



IHC Supporter[®] class

Better for less



Research, development & marketing

KIVI NIRIA Presentation, February 14, 2013

Cor van der Harst - Product director

IHC Merwede, Offshore Division

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Innovative vessels
Advanced equipment
Life-cycle support



Dredging



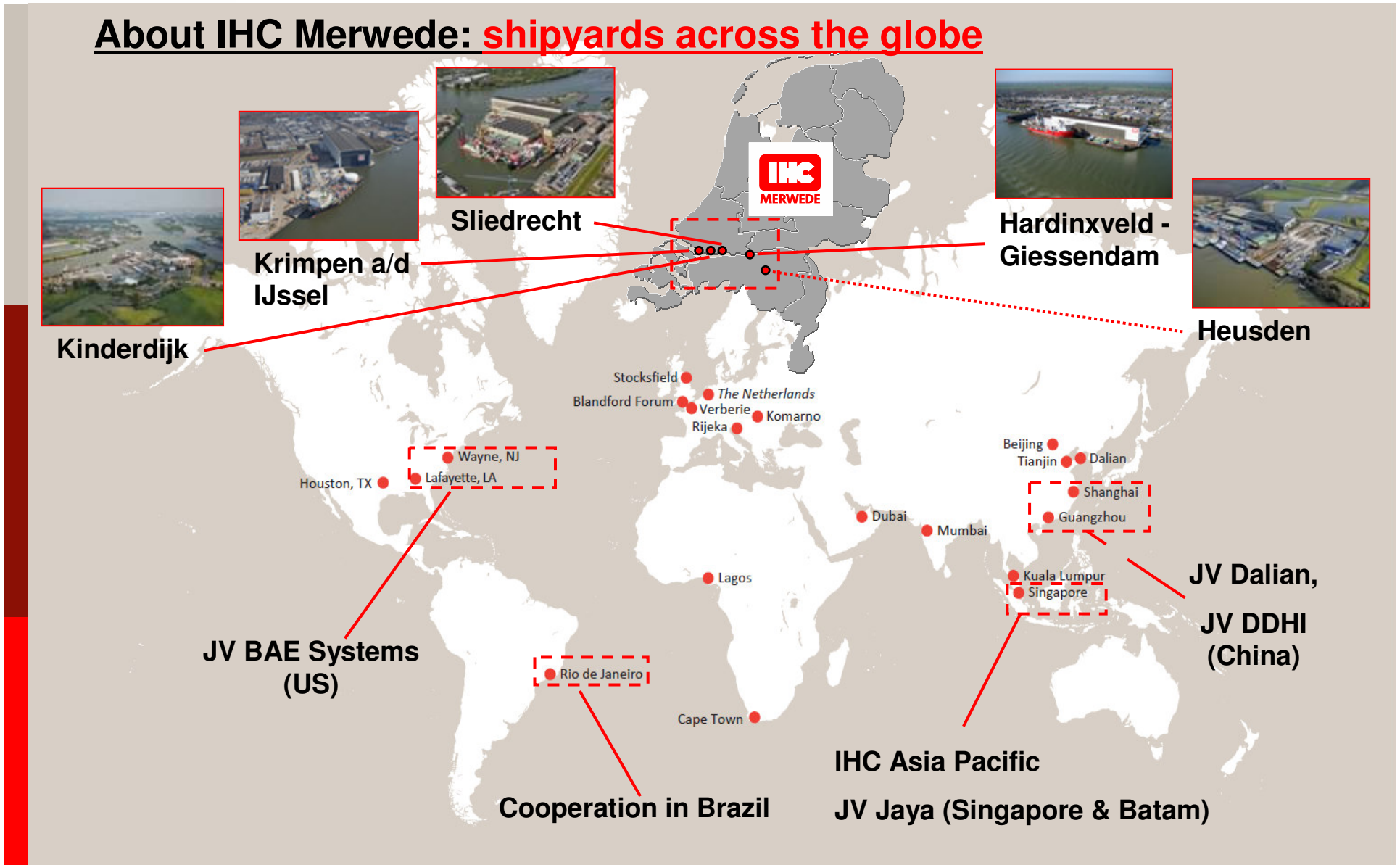
Mining



Offshore

The technology innovator.

About IHC Merwede: shipyards across the globe



The technology innovator.

- **IHC Merwede Offshore division**
- **IHC Merwede philosophy**
- **IHC Supporter[®] class**
 - Modular offshore vessel
 - IHC Merwede fast assembly process:
Decoupled hull and subsystems
 - Supply chain integration
 - Prepared for future regulations



IHC Merwede – Offshore division

Reliable partner for efficient offshore solutions

Market segments

- **Oil and gas**
- Renewable energy

Product groups

- Pipelaying
- Cablelaying
- Well intervention
- Offshore support
- Diving support
- Offshore wind farm development
- Pile driving
- FPSO installation and offloading
- Handling, lifting and deep-water lowering
- Hydraulic systems
- Electrical power and automation systems



Field development

IHC Merwede – Offshore division

Reliable partner for efficient offshore solutions

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Offshore wind farm development

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- Pile driving
- FPSO installation and offloading
- Lifting and deep-water
- ... systems
- ... power and automation
- ...

2 approaches



Custom-built



Modular standard

- **IHC Merwede Offshore division**
- **IHC Merwede philosophy**
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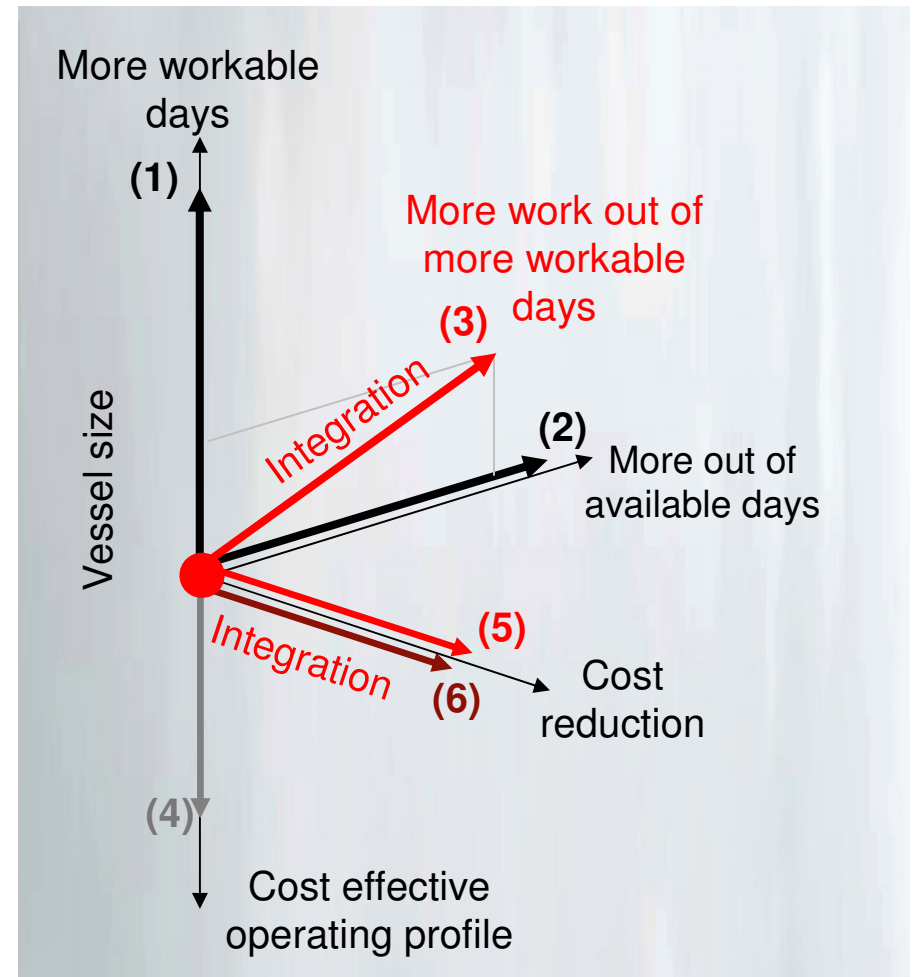


IHC Merwede – Offshore division

Our philosophy for new product development (IMCA, New Orleans, 2011)

6 axes in (new) product development

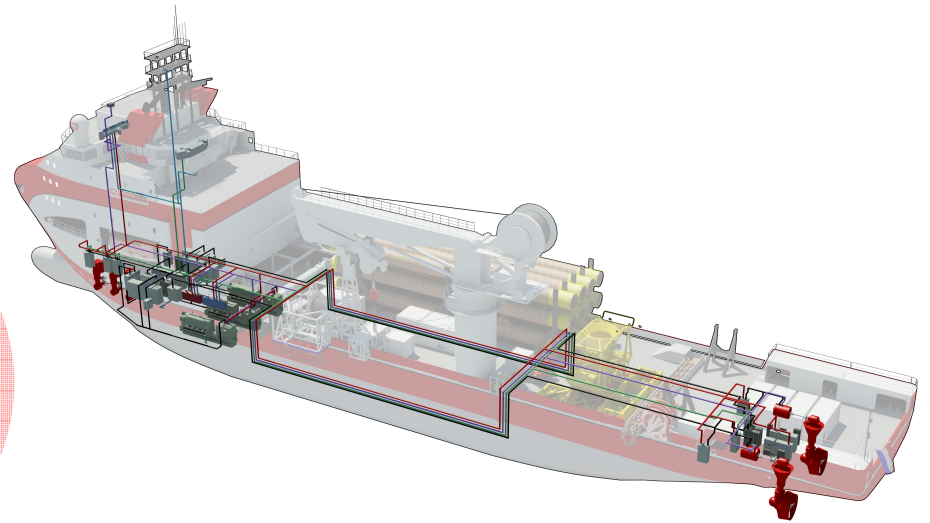
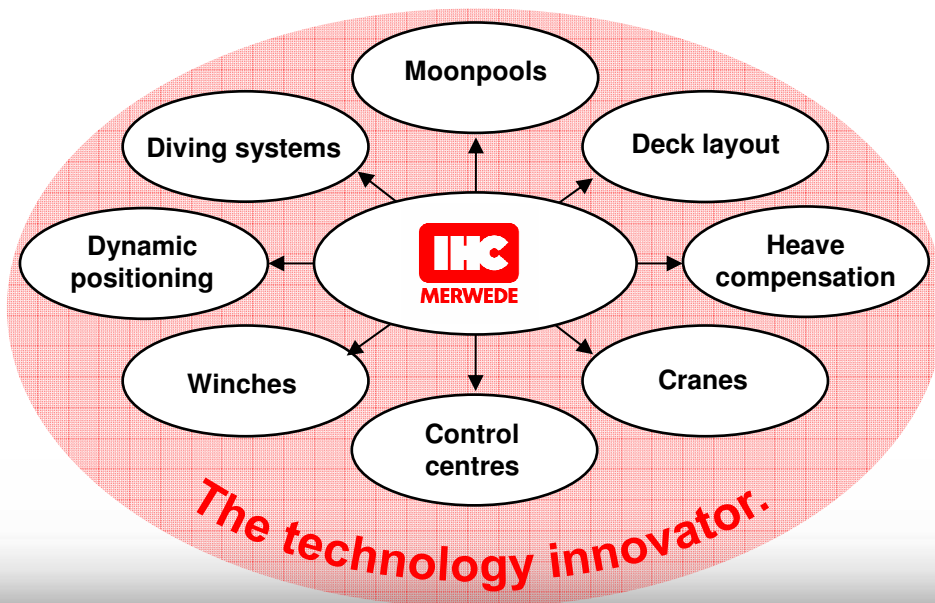
1. Larger vessel
2. More advanced equipment
3. Compact vessel vs. advanced equipment
4. Smaller vessel
5. Automated vessel
6. Modular vessel



IHC Merwede Integrated Vessels

IHC Supporter® class - Modular offshore support vessel

Turn key delivery including mission equipment and automation



- In-house knowledge, in-house technology

- | | | |
|-------------------------|------------------------------|-----------------------------|
| • Reduced costs | • Life-cycle support ability | • IHC Drives and Automation |
| • Reduced lead time | • Increased versatility | • IHC Engineering business |
| • Increased reliability | • Reduced risk | • IHC Hytech |
| | | • ... |

IHC Merwede
Our strategy

Custom-built vessels

Standard (modular) vessels

Cutter suction dredgers



ATHENA



IHC 8527MP®

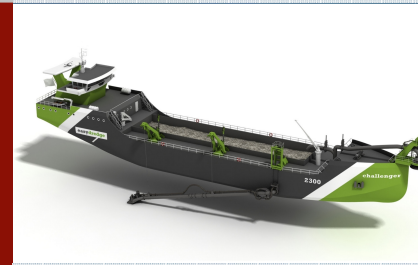


IHC Beaver®

Trailer suction hopper dredgers



VOX MÁXIMA



Easydredge

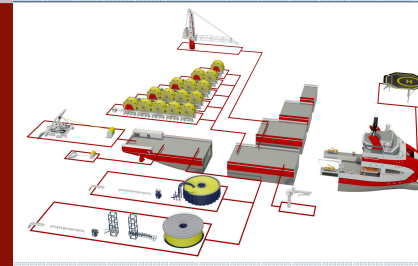


IHC Beagle

Offshore vessels



SEVEN SEAS



IHC Supporter® class



IHC Packhorse™

- **IHC Merwede offshore division**
- **IHC Merwede philosophy**
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IHC Merwede – Offshore division

Our philosophy for new product development (IMCA, New Orleans, 2011)

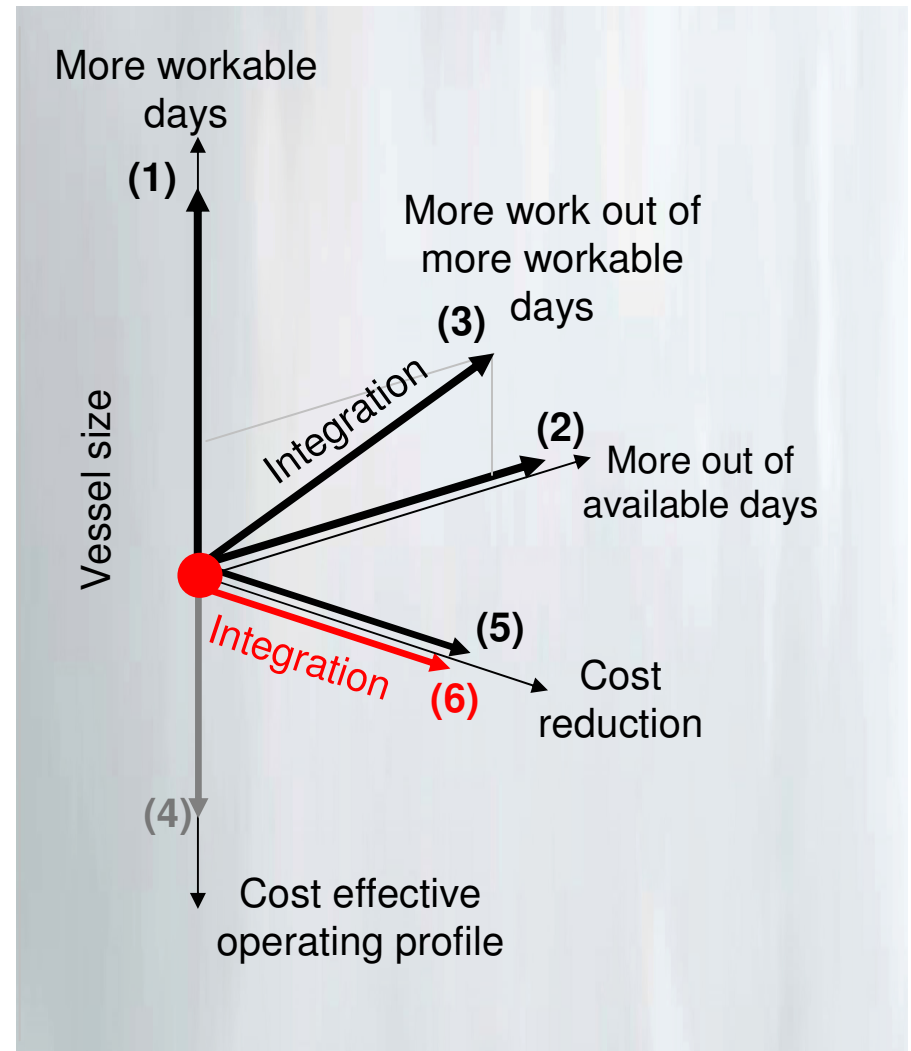
6 axes in (new) product development

1. Larger vessel
2. More advanced equipment
3. Compact vessel vs advanced equipment
4. Smaller vessel
5. Automated vessel

6. **Modular vessel**

IHC Supporter® class

- Charter fleet / investor market
- Price reduction
- Global production / JV Yards
- More competitive proposition
- Shorter lead time to market
- Reliability



1. **Modular design based on value engineering: designed for production fit for versatile offshore operations**
2. Design & engineering issues: Modularity & regulations
3. IHC Merwede fast assembly process: Decoupled hull and skid based vessel systems enables parallel building processes
4. Global production: Cost reduction through supply chain integration



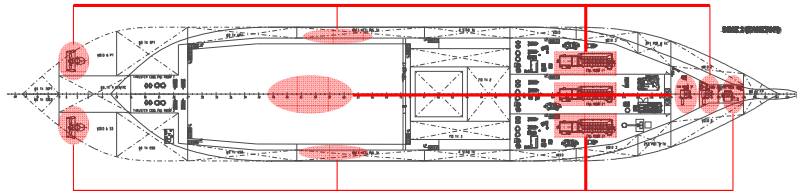
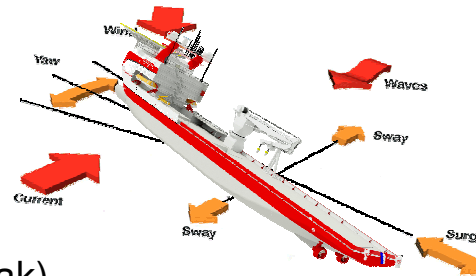
IHC Supporter® class - Modular offshore support vessel

What makes a vessel an Offshore Support Vessel

Station-keeping capability

DP3 – High level redundancy

- Failure of components
- Failure of compartments (fire/leak)



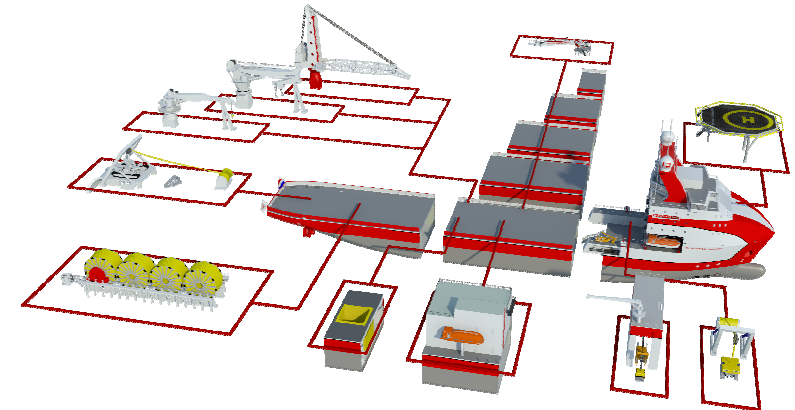
Mission-equipment

Multi-functional

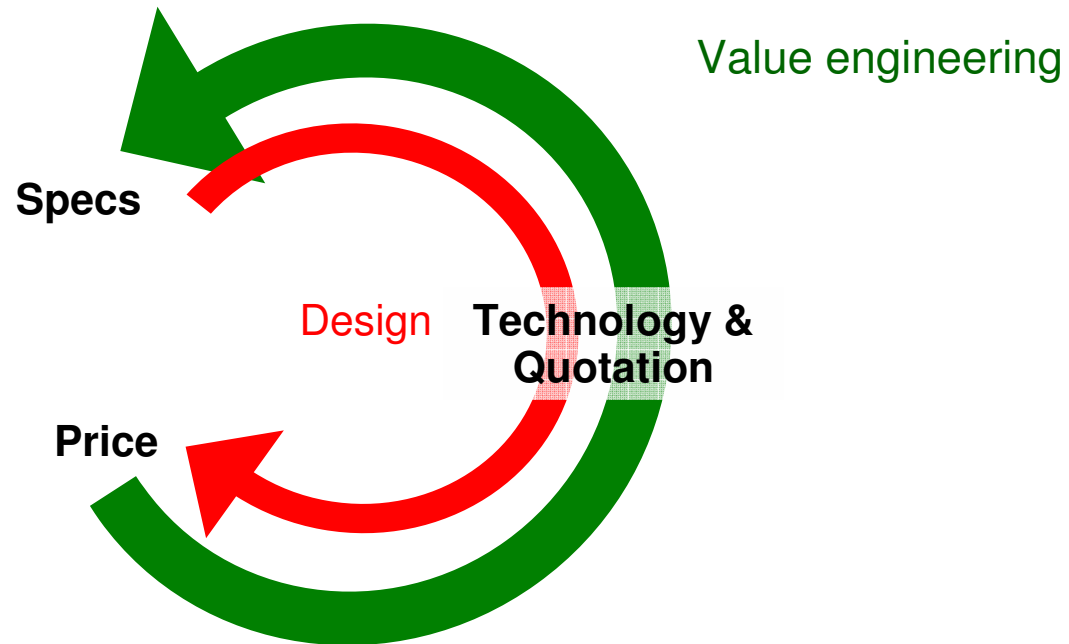
- Offshore-cranes
- Remote Operated Vehicles
- Cable-/Pipelaying installations
- Sat. Diving installation

Accommodation

Large accommodation



IHC Supporter® class - Modular offshore support vessel Value engineering (IMCA, Amsterdam, 2012)

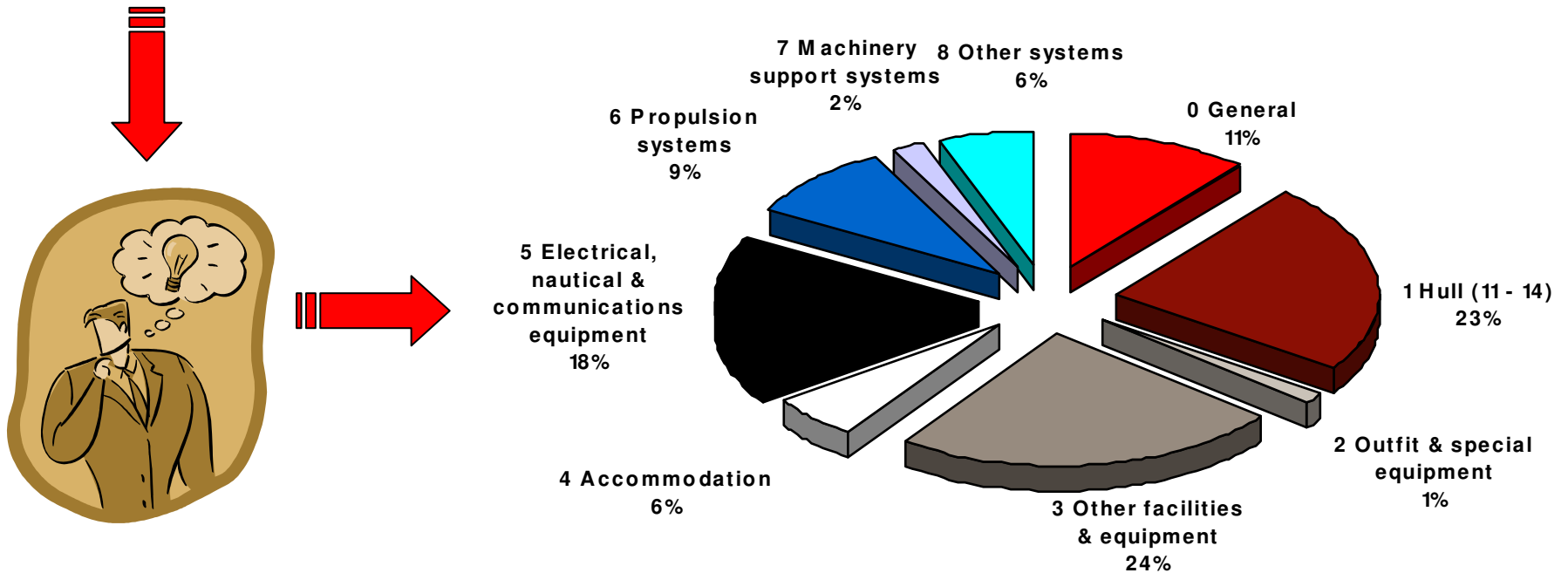


- 30% price reduction of 2009 deliveries through
 - Rationalised design
 - Sourcing – Yard spec fit for function
 - Process – Modular design & repetition

IHC Supporter® class - Modular offshore support vessel

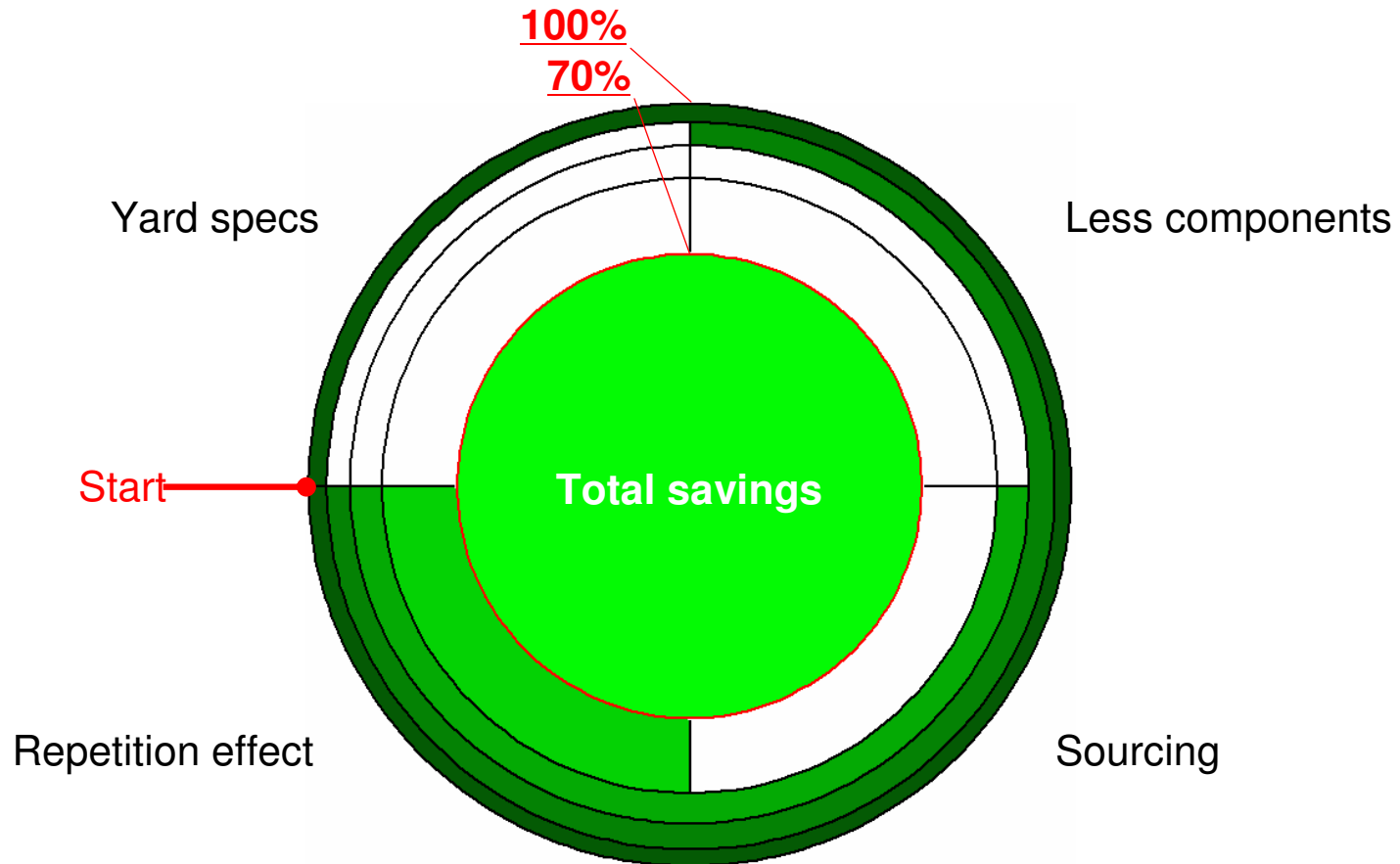
Rationalised design

- 9 enquiries
 - On every chapter
 - No chapter left out
 - No supplier left out
 - Together this is feasible



IHC Supporter[®] class - Modular offshore support vessel

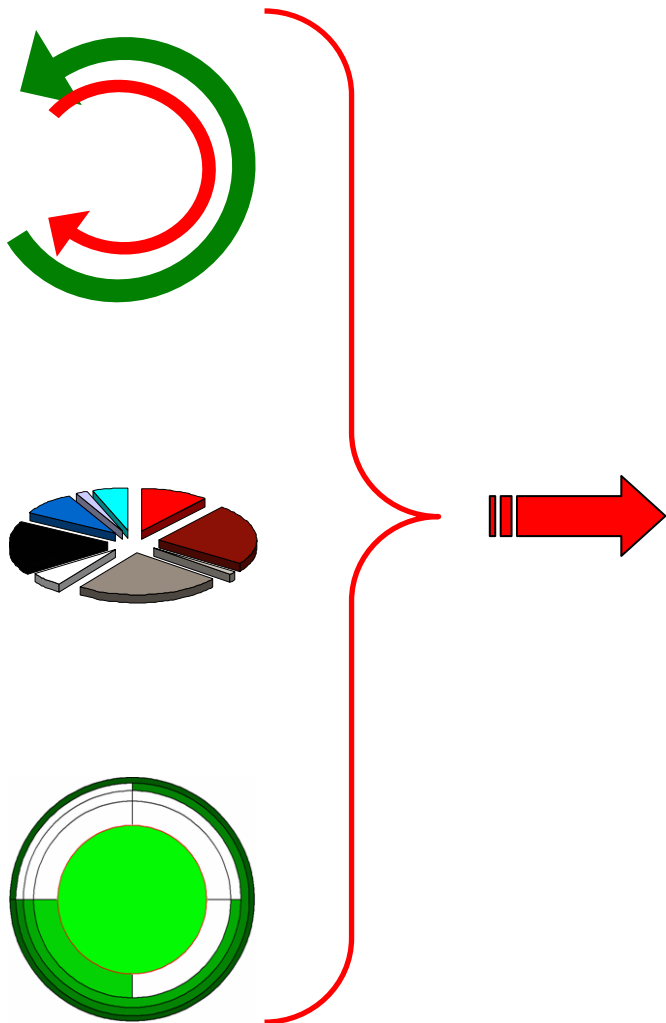
Total savings



Yard specs x Less components x Sourcing x Repetition effect = Total savings

IHC Supporter® class - Modular offshore support vessel

Rationalised design



Ch.	Description	Savings	
0	GENERAL	11 %	\$...
1	HULL AND CONSERVATION	23 %	\$...
2	OUTFIT AND SPECIAL EQUIPMENT	1 %	\$...
3	OTHER FACILITIES & EQUIPMENT	24 %	\$...
4	ACCOMMODATION	6 %	\$...
5	ELECTRICAL, NAUTICAL & COMMUNICATIONS EQUIPMENT	18 %	\$...
6	PROPULSION SYSTEMS	9 %	\$...
7	MACHINERY SUPPORT SYSTEMS	2 %	\$...
8	OTHER SYSTEMS	6 %	\$...
	Total		30%

IHC Supporter[®] class - Modular offshore support vessel

Proven design



Bold Endeavour



Toisa Perseus



Toisa Proteus



Toisa Polaris



Toisa Pegasus



HOS Achiever



Well Enhancer



HOS Iron Horse



IHC Supporter® class - Modular offshore support vessel Yard spec fit for production



Bold Endeavour



Toisa Perseus



Toisa Proteus



Toisa Polaris



Toisa Pegasus



HOS Achiever



Well Enhancer



HOS Iron Horse



IHC Supporter[®] class - Modular offshore support vessel

Rationalised modular design derived from 8 IHC Type 22's



Bold Endeavour



Toisa Perseus



Toisa Proteus



Toisa Polaris



Toisa Pegasus



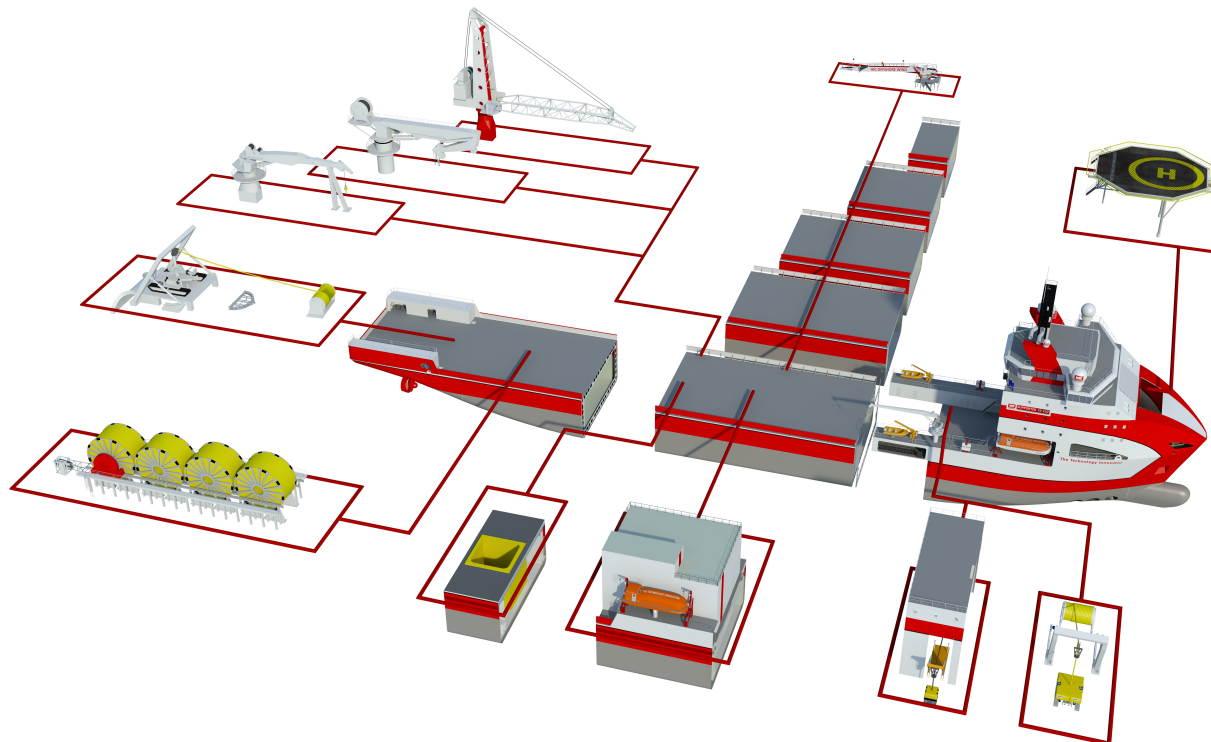
HOS Achiever



Well Enhancer



HOS Iron Horse



IHC Supporter[®] class - Modular offshore support vessel

New modular vessel combinations



Bold Endeavour



Toisa Perseus



Toisa Proteus



Toisa Polaris



Toisa Pegasus



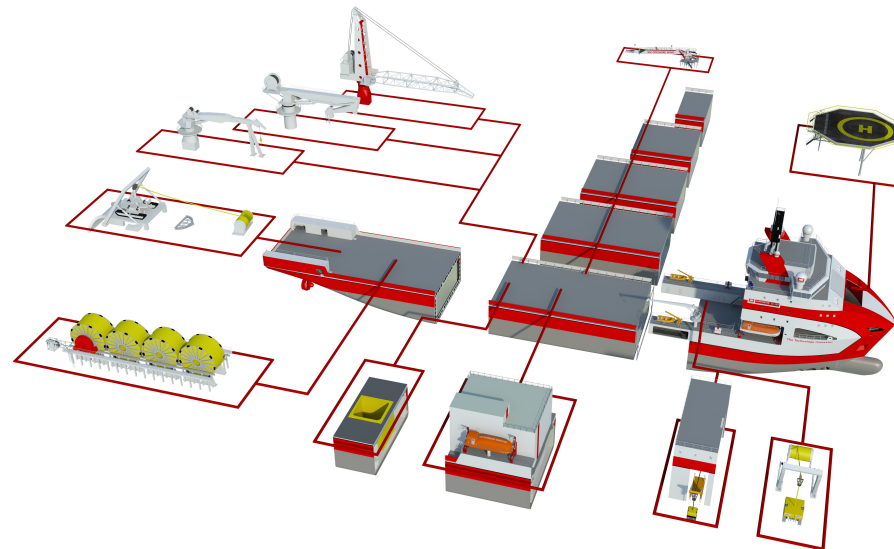
HOS Achiever



Well Enhancer



HOS Iron Horse



Diving Support



Offshore Construction



Cablelay



Wind farm service

IHC Supporter® class - Modular offshore support vessel

Client configurable designs



Bold Endeavour



Toisa Perseus



Toisa Proteus



Toisa Polaris



Toisa Pegasus



HOS Achiever



Well Enhancer



HOS Iron Horse



Turn-key delivery
With vessel and mission equipment fully integrated



Diving Support



Offshore Construction



Cablelaying



Wind farm service

IHC Supporter[®] class - Modular offshore support vessel

From R&D to sales & marketing documents

- Client configurable modular offshore vessel
 - Visual configurator → Instant vessel design
 - Technical configurator → Stability & payload conditions
 - Commercial configurator → Commercial proposal
 - Operational configurator → Technical proposal



Visual configurator

IHC Supporter® class - Modular offshore support vessel

Reduced risk

- Repetition
 - Proven vessel design without teething problems
 - Integration becomes “expert process”
 - Increased reliability
- Modular based design
 - Semi integrated design enables profitable overhauling when market disappears

- | | | |
|-------------|---|--|
| • Investors | → | Increased market for vessel |
| • Owners | → | Short term fully functioning delivery |
| • Operators | → | Low charter rates due to low investor risk |



IHC Supporter[®] class

Development of a modular offshore platform



Part I

- Modular design based on value engineering: designed for production fit for versatile offshore operations

Part II

- Design & engineering issues: Modularity & regulations
- IHC Merwede fast assembly process: Decoupled hull and skid based vessel systems enables parallel building processes
- Global production: Cost reduction through supply chain integration

End of part I



1. Modular design based on value engineering: designed for production fit for versatile offshore operations
2. **Design & engineering issues: Modularity & regulations**
3. IHC Merwede fast assembly process: Decoupled hull and skid based vessel systems enables parallel building processes
4. Global production: Cost reduction through supply chain integration



IHC Supporter® class - Modular offshore support vessel Design & engineering issues: Modularity & regulations

- Many aspects not well suited for modular approach
 - Structural (forces do not take account of modularity)
 - Hatches and moonpool vs neighboring modules
 - Moonpool- cranefoundation interaction
 - Regular webspacing through all modules
 - Doublings (bulkheads, decks)
 - Systems (dependent on final design, mission and complement)
 - HVAC, Electrical, Automatisation, DP, etc.
 - Regulations (Length is a parameter in many rules)
 - Equipment number, Frame spacing, Required subdivision index
 - 2008 SPS Code, MLC 2006 **Hot topic in industry**
 - End-client regulations (Statoil compliance)
 - DP capability dependent on L and deck arrangement
 - And many more.....

IHC Supporter® class - Modular offshore support vessel 2008 SPS Code compliancy

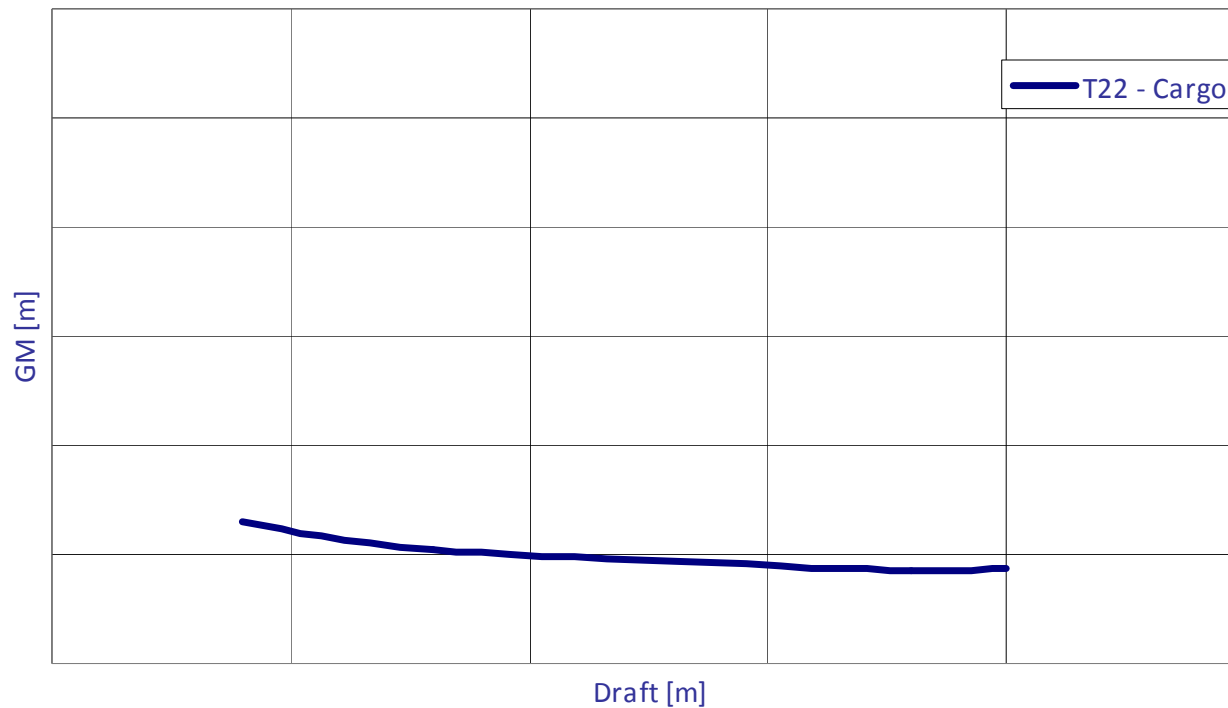
- Code of safety for Special Purpose Ships (SPS Code)
 - Developed early 80's
 - Hardly applied in offshore shipbuilding, and circumnavigated due to penalized subdivision requirements
 - After 2008 SPS Code update
 - More freedom in vessel's subdivision design leads to increase in request for SPS compliance by clients
- 3 cases - 2008 SPS Code compliancy
 1. Payload vs. crane balance
 2. Number of persons on board
 3. Life saving appliances

IHC Supporter[®] class - Modular offshore support vessel

1) 2008 SPS Code compliancy - payload vs. crane balance

- IHC Merwede Type-22 - **Cargo**: a-symmetrical subdivision, 400t crane capacity

Minimum GM limiting curve

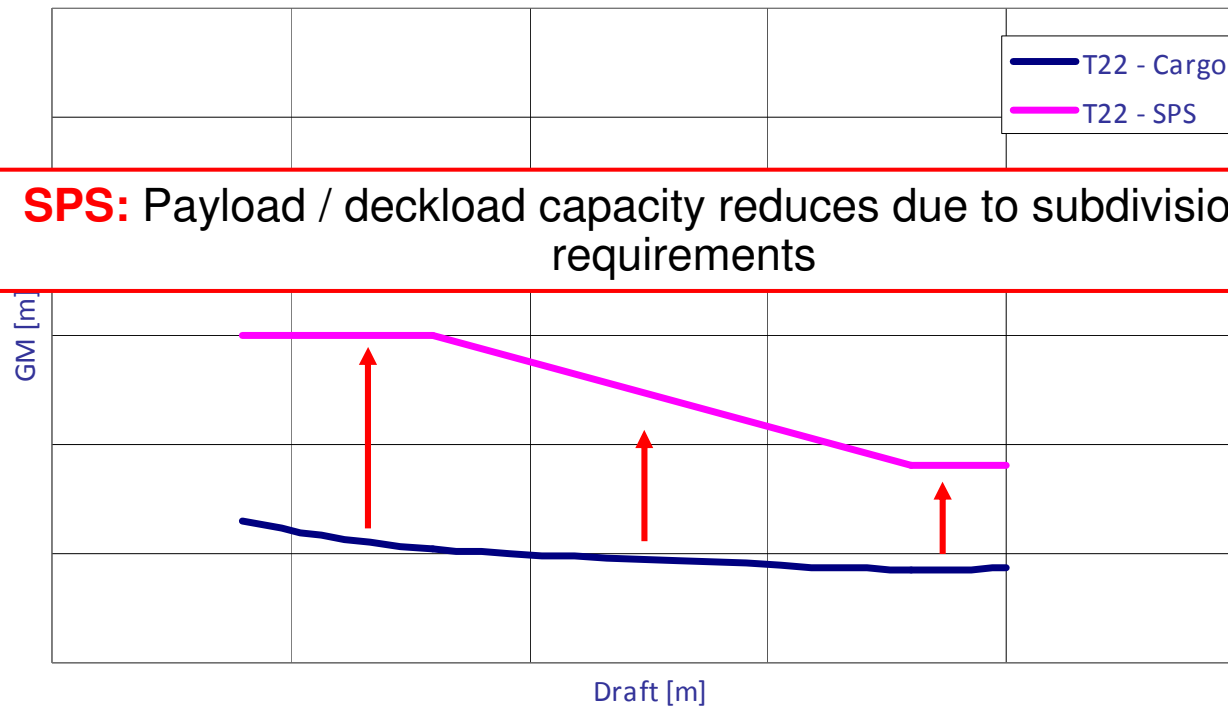


IHC Supporter® class - Modular offshore support vessel

1) 2008 SPS Code compliancy - payload vs. crane balance

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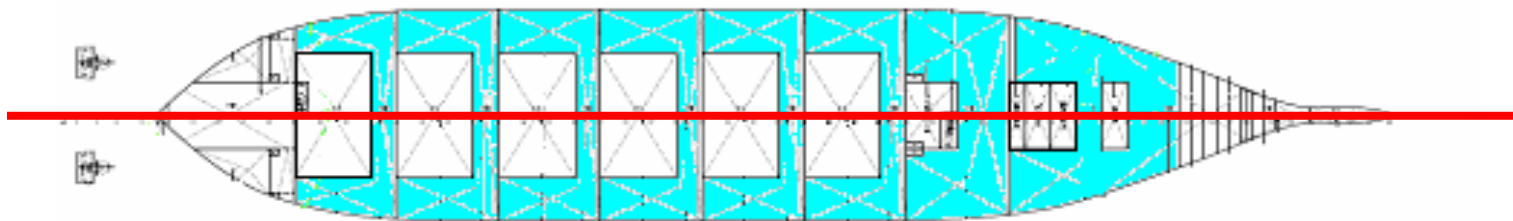
Minimum GM limiting curve



IHC Supporter[®] class - Modular offshore support vessel

1) 2008 SPS Code compliancy - payload vs. crane balance

- Reduction of SPS consequences
 - Symmetrical subdivision



- Optimization of probability of survival
- Reduction of 50% of anti-heeling tank capacity

Symmetrical tank arrangement: Except for anti-heeling tank, water ballast tanks are not separated between PS and SB → water ballast tanks can not be used for counter ballasting!

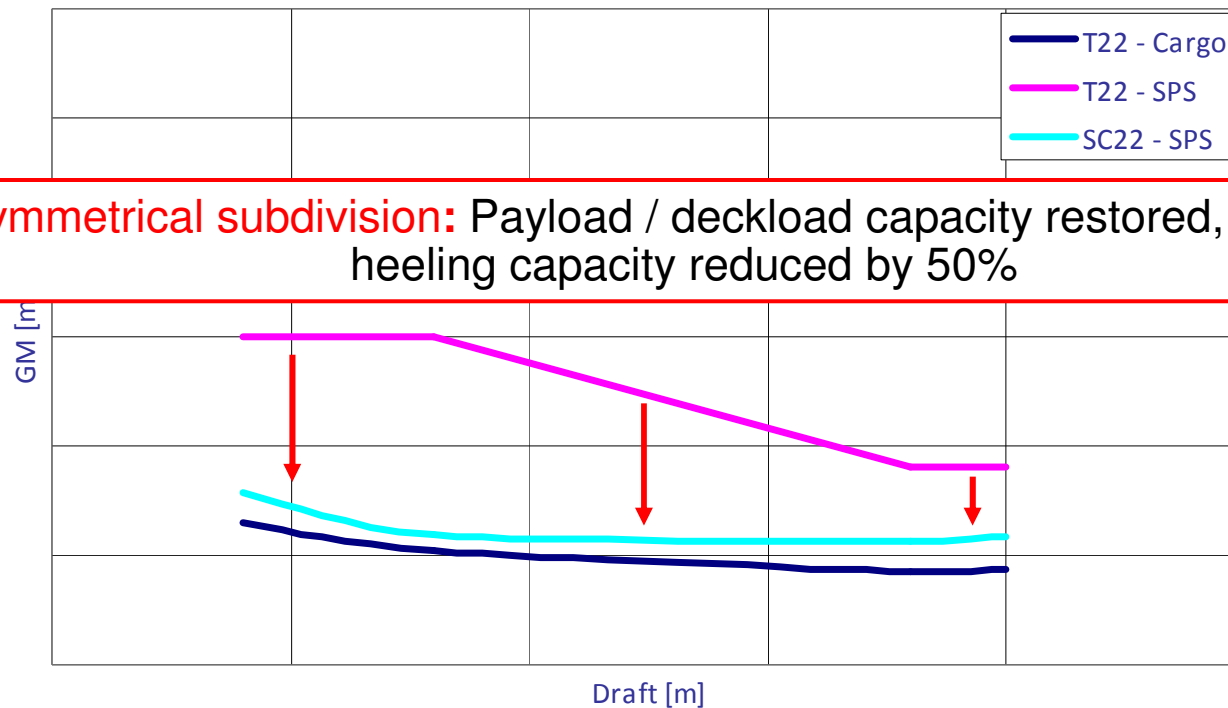
- Knuckle boom crane for low point of application crane load

IHC Supporter[®] class - Modular offshore support vessel

1) 2008 SPS Code compliancy - payload vs. crane balance

- IHC Supporter[®] class - **SPS**: symmetrical subdivision, 250t crane capacity

Minimum GM limiting curve



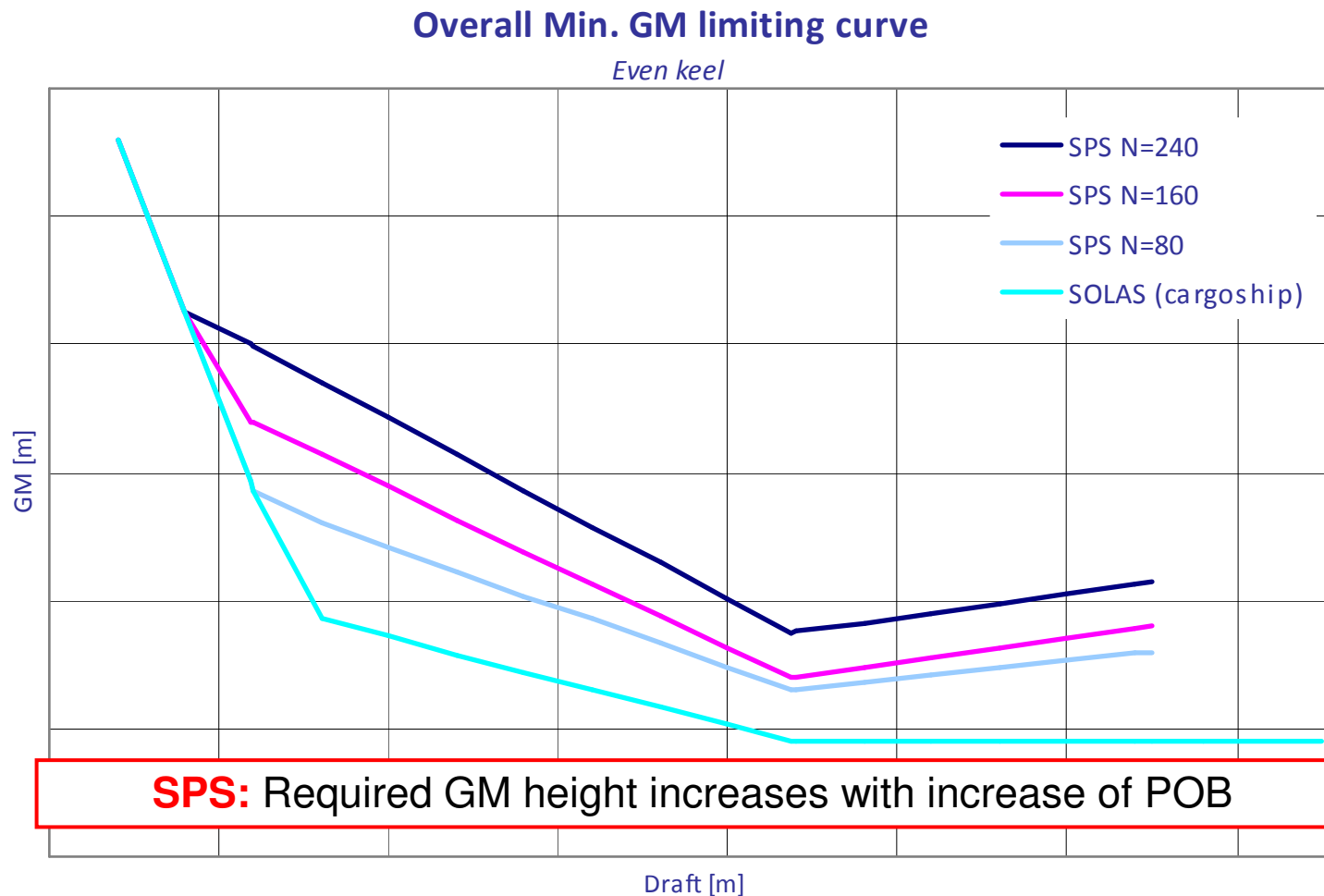
Symmetrical subdivision: Payload / deckload capacity restored, anti-heeling capacity reduced by 50%

IHC Supporter® class - Modular offshore support vessel 2008 SPS Code compliancy

- 3 cases - 2008 SPS Code compliancy
 1. Payload vs. crane balance
 2. **Number of persons on board**
 3. Life saving appliances

IHC Supporter[®] class - Modular offshore support vessel

2) 2008 SPS Code compliancy - Number of persons on board

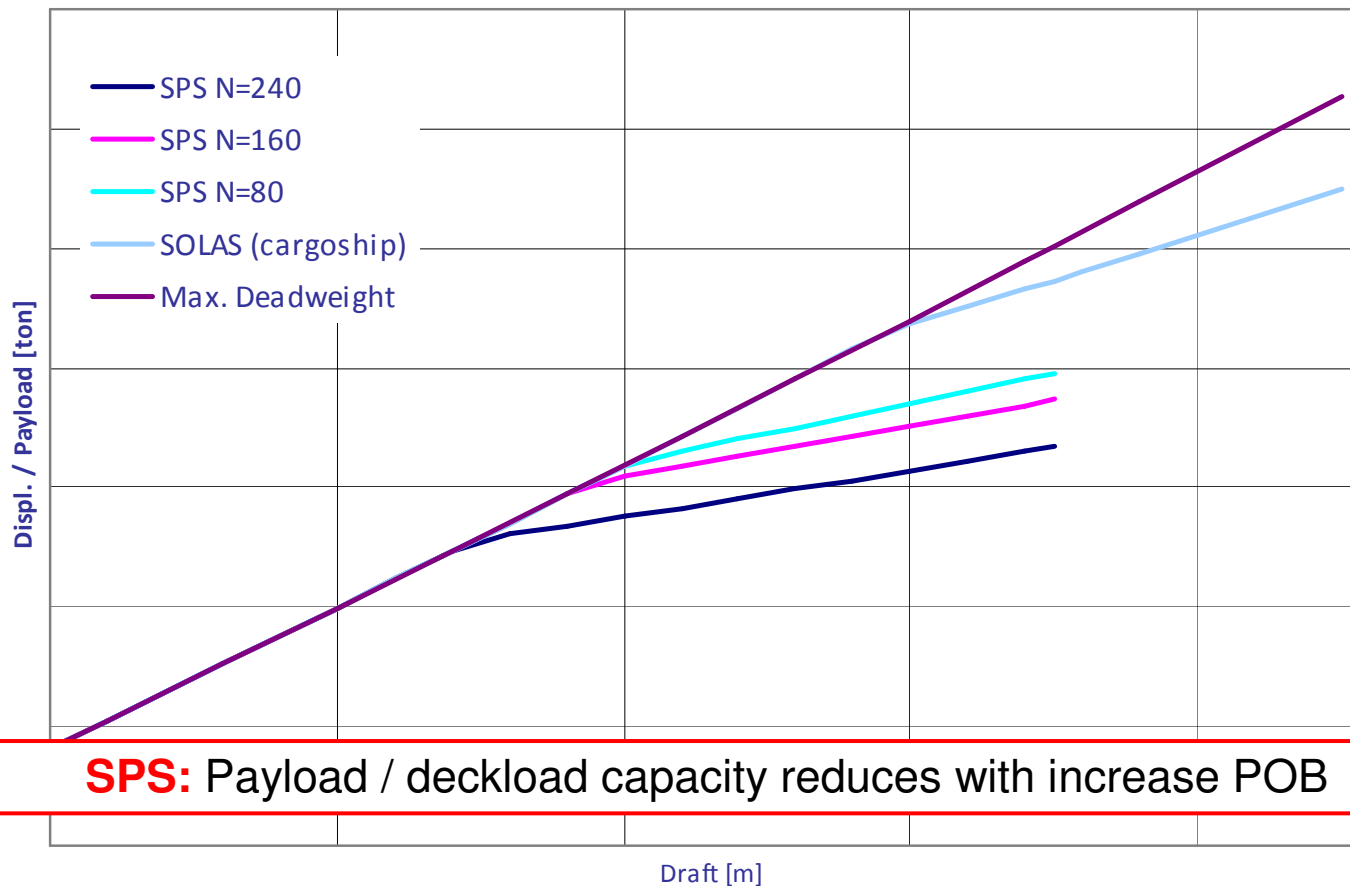


IHC Supporter® class - Modular offshore support vessel

2) 2008 SPS Code compliancy - Number of persons on board

Maximum allowable payload at 12m A.B.

100% Consumables



SPS: Payload / deckload capacity reduces with increase POB

IHC Supporter® class - Modular offshore support vessel 2008 SPS Code compliancy

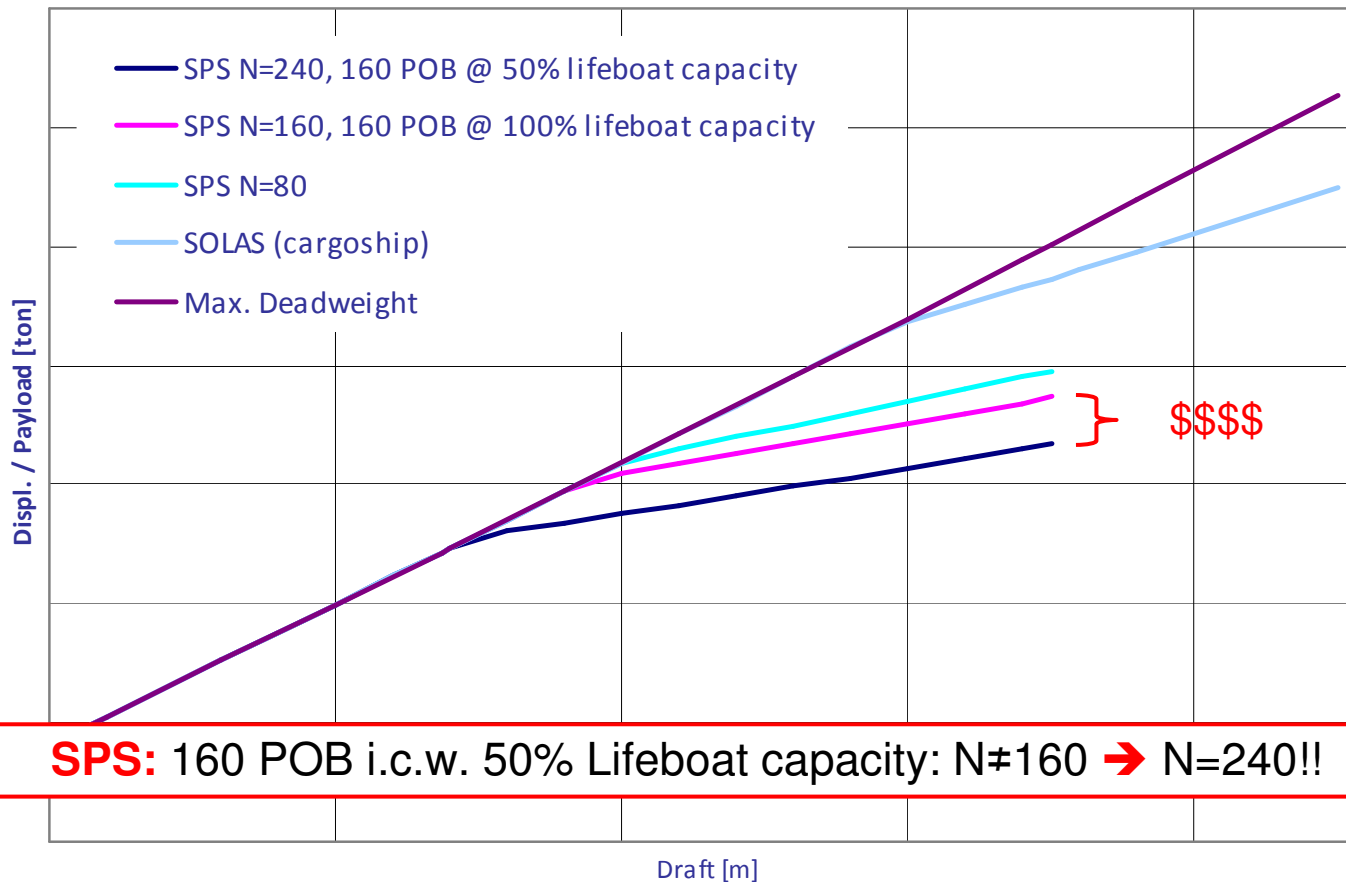
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 3. **Life saving appliances**

IHC Supporter® class - Modular offshore support vessel

3) 2008 SPS Code compliancy - Life saving appliances

Maximum allowable payload at 12m A.B.

100% Consumables



SPS: 160 POB i.c.w. 50% Lifeboat capacity: N=160 → N=240!!

IHC Supporter® class - Modular offshore support vessel **MLC 2006 vs. SPS Code**

- **MLC 2006**
 - 'Only single cabins for seafarers' (generic)
 - Flag state dependent ratifications being published
- **SPS compliant vessel**
 - **MLC 2006 allows more persons per cabin, when SPS**
 - Loss of payload capacity in relation to Cargo compliant vessel
 - Loss of anti-heeling capacity in relation to hoisting optimised vessel

New built SPS 2008 vessels highly penalized compared to "alternative coded" pre-SPS 2008 vessels

IHC Supporter[®] class - Modular offshore support vessel **MLC 2006 vs. SPS Code**

- IHC supporter[®] class**

	I	II
• MLC 2006	Yes	Yes
• 2008 SPS Code	No	Yes
• Deadweight	9200t	8000t
• Max. draft	6.75 m	6.25 m
• Payload @ 12m a.b.	5500 t	4000 t
• POB	47/12	80

Payload vs. Persons on board

IHC Supporter® class - Modular offshore support vessel Preparation for future regulations: Discussion

- Combining I and II will bring the advantages:
 - Which flag allows operational personnel on board:
 - Without SPS → Gives extra deadweight
 - Without them being passenger → Gives extra deadweight
 - Without them being seafarers → No single berth consequences

- SPS personnel in general highly skilled; with offshore SHE level
 - **Consideration:** Set a non-mariner 'safe to sail certificate' for SPS-exempts

- 2008 SPS and MLC 2006 are for safety and wellbeing of life at sea:
 - Why only living conditions on new vessels?
 - Why only safety conditions on new vessels?
 - Why penalizing new vessels?

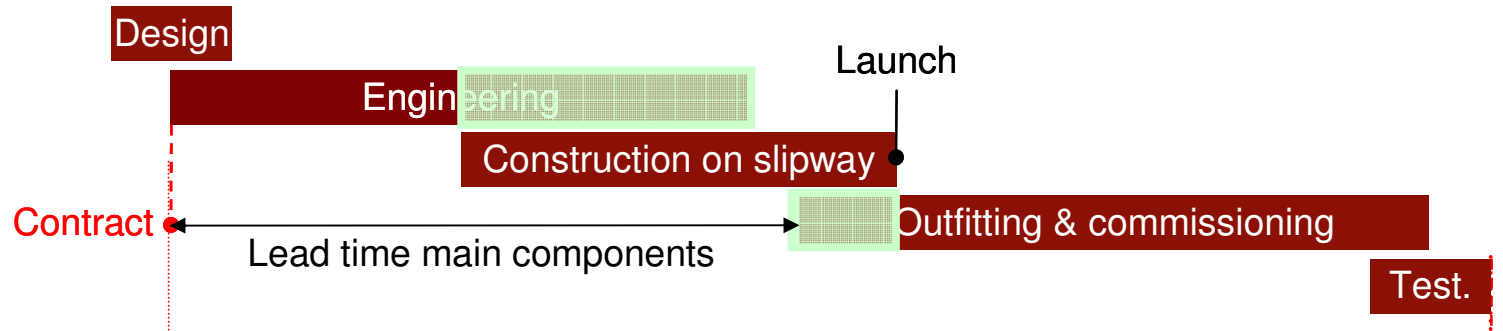
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4. Global production: Cost reduction through supply chain integration



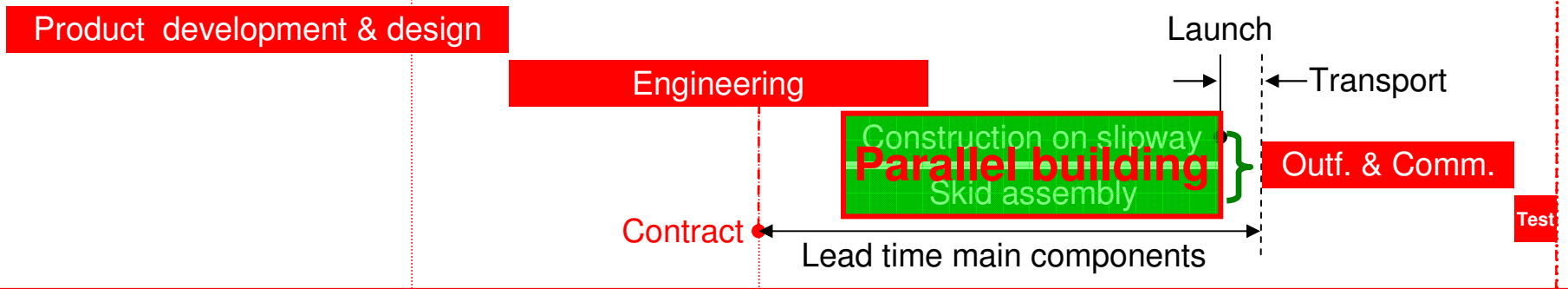
IHC Supporter® class - Modular offshore support vessel

Quayside outfitting

- Collaborative shipbuilding: **Design & production to order**



- Yard spec pre-sales design: **Design to stock & series production to order**



Only for first of series

Pre-sales yard spec design

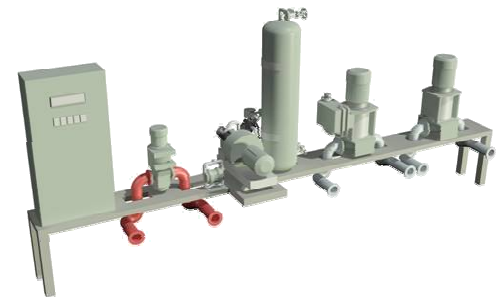
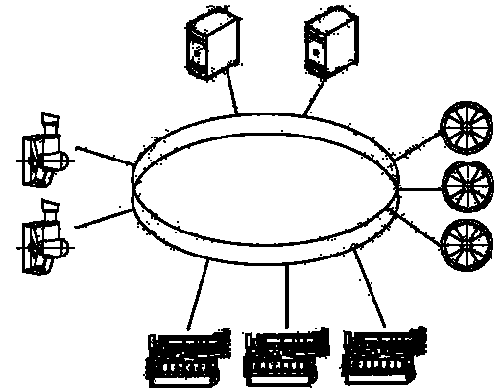
Design & production to order

Delivery

IHC Supporter® class - Modular offshore support vessel

Local hull & skid based machinery

- Low cost hull
- Skid based systems
 - Workshop assembly
- Factory testing
 - Interchangeable components
 - Demarcation
 - Global supply
- Framework contracts
- Work packages
- IHC fast assembly process



IHC Supporter[®] class - Modular offshore support vessel

Designed for assembly: IHC fast assembly process

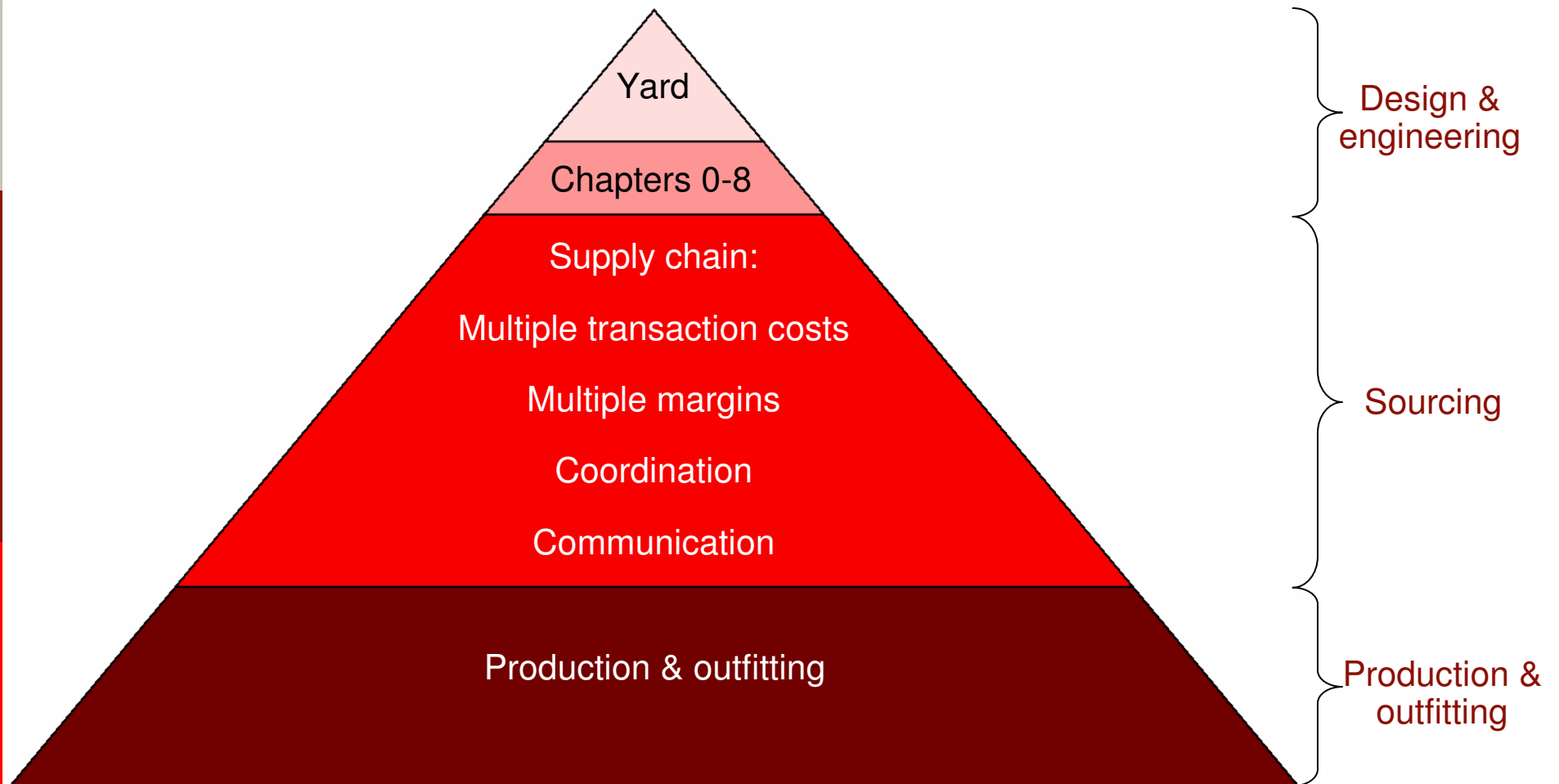
- Shorter delivery time: full pre-sales yard spec design
- Configurable design → configurable production process
- Clean outfit due to prepared hull design
 - In-hull logistics
 - “The hull is the hall”



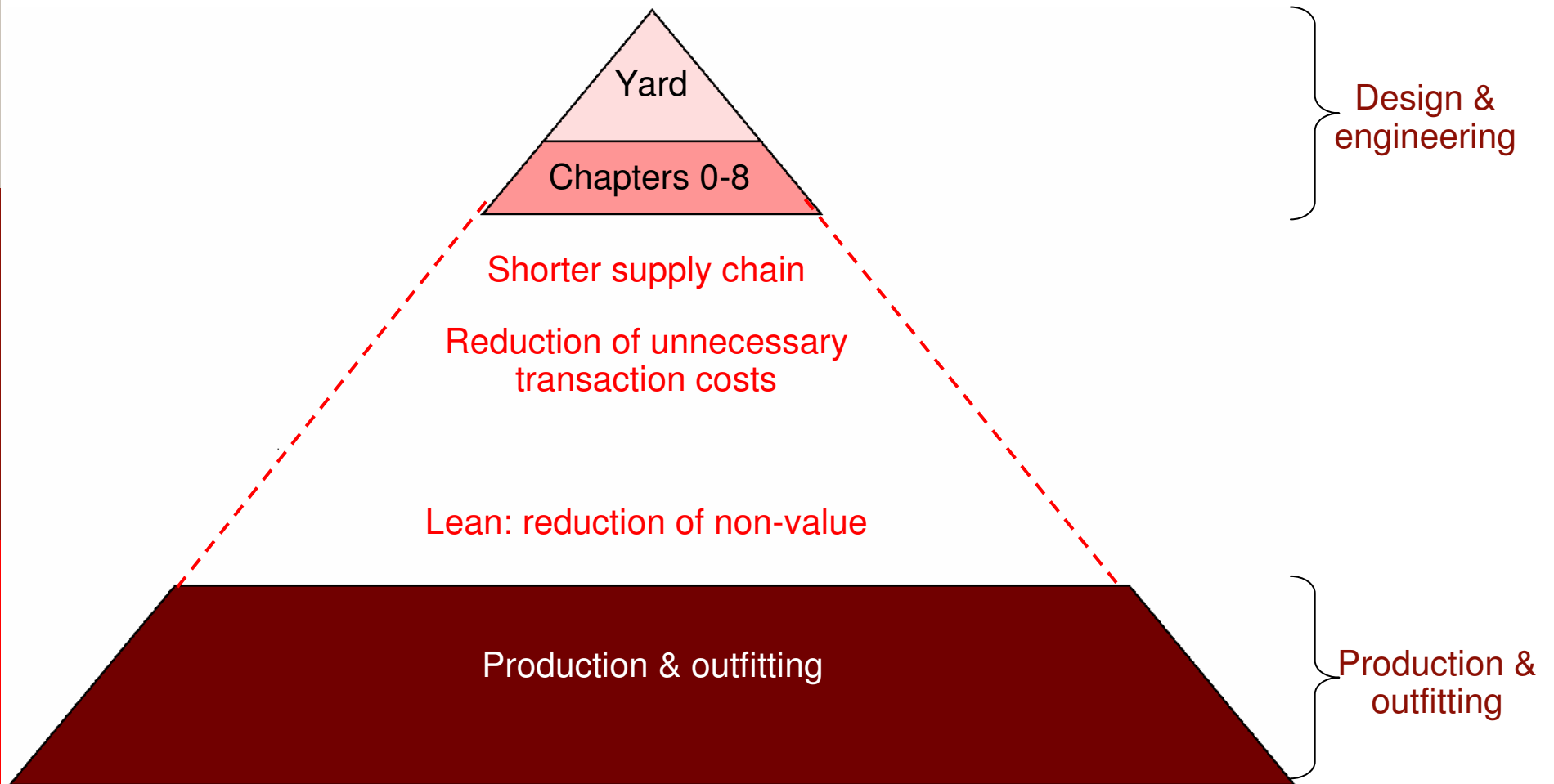
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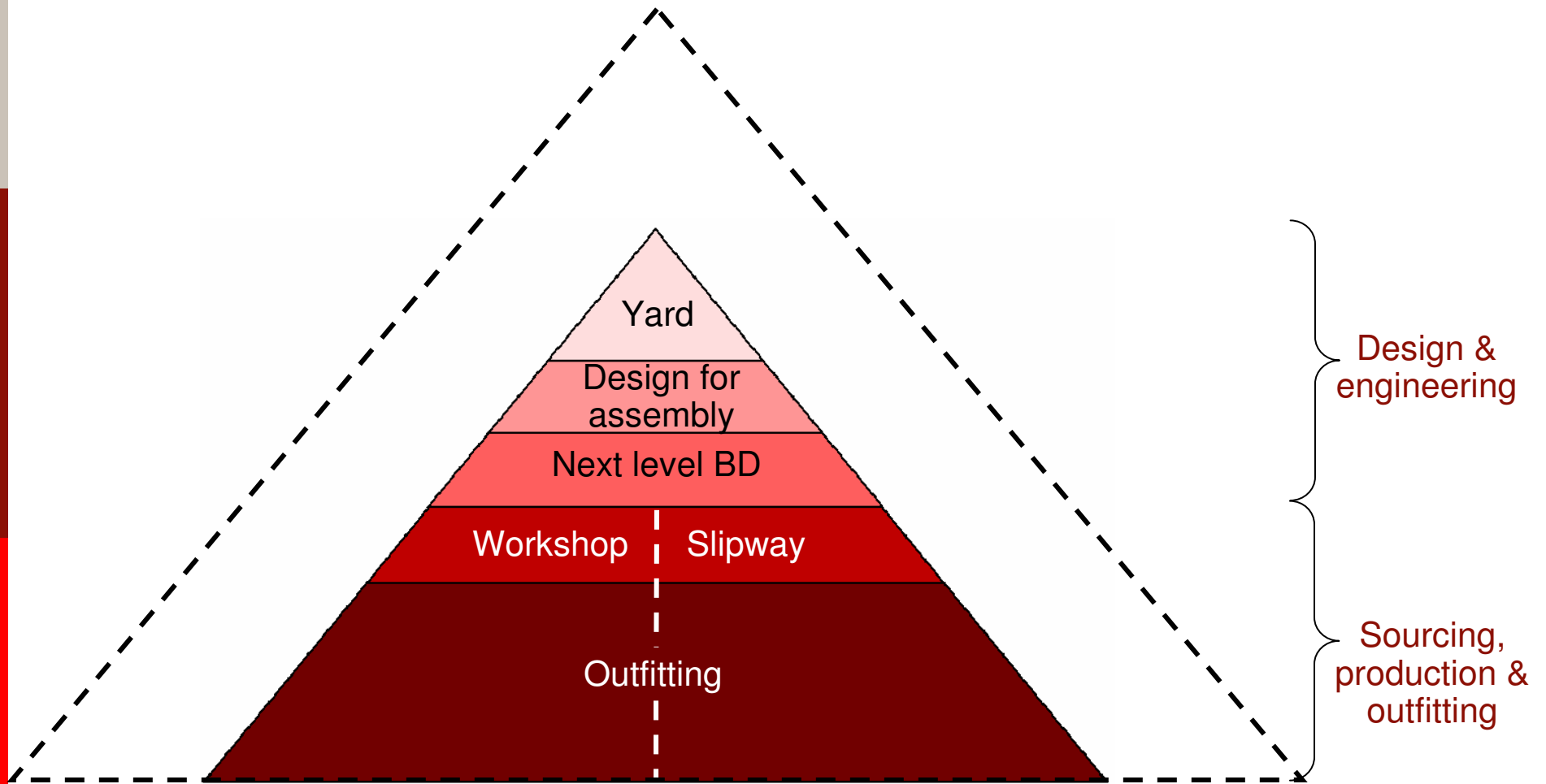
IHC Supporter® class - Modular offshore support vessel Supply chain integration



IHC Supporter® class - Modular offshore support vessel Supply chain integration



IHC Supporter® class - Modular offshore support vessel Supply chain integration



IHC Supporter® class - Modular offshore support vessel Designed for global production (SVC, Singapore, November 2012)

- **Modular design**
 - Pre-sales yard spec design

- **IHC Merwede fast assembly process**
 - Decoupled hull and subsystems
 - Supply chain integration

- **Universal production process**
 - High tech vessel systems & equipment

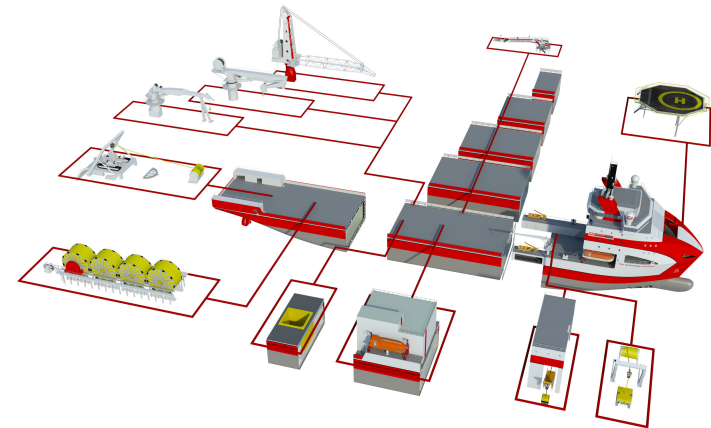
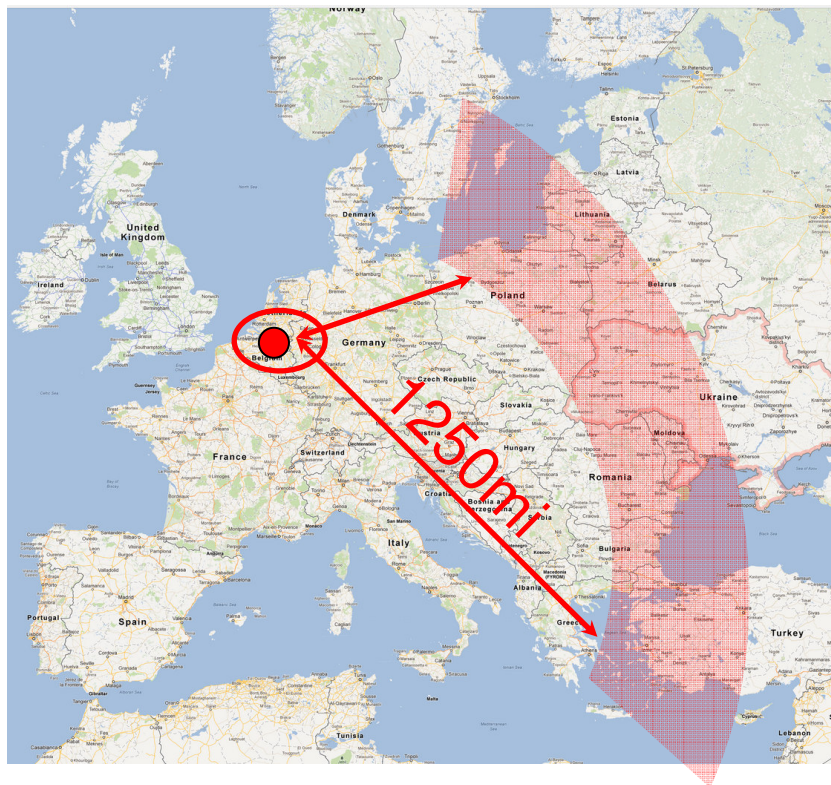
 - Medium tech skids

 - Low tech hull, fully pre-outfitted

 - Hi-tech integration, made simple and reliable

IHC Supporter® class - Modular offshore support vessel: Global production: Eastern Europe

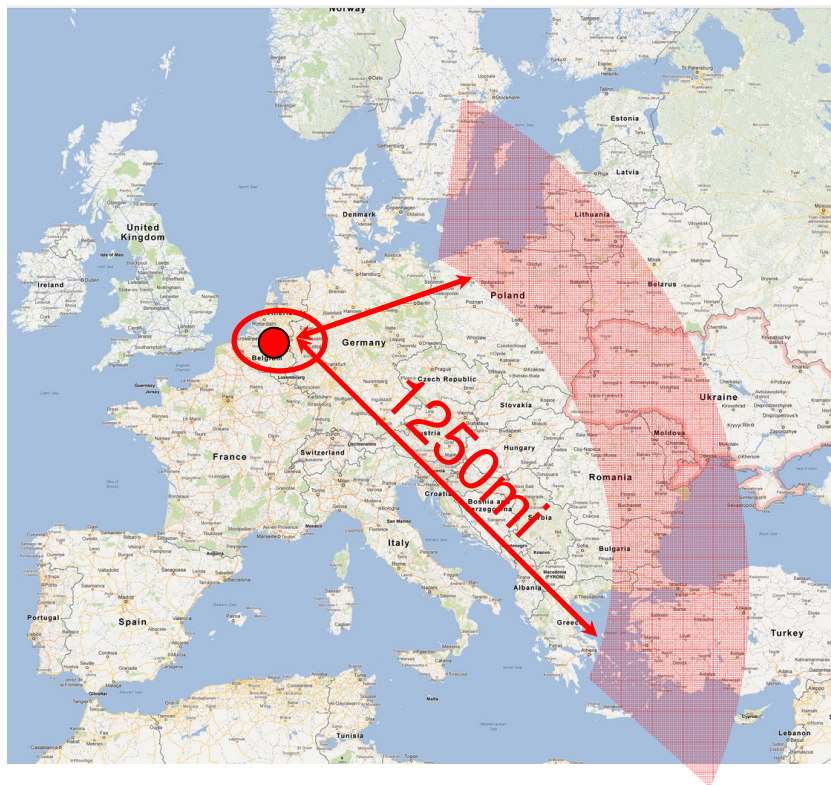
- Rotterdam & Eastern Europe



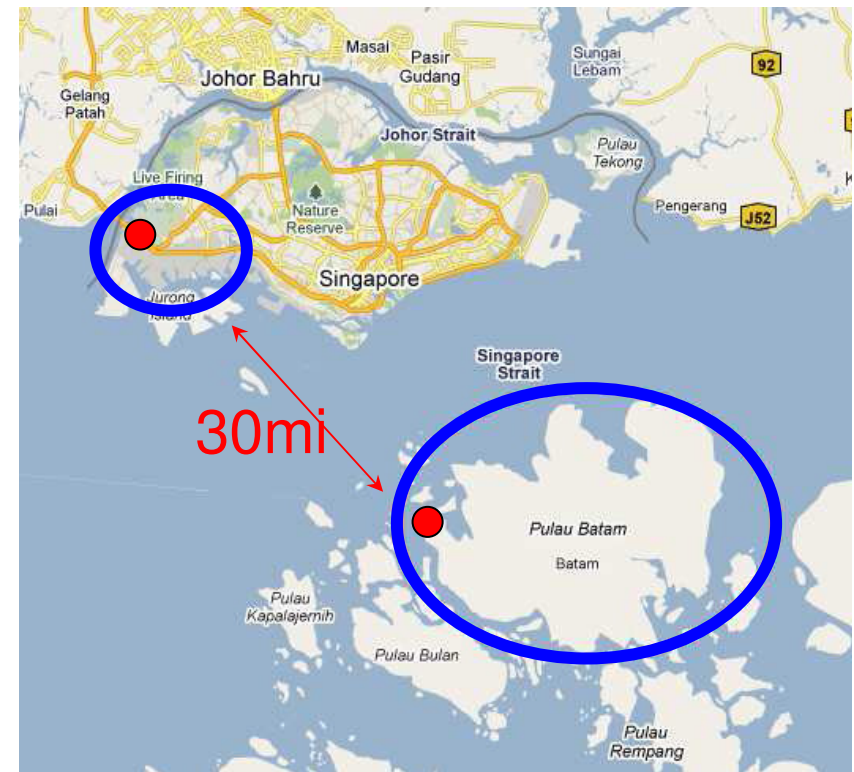
IHC Supporter® class - Modular offshore support vessel

Global production: Eastern Europe & Asia Pacific

- Rotterdam & Eastern Europe



- Singapore & Indonesia



IHC Supporter® class - Modular offshore support vessel

Global production: IHC Asia Pacific



- IHC Asia Pacific
 - Local supply chain
 - Project financing support
- IHC Offshore & Marine
 - Vessel design
 - Project management skills

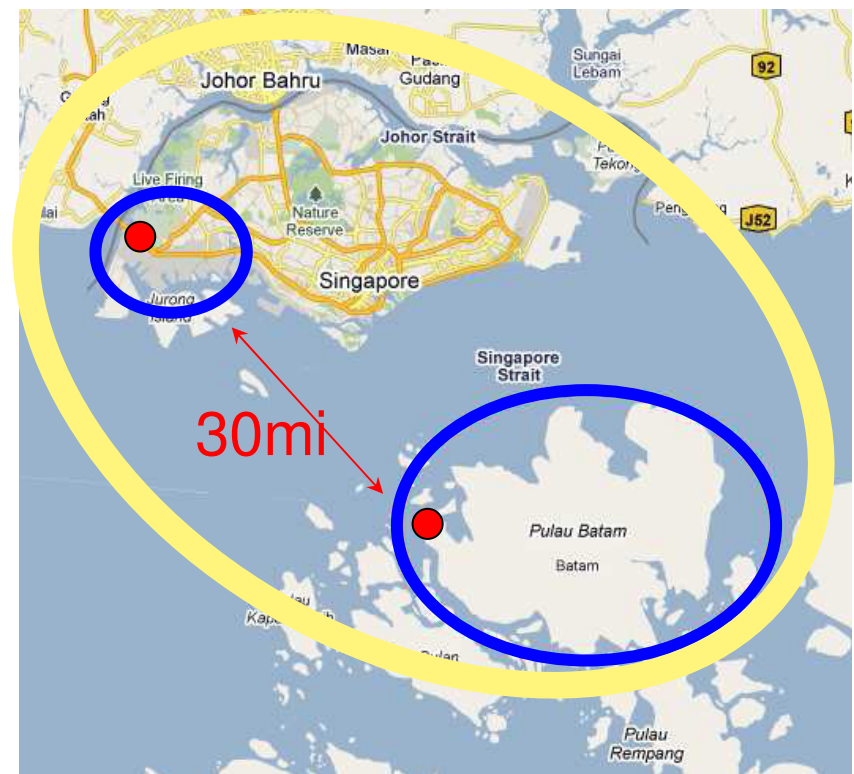


- Jaya Batam
 - Production capacity
 - Experienced personnel
- Jaya Singapore
 - Outfitting quay
 - Engineering workshops
 - Skilled management



- Singapore cluster & offshore quay





- Singapore & Indonesia



IHC Supporter® class - Modular offshore support vessel

Designed for global production (SVC, Singapore, November 2012)

- **Modular design**
 - Pre-sales yard spec design
- **IHC Merwede fast assembly process**
 - Decoupled hull and subsystems
 - Supply chain integration

- **Universal production process**
 - High tech vessel systems & equipment 
 - **Singapore cluster**
 - Medium tech skids 
 - **Greater Singapore area workshops**
 - Low tech hull, fully pre-outfitted 
 - **Jaya Batam, Indonesia**
 - Hi-tech integration, made simple and reliable 
 - **IHC Asia Pacific & Jaya Singapore**

IHC Supporter[®] class - Modular offshore support vessel

Conclusion

- **IHC supporter[®] class**
 - Cost reduction
 - Value engineering / Designed for assembly
 - Supply chain integration
 - Modular design
 - Client configurable
 - IHC fast assembly process
 - (near) Future ready
 - SPS compliant
 - MLC 2006 compliant
 - Flag state loop hole ready
 - Risk management
 - Internally: Combination of many new aspects
 - Externally: turnkey, higher residual value



IHC Supporter[®] class

Better for less



Reliable partner for efficient offshore solutions

- **Cost reduction**
 - Value engineering / Designed for assembly
 - Supply chain integration
- **Modular design**
 - Client configurable
 - IHC Merwede fast assembly process
- **(near) Future ready**
 - SPS compliant
 - MLC 2006 compliant
 - Flag state loop hole ready

Thank you for your attention

