

VNSI

SCHEEPSBOUW NEDERLAND
Vereniging Nederlandse Scheepsbouw Industrie

Environmental Practices in the Dutch Shipbuilding Industry

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Presentation overview

- General impression of products and services
- World market position

- Environmental legislation EU
- Environmental legislation The Netherlands
- Environmental management and precautions

- Blasting and Coating in newbuilding and repair

Products: Cargo Sea / Inland



Products: Tugs / Workboats / Fishery



Products: Research / Service vessels



Products: Navy / Coast Guard



Products: Dredging



Products: Offshore

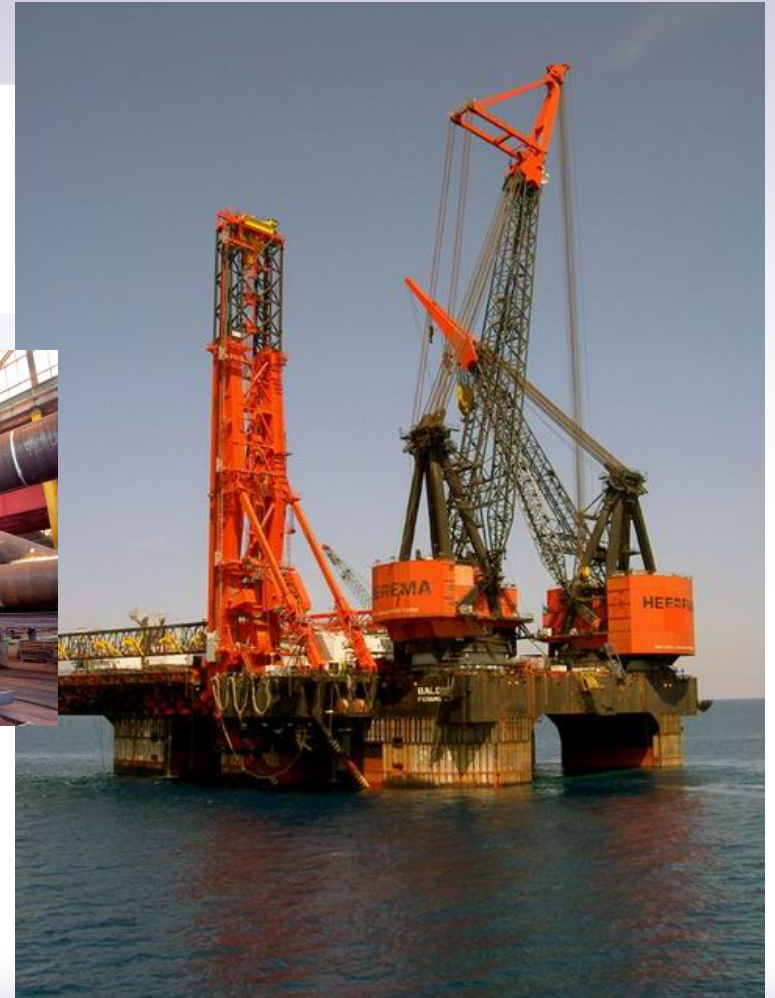


The world's first concrete heavy lifter
for offshore platform decommissioning
To be completed in 2009

Well intervention &
Diving support vessel
To be completed in 2008



Products and services: Conversion



Leisure time: Top of the bill



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World share Order intake

New orders	2003	2004	2005
<i>Netherlands</i>	<i>1,0%</i>	<i>1,3%</i>	<i>2,5%</i>
CESA (Europe) incl. Netherlands	10%	15%	18%
Japan + South Korea	73%	66%	58%
Other countries	17%	19%	24%
World	100%	100%	100%

Environmental legislation EU

Most relevant legislation for shipyards

- Waste: European Waste Catalogue and European Treaty for Waste Shipment
- Air: Solvents Emissions Directive
- Blasting and Coating: BREF Reference document on Surface Treatment using Organic Solvents (IPPC)
- Other emissions: E-PRTR (new regulation, only relevant for larger shipyards)
- Biocidal Products Directive: registration of biocides, a.o. for antifouling

Environmental legislation Netherlands

Main topics

- Waste disposal: registration according to EU legislation
- Waste shipment: EU legislation,
- Other waste aspects (prevention, storage): Dutch legislation
- Air: Dutch implementation of the EU Solvent Emissions Directive
- Heated discussions with Dutch authorities: who decides on coatings choice and emission reduction possibilities?
(outcome: solutions for best practices and solvent registration)
- Dutch antifouling registration system frequently causes practical problems for shipyards
- Specific attention: asbestos removal and disposal
- Environmental permits : general and water authority permit
- Detailed registration of waste disposal

Environmental management practices

- **1987** Branch model regulation to diminish water pollution: Dock floor and Slipway Discipline. Compulsory for all shipyards
Adopted by European association CESA as leading document
- **1990** Development of Environmental Management Manual (blue collar / middle management / HSE manager)
One of the first in its kind on branch level.
- **1991** Final report Inventory of Surface Water Emissions and Precautions. Joint project of VNSI and national / regional water authorities (Summary available)
- **1993** Long term policy agreement (1993-2010) with national and regional authorities: integrated approach of environmental management in shipyards. Unique approach and results.

Environmental management practices

- **1995** Schedule emission reductions water by ship repair yards for period 1985-2010 and onwards
- **1998** Environmental Management Manual for the Metal and Electro technical Industry, with special chapter for shipbuilding and –repair (comparable to the EPA Sector Notebook Project ‘Profile of the Shipbuilding and Repair Industry’, 1997)
- **2002** Safety education DVD for repair yards (multi-language)
- **2006** Update of time table for emission reductions to water (integrally adopted by CESA as European guidance)
- **2007** Update of Environmental Management Manual for the Metal and Electro technical Industry (finalized January 2007) (now official status for representing Best Available Techniques)

Shipyard activities and topics

Topics in shipbuilding and -repair chapter

- Metal treatment (fitting shop)
- Welding
- Blasting
- High pressure washing down
- Cleaning and degreasing
- Coating application
- Piping and fitting
- Propeller and propeller shaft
- Carpentry / finishing of walls and floors
- Insulation
- Glass fiber reinforced polyester
- Installation work
- Internal transport
- Soil / water bottom management
- Waste management and prevention
- Energy management
- Storage of hazardous goods, gases and oxygen
- External safety
- Noise and vibrations
- Odor

Activity and precautions (examples)

- Metal treatment (fitting shop)
 - Reduce losses of (metal) machining fluids
 - Dry machining
 - Restrict air emissions by (metal) machining fluids and other substances
 - Use alternative (metal) machining fluids
 - Process optimization
 - Treatment of (metal) machining fluids
 - Use (metal) machining fluids as refrigerant
 - Prevention and re-use of scrap
 - Waste separation

Activity and precautions (examples)

- High pressure washing down
- Blasting
 - Collecting and treatment of waste water (also for blasting in dry docks)
 - Choice of technique and blast medium
 - Proper tuning and maintenance
 - Exhaust and filtering of blasting dust (only relevant for blasting cabins and halls)
 - Full encapsulating for blasting in open air (usually practically unaffordable)
 - Soil protection provisions
 - Reduction of noise nuisance
 - Separating 'clean' and 'dirty' blasting
 - Dry blasting on 'easy clean' floors
 - Save energy: recirculating heated air
 - Use fine meshed nets to reduce blowing away of blasting dust and paint particles

Activity and precautions (examples)

- Coating application
 - Good housekeeping at coating application
 - Investigate the possibility of using solvent less coatings
 - Application only above impermeable floors
 - Use watertight collecting bins (dripping pans)
 - Conditioning of coating storage facilities (waste prevention)
 - Prohibition of coal tar (epoxy) application
- Soil / water bottom management
 - Assessment of null situation regarding possible soil pollution
 - Soil protection (general)
 - Water bottom protection near slipways

Activity and precautions (examples)

- Energy management
 - Pipe insulation, cavity wall insulation, roof insulation, double glazing
 - Local exhaust of polluted air, rpm control of time control of ventilator
 - Weather strips application
 - High frequency light armature, energy saving lamps, work place lighting, daylight controlled switches, extension of light switch groups, presence detection etc.
 - Fume gas condenser, high efficiency boiler, thermostatically controlled radiator valves, pump control
 - Good housekeeping
 - Reduction of compressed air systems
 - Set up of energy saving plan

Activity and precautions (examples)

- Storage of hazardous goods, gases and oxygen
 - Precautions for oil storage in underground tanks
 - Precautions for oil storage in surface tanks
 - Precautions for storage of hazardous substances
 - Precautions for tapping of hazardous substances
 - Danger restriction for storage of gas cylinders
 - Danger restriction for use of gas cylinders
 - Soil protection for storage of hazardous substances

Research and Practical tests

Selection of Research and Practical tests (1990 – today)

- Treatment of waste water from dry docks and slipways.
- In co-operation with the national Water Authority
- Testing operational water treatment installations
- Blasting 1990-2006: practical testing of many techniques (dry and wet)
- TISS-projects (newbuilding): full scale comparison of paint application techniques
- Stracon 1 (ship repair): comparison of techniques for pre-treatment, coating, shielding, workplace access
- Branch research project: exposure to welding fume
- Stracon 2 (ship repair): reduction of overspray

Schedule emission reductions (ship repair yards with dry docks)

ESTIMATED IMPACT OF MEASURES IN PLACE IN THE NETHERLANDS

Period	Index emissions	% reduction compared to basic year	Emissions breakdown	Activity	Environmental precautions / Remarks
Before 1985 (basic year)	10	0%	Via dock floor 10	High pressure cleaning (< 300 bar)	No specific environmental precautions
	70		Blowing away 20 Via dock floor 50	Blasting (Open dry blasting)	No specific precautions to prevent blowing away General cleaning up of dock floor
	20		Blowing away 18 Via dock floor 2	Paint spraying (airless)	No specific precautions to prevent blowing away No specific precautions for cleaning up of dock floor
	100				
1985-1990	10	50%	Via dock floor 10	High pressure cleaning	No specific environmental precautions
	25		Blowing away 20 Via dock floor 5	Blasting (Open dry blasting)	No specific precautions to prevent blowing away Thorough cleaning up of dock floor ²
	15		Blowing away 13 Via dock floor 2	Paint spraying (airless)	Introduction of "Dock floor discipline" for B&C contractor ³ Thorough cleaning up of dock floor ³
	50				
1991-1995	10	66,5%	Via dock floor 10	High pressure cleaning	No specific environmental precautions
	15		Blowing away 10 Via dock floor 5	Blasting (Open dry blasting)	Use of fine meshed nets ³ Thorough cleaning up of dock floor ³
	8,5		Blowing away 6,5 Via dock floor 2	Paint spraying (airless)	Use of fine meshed nets ³ "Dock floor discipline" by B&C contractor ³ Thorough cleaning up of dock floor ³
	33,5				

Schedule emission reductions (ship repair yards with dry docks)

Period	Index emissions	% reduction compared to basic year	Emissions breakdown	Activity	Environmental precautions / Remarks
1996-2000	1,5		Via dock floor 1,5	High pressure cleaning	Introduction of waste water treatment (settling tanks + oil separator, 85% effective reduction of heavy metals emissions)
	11		Blowing away 10 Via dock floor 1	Blasting (Open dry blasting)	Use of fine meshed nets ³ Waste water treatment Thorough cleaning up of dock floor ³
	7		Blowing away 6,5 Via dock floor 0,5	Paint spraying (airless)	Use of fine meshed nets ³ "Dock floor discipline" by B&C contractor ³ Waste water treatment Thorough cleaning up of dock floor ³
	<u>19,5</u>	<u>80,5%</u>			
2001-2005	1,5		Via dock floor 1,5	High pressure cleaning	Waste water treatment
	6		Blowing away 5 Via dock floor 1	Blasting (both open dry blasting and other techniques)	Use of fine meshed nets ³ Increased use of low-emission blasting techniques Waste water treatment Thorough cleaning up of dock floor ³
	7		Blowing away 6,5 Via dock floor 0,5	Paint spraying (airless)	Use of fine meshed nets ³ "Dock floor discipline" by B&C contractor ³ Waste water treatment Thorough cleaning up of dock floor
	<u>14,5</u>	<u>85,5%</u>			

Schedule emission reductions (ship repair yards with dry docks)

Period	Index emissions	% reduction compared to basic year	Emissions breakdown	Activity	Environmental precautions / Remarks
2006-2010	1,5		Via dock floor 1,5	High pressure cleaning	Waste water treatment
	3,5		Blowing away 2,5 Via dock floor 1	Blasting	Use of fine meshed nets ³ Increased use of low-emission blasting techniques Waste water treatment Thorough cleaning up of dock floor*
	5,5		Blowing away 5 Via dock floor 0,5	Paint spraying (airless)	Use of fine meshed nets ³ "Dock floor discipline" by B&C contractor ³ Waste water treatment Thorough cleaning up of dock floor Development + introduction of low-emission painting techniques
	<u>10,5</u>	<u>89,5%</u>			
From 2010	1		Via dock floor 1	High pressure cleaning	Waste water treatment
	1,5		Blowing away 1 Via dock floor 0,5	Blasting	Only low-emission blasting techniques Waste water treatment Use of fine meshed nets ³ Thorough cleaning up of dock floor ³
	2,5		Blowing away 2 Via dock floor 0,5	Paint application (low-emission)	Use of fine meshed nets ³ Only low-emission paint application techniques Waste water treatment
	<u>5</u>	<u>95%</u>			

Blasting and coating (ship repair)

Project Stracon 1:

- Evaluation of available techniques:
 - surface pre-treatment
 - paint application
 - smart but affordable methods for reduction and control of weather influences
 - 'work place accessibility' (cherrypickers, scaffolding etc.)
- with regard to:
- investment and operational costs
 - production speed
 - health & safety aspects
 - environmental aspects
 - flexibility in application (inside/outside, curved areas, spotblasting/full blast etc.)

Stracon project evaluation (ship repair)

Code	Techniek	Investering	Operationele kosten	Prestaties		Milieu-belasting		Afvalkosten		ARBO/veiligheid		Toepassingsmogelijkheden		Opmerkingen
				binnen	buiten	binnen	buiten	binnen	buiten	binnen	buiten	binnen	buiten	
Straaltechnieken														
S.1	Open stralen met eenmalig grit	laag	gem.	++	++	-	--	-	--	-	-	+	+	met goede afscherming kansrijk
S.2	Open stralen met meermalig grit	gem.	gem.	++	-	-	-	+	-	+	-	++	-	met goede afscherming kansrijk
S.3	Open stralen met windream grit	laag	hoog	+	+	-	-	-	-	-	-	+	+	met goede afscherming kansrijk
S.4	Open stralen Thermoblast	hoog	hoog	++	++	-	-	-	-	--	--	-	-	
S.5	Cryojet droogijs-stralen	hoog	gem.		-		+		++		+		-	
S.6	Gesloten stralen	hoog	gem.	+		++		++		++		+		binnen kansrijk
S.7	Gesloten stralen met mobiele machines	hoog	gem.		++		++		+		++		-	
S.8	Vacuüm spotstralen (Japanse machine)	hoog	hoog		++		++		+		++		+	wellicht kansrijk; test nodig
S.9	Natstralen (grit+water)	gem.	gem.		+		-		-		-		+	
S.10	Hydrojetten, handmatig	gem.	hoog		--		-		-		--		-	
S.11	Hydrojetten, mechanisch	hoog	gem.		+		++		+		++		+	kansrijk
S.12	Machinaal spot-hydrojetten	hoog	gem.		+		++		+		++		+	kansrijk
S.13	Hammelmann hydrojet machine	hoog	hoog		++		++		+		++		-	
S.14	Hydrojetten met heet water	gem.	hoog		-		-		-		-		-	
S.15	Laserreiniging	hoog	hoog		--		-		-		-		--	
S.16	Ultrastrip													
Conserveringstechnieken														
C.1	Airless	laag	laag	+	++	-	--	-	-	--	--	+	++	met goede afscherming kansrijk
C.2	Airmix	gem.	laag	++	+	-	--	-	-	-	--	++	+	
C.3	Elektrostatisch hot airmix (HE-AM)	hoog	gem.	++	+	+	-	+	+	+	-	++	+	kansrijk
C.4	HVLP (high volume low pressure)	gem.	gem.	++	-	++	-	+	-			++	-	
C.5	Handmatig (kwast/roller)	laag	gem.	-	-	+	+	+	+	+	-	+	-	
Afschermingstechniek														
A.1	Zeildoek	laag	hoog		-		+		+		-		+	
A.2	Krimpfolie	laag	hoog		+		+		-		+		+	kansrijk
A.3	Aluminium kappen	gem.	laag		--		+		+		+		-	
A.4	Windafleidingspanelen	hoog	laag		?		+		+		?		?	kansrijk?
Bereikbaarheidstechnieken														
3.1	Stellingen	laag	gem.		+		+		+		+		+	
3.2	Hoogwerker	laag	laag		+		+		+		+		++	kansrijk
3.3	Dokarmen	hoog	hoog		+		+		+		++		-	

Verklaring waarderingen:

++ goed (groen)
 + redelijk (lichtgroen)
 - matig (lichtrood)
 -- slecht (rood)

TISS-projects (newbuilding)

Projects executed from 2000-2003

Innovative paint spraying in steel preservation

- Comparing new paint spraying techniques to airless spraying, with full scale objects and under field circumstances (= during the shipbuilding process programme)

Goals

- Improvement on both
 - Costprice
 - Quality (coating performance)
 - Environment
 - Health and safety

TISS-projects (newbuilding)

Features:

- standardised project plan
- standardised registration method for all parameters
- standardised reporting model
- permanent team for training, supervision and project management

Advantages:

- coherence and mutual comparison of projects
- knowledge is increased systematically

Results 3 TISS-projects (newbuilding)

(with solvent rich coatings)

Hot electrostatic airmix versus airless spraying:

- Environment: 25-35% reduction in paint consumption, less waste (empty cans, dry paint dust), little overspray, less solvent emission
- Health: hardly any spray mist, less solvents (= better working environment)
- Quality: better control of layer thickness, better performance, very good edge retention
- Appearance : very tight (no orange peel)
- Breakdowns: higher equipment breakdown risk due to heating
- Costs: higher investment and maintenance costs, lower direct costs (less paint consumption compensates higher labour costs)

Present focus ship repair yards

Project Stracon 2:

- Strong focus of shipyard management to continue the positive paint spraying results in newbuilding
- Paint spraying in open air: overspray is serious bottleneck
- Full shielding (encapsulating) too expensive
- How to cope with the wind otherwise??
- Present focus is on semi-automatic spraying with a shielded spray nozzle
- 1st open air test executed January 2007

Evaluation and Follow up

Open air test January 2007 – poor result:

- Murphy's law: not a usual high solid or (solvent rich) top coating, but a "light weight" sealer coating had to be applied, with a very thin wet film thickness
- The operator had no other option than to lower the pressure
- As a result, the wind caught the paint particles: overspray!
- The envisaged high standard cherry picker was not available, we had to use standard equipment
- Trial and error as always: don't give up
- Despite the bad first open air result this is a promising way to continue according to a leading coating application contractor

International co-operation?

- Blasting & Coating operations create environmental problems worldwide
- The problems are too complex and too costly to solve by individual companies
- Co-operation of “paint chain parties” is essential
- VNSI welcomes international co-operation in blasting and coating projects

Thank you for your attention

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