- ✘ Location: English Channel, Europe
- ✘ Cargo: +5000 ton of timber
- ✘ Depth: 65m
- ✘ High Currents, busy shipping lanes
- ✘ Use of ROVs and POLREC system
- ✘ Recovery: 320 tons of IFO bunkers, 12 tanks



PRESENTATION | SMIT I&D





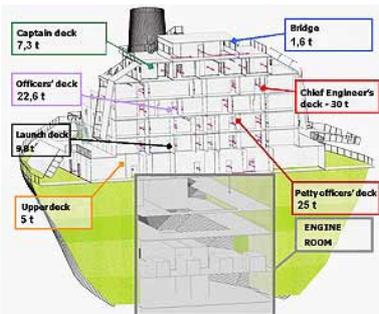
“MT HAVEN”

OIL CLEANING OPERATION WITH SAT DIVING



HAVEN PROJECT

- ❌ VLCC Crude Oil Tanker
- ❌ Exploded & caught fire
- ❌ Sank Off Coast Genoa, Italy, 1991
- ❌ 50.000 tons oil spill
- ❌ +75m waterdepth



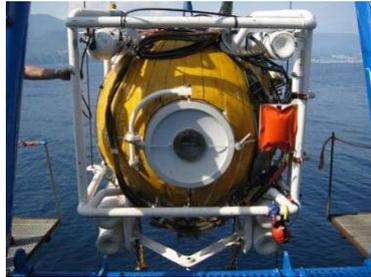
- ❌ In 2008 SMIT conducted an cleaning and oil recovery operation to remove remaining oil from 88 spaces up to 75m with a Saturation Diving System



HAVEN OIL RECOVERY

SMIT'S WORLD

- ✘ SAT Diving + hot-tap
- ✘ 88 Spaces cleaned
- ✘ Engine rooms, accomodation
- ✘ 100 tons of oil recovered



SMIT SALVAGE | PRESENTATION | SLIDE 76



SMIT'S WORLD

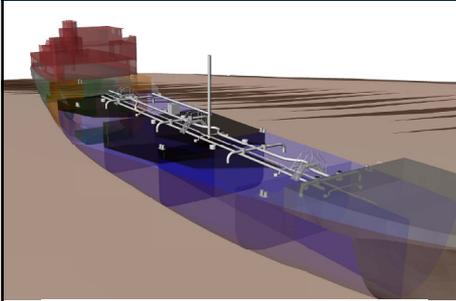
KYUNGSHIN OIL RECOVERY

Subsea Heat exchange system

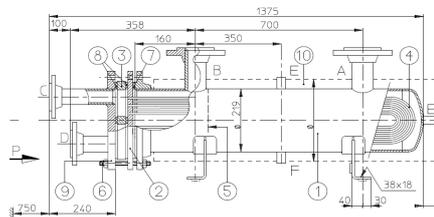
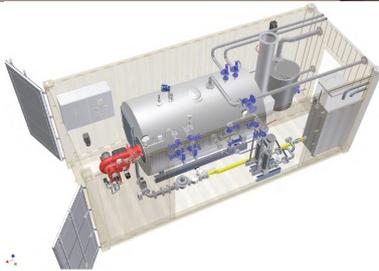
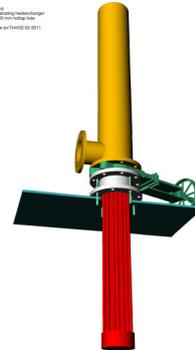


OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD



- SAT Diving @ 100m
- Hottapping Tanks
- Subsea Heat exchangers
- Steam Plant

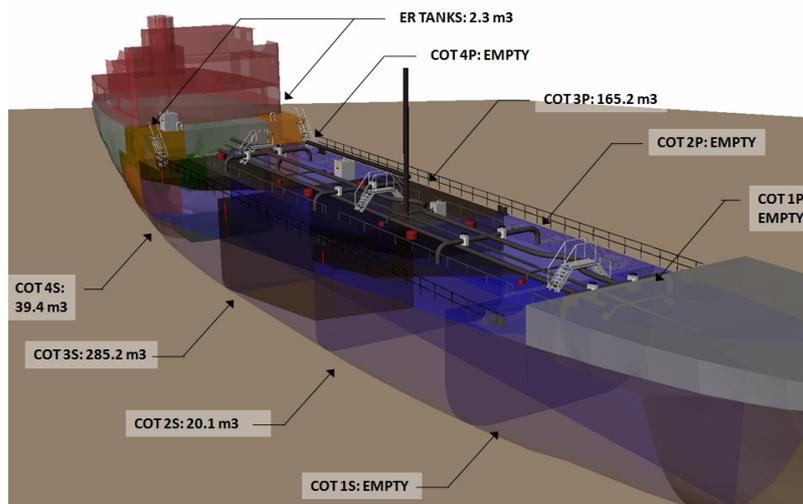


SMIT SALVAGE | PRESENTATION | SLIDE 78



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD



SMIT SALVAGE | PRESENTATION | SLIDE 79



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD



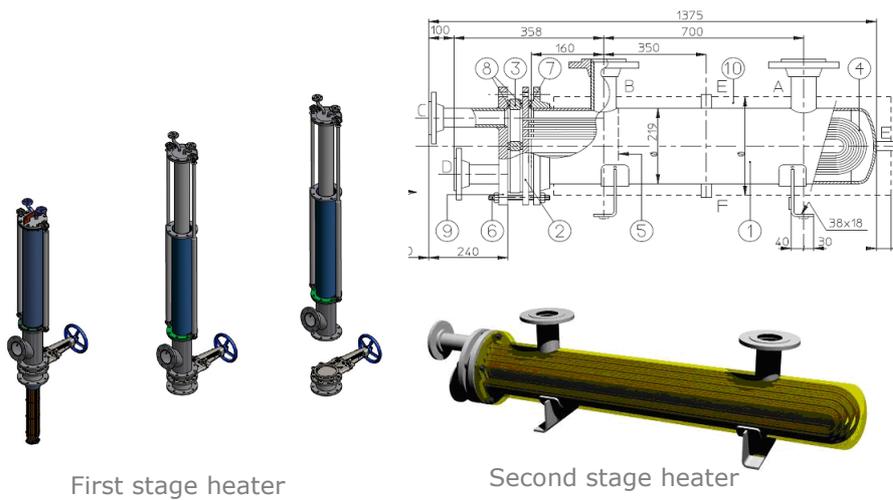
SMIT SALVAGE | PRESENTATION | SLIDE 80



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

Heating system elements



SMIT SALVAGE | PRESENTATION | SLIDE 81



Testing heat Exchanger



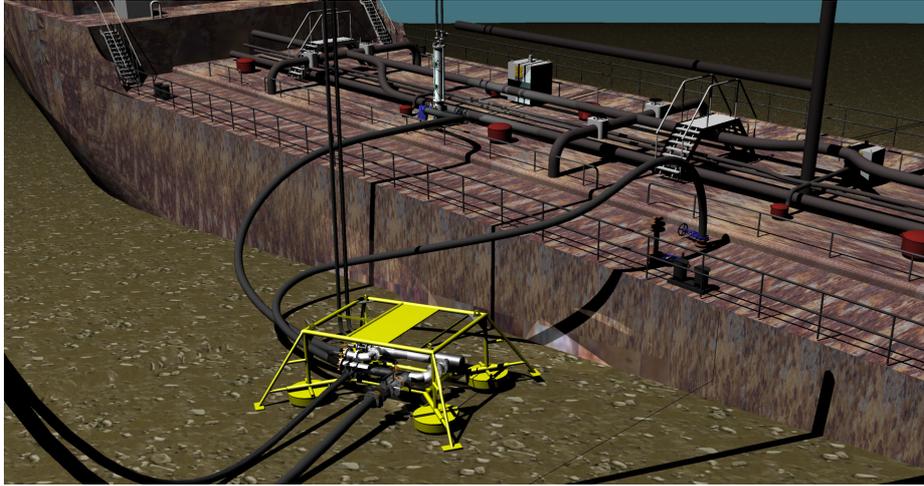
Hottap/Heat Exchanger



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

2nd Stage Heat Exchanger / Recirculation



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OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

Building and testing of SKID



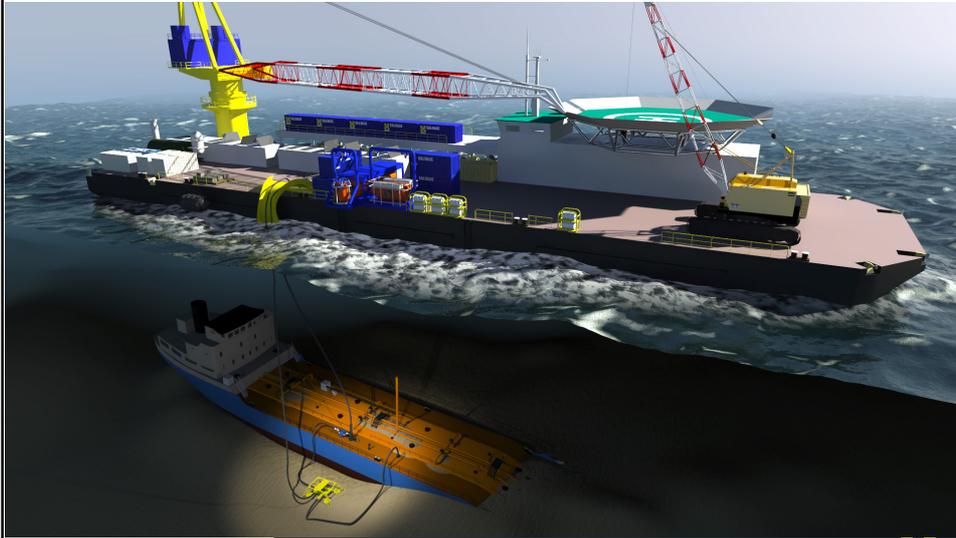
SMIT SALVAGE | PRESENTATION | SLIDE 85



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

Situation above Wreck



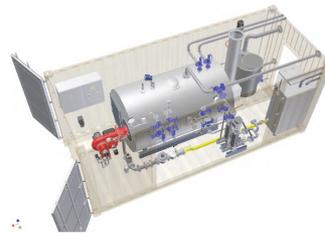
SMIT SALVAGE | PRESENTATION | SLIDE 86



OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

- Sat system
- Hoses + other project related materials
- Steam Plant



SMIT SALVAGE | PRESENTATION | SLIDE 87

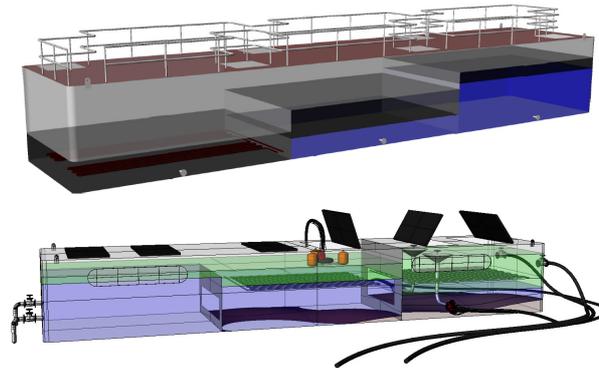


OIL RECOVERY OPERATION KOREA (KOEM)

SMIT'S WORLD

On site:

- Recovered oil stored on SMIT BORNEO: collected in the Oil-water Separation Tank (OST).



SMIT SALVAGE | PRESENTATION | SLIDE 88



▶▶▶ THANK YOU FOR YOUR ATTENTION



VISIT SMIT'S WORLD ONLINE AT WWW.SMIT.COM

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