Regulatory developments and impact on design and operation of offshore accommodation units

Mission
Assurance of Optimum Performance with Design, Innovation & Technology.

Vision
A Sea of Technology

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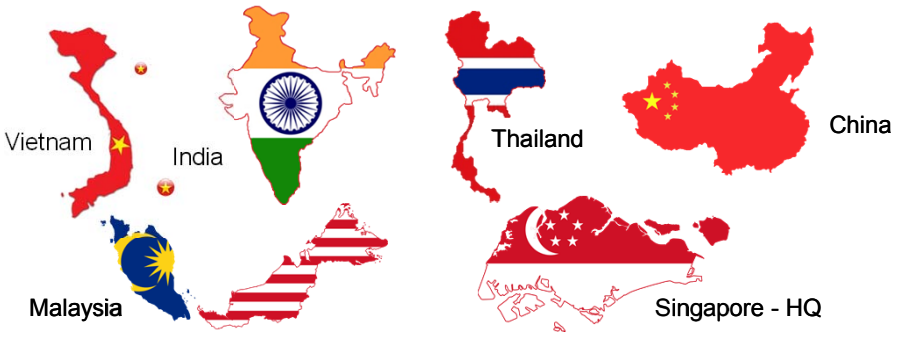
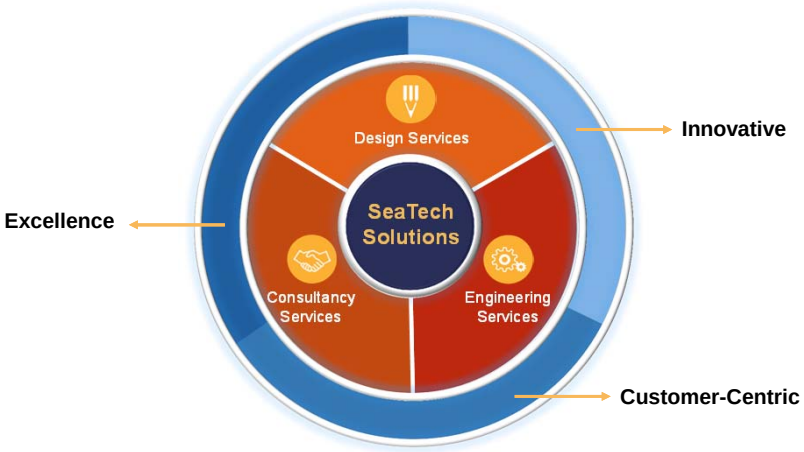
Footprint



more than	over	across
130	**13**	**6**
engineers	nationalities	countries

Overview of SeaTech



New Build & Conceptualisation

Design | Engineering | Consultancy

Number of Vessels Designed

99 Harbour Crafts | **67** Merchant Vessels | **79** Offshore Vessels | **8** Specialised Vessels | **19** Oil & Gas | **20** Conversions

23	306	378
Types of vessel designs	Unique designs	Vessels built

- Customised
- Purpose Built
- Interactive
- Easy to Build
- Easy to Maintain

Accommodation Units – Typical Requirements & Trends

- Living accommodation for offshore personnel (>150 pax)
- Provides accommodation for personnel that
  live on board but work offshore
- Comfortable, Recreation, entertainment and dining areas
- Efficient online communications systems
- Operate in deep waters with harsh environment settings
- Larger accommodation units preferred
- Moored next to platforms being serviced (8pt – 12pt mooring)
- May be DP-2/DP-3
- Crane
- Heli-deck

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Demand for Accommodation Units

- Douglas-Westwood: demand for offshore accommodation vessels will average about 42,000 personnel on board per year from 2015 - 2020
- Increase of 14% compared to previous six years
- Offshore projects going deeper and further away from shore.

Accommodation Barge | Self Propelled Accommodation Vessel | Accommodation workboat | Liftboat | Floatel

Demand for Accommodation Units

Accommodation unit fleets as of March 2016

Accommodation Units				
No. of Units	Fleet at 1/1/10	Fleet at 1/3/16	Order Book at 1/3/16	Delivery over next 6 mths
DP 2/3 Monohull or Barge Hulls	5	16	7	0
DP 2/3 Semis	7	21	14	3
Non-DP Semis	8	9	0	0
Jack-Ups (min 200 ft leg length)	8	20	6	0

For accommodation units over 240 berths

Source: Kennedy Marr Mar 2016 Report

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Important Regulations for Accommodation Units

- MODU
- SPS
- Safe Return to port
- MLC
- MARPOL
- Ballast Water Management
- Noise Code
- Comfort Class
- DP

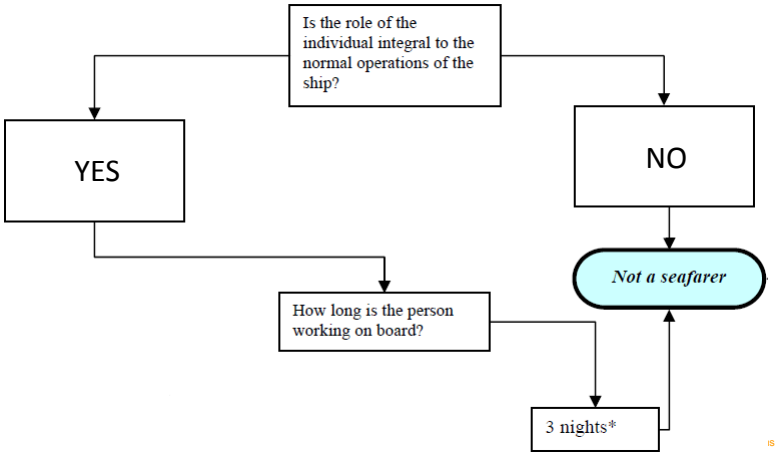
Application of Rules is Unclear

- MODU or SPS?
- Definition of persons onboard
- MLC 2006

Definition of Persons Onboard

Crew	Special Personnel	Industrial Personnel	Seafarer
• All persons who are employed or are engaged or work in any capacity on board a ship	• All persons who are not passengers or crew • To do special work carried out on board ship	• All persons who are not passengers or crew • To work offshore on platforms etc.	• Any person who is employed or engaged in works in any capacity on board a ship
• Persons who provide navigation or maintenance of the ship, machinery systems, or provide catering services etc.	• Scientists, Trainees, Fishermen, Salvage, Pipe-laying, Cable-laying, Seismic, Diving, Crane operators	Able bodied and medically fit. With basic safety training With knowledge of ship layout and handling of safety equipment onboard.	**Except** Harbor Pilots Port workers Port personnel Guest Entertainers Surveyors Ship inspectors Superintendents Scientists Researchers Divers Repair technicians Specialist offshore technicians

Seafarers - UK Guidance



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Grey Area

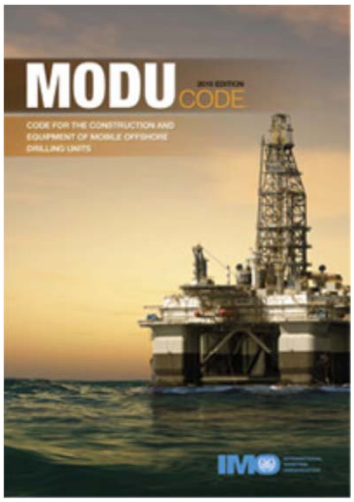
- How do we classify those personnel who **do not work onboard** the ship but are required to work on offshore platforms and use the barge only for accommodation purposes?

Passenger Vessel
- a merchant ship whose primary function is to carry passengers
- More than 12 passengers

Accommodation Unit
- A vessel providing accommodation for those working on other vessels and installations

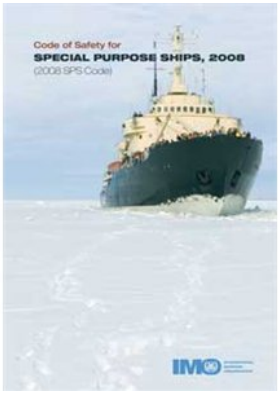
MODU Code

- For mobile offshore drilling units
- Adopted in 1979
- Revised in 2009



SPS Code

- For special purpose ships
- Adopted in 1983
- Revised in 2008
- Carrying more than 240 persons, vessel is treated as a passenger ship



MODU Or SPS?

Item	MODU	SPS
Intact Stability	More relevant as weather criteria is taken into account for operations	Uses general requirements for all ships
Weather Criteria	It is part of intact stability	No requirement
Damage Stability	Deterministic	•There is more subdivision •More bulkheads are required
Fire Protection	-	More stringent
Life Saving Appliances	More stringent	-
Safe Return to Port	Not applicable	Applicable
MLC 2006	Not applicable	Applicable

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Safe Return to Port

Addresses three scenarios:

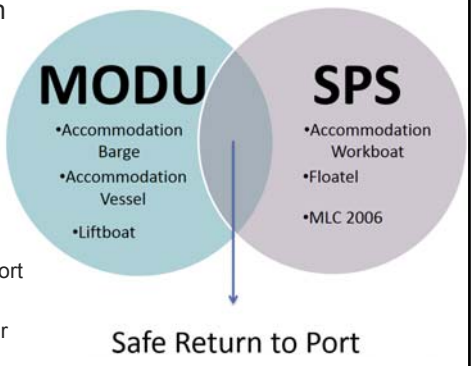
- Flooding of any single watertight compartment
- Fire not exceeding a defined casualty threshold
- Fire exceeding a defined casualty threshold, but not exceeding one main vertical fire zone

Purpose: a passenger ship system's capabilities after a fire or flooding casualty

Helps to address issues to provide solutions and tools to avoid the problem of the ship "stuck" in the middle of the sea

Safe Return to Port

- Applicable to vessels having a length of >120m carrying more than 240 persons
- Only applicable for SPS Code
- When an accident takes place
  - Ship's crew should be able to return to port without requiring personnel to evacuate.
  - Able to support a ship's safe return under its own propulsion after a fire casualty



Safe Return to Port

- Safe area any area(s) which is not flooded or which is outside the main vertical zone(s) in which a fire has occurred (SOLAS II-2 Reg. 3.51)
- Safe areas can be separate spaces and are defined for all casualty scenarios
- Documentation on the arrangement of safe areas has to be provided.
- Alternate space for medical care
- Access to life-saving appliances

Safe Return to Port

- The safe area(s) shall provide all occupants with the following basic services:
- 1 sanitation
- 2 water
- 3 food
- 4 alternate space for medical care
- 5 shelter from the weather
- 6 means of preventing heat stress and hypothermia
- 7 light
- 8 Ventilation

Maritime Labor Convention 2006

Code	**MODU**	**SPS**
	Not applicable	Applicable for seafarers only

Only Applicable for SPS

Maritime Labour Convention 2006

- For seafarers
  - Applies to all ships above 500 GT
  - Does not apply to MODU
  - Rules for Accommodation
  - Exemption for persons that are not seafarers

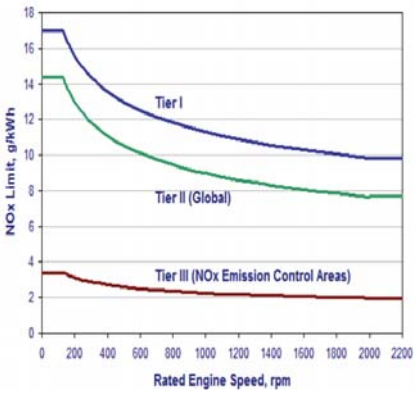
Maritime Labour Convention 2006

Seafarers performing duties of ship officers	Floor Area
Junior Officer	≥ 7.5
Senior Officer	≥ 8.5
Cabin	Floor Area
Two	≥ 7.5
Three	≥ 11.5
Four	≥ 14.5

On special purpose ships:
•sleeping rooms: may accommodate more than four persons;
•the floor area ≥ 3.6 square meters per person

MARPOL Annex VI NOx Emission Limits

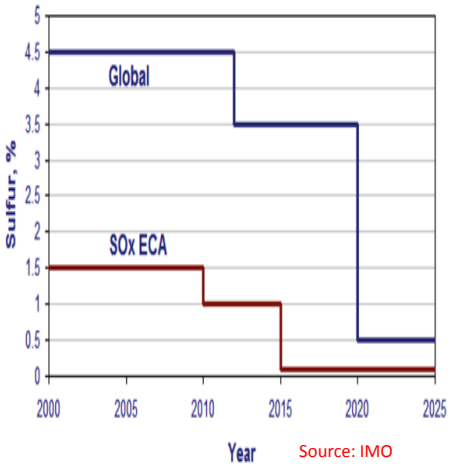
Tier	Date	NOx Limit, g/kWh		
		n < 130	130 ≤ n <2000	n ≥ 2000
Tier I	2000	17.0	45	9.8
Tier II	2011	14.4	44	7.7
Tier III	2016 †	3.4	9	1.96
† In NOx Emission Control Areas (Tier II standards apply outside ECAs)				



Source: IMO

MARPOL Annex VI Fuel Sox (Reg. 14)

Outside an ECA established to limit SOx and particulate matter emissions	Inside an ECA established to limit SOx and particulate matter emissions
4.50% m/m prior to 1 January 2012	1.50% m/m prior to 1 July 2010
3.50% m/m on and after 1 January 2012	1.00% m/m on and after 1 July 2010
0.50% m/m on and after 1 January 2020	0.10% m/m on and after 1 January 2015



Source: IMO

Ballast Water Convention

- All ships to
  - Implement a ballast water management plan
  - Carry a ballast water record book
  - Carry out ballast water management procedures to a given standard
  - Not yet in force. 49 countries but only 34.81% as per 8th March 2016

Should this apply to barges / accommodation units?

IMO Noise code

- Applies to new ships of a GT ≥ 1600
- Applies to ships in port or sea with seafarers on board
- Exclusions include
  - High Speed Crafts
  - MODU's
  - Non-propelled vessels (By mechanical means)
  - Others

IMO Noise code

	IMO		ABS			DNV		
	160up up to 10000 GT	***≥ 10000GT***	***HA B***	***HA B+***	***HA B++***	***Crn 1***	***Crn 2***	***Crn 3***
Work Spaces	85	85	85	80	80	85	85	85
Cabins	60	55	60	55	50	49	52	55
Open Deck	75	75	75	70	70	65	65	70
Public Spaces	Nil	Nil	Nil	Nil	Nil	55	58	62

Comfort Class

DESCRIPTION OF COMFORT NOTATIONS

Classification Society	Class Notation	Requirements and applicability
ABS	COMF(+) HAB(+)	Based on BS6841 (1987) separate limits for ship motions and mechanical vibrations; COMF for passengers, HAB for crew.
BV	COMF-VIB(n)	Notation grade n ranges from 1 - best comfort to 3 - acceptable comfort (Bureau Veritas 2000).
DNV	COMF-V(n)	Notation grade n ranges from 1 - best comfort to 3 - acceptable comfort (Det Norske Veritas 1995).
GL	GL-HC (n/m)	Harmony Class for cruise ships (ship speed < 25knots, length > 120m); notation grade n ranges from 1 – extraordinary comfort to 5 - acceptable comfort, n – for passengers, m – for crew (Germanischer Lloyd 2002).
LR	PAC , CAC, PCAC (n)	Passenger and/or Crew Accommodation Comfort, n-acceptance numeral; applicable for passenger ships, high speed crafts and yachts (Lloyds Register 1999).
RINA	HNVC (n)	Applicable for HSC; notation level n ranges from 30 - acceptable comfort to 100 - excellent comfort; complies with the ISO and IMO standards.

Source: Proceedings of the 15th Intl. Ship and Offshore Structures Congress Vol. 1, 2003

Novel Design Concepts

Novel design concepts

- Enhanced Comfort Standards
- Semi DP
- Cost Effective
- Barrier Management

Comfort Standards

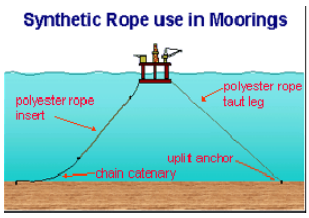
Artistic impression of interior

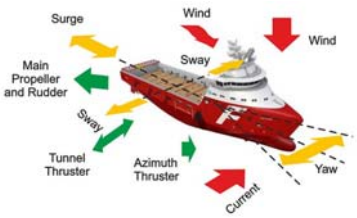
Lift

- Improves comfort as personnel are not required to take the stairs
- Aids in Stretcher evacuation

Mooring vs DP

- Depends on location and depth of operation
  - Anchors not feasible where there are subsea cables and pipes
  - For locations deeper, mooring not a viable option





Dynamic Positioning

Mooring vs DP

	Mooring	Dynamic Positioning
Water Depth	Less suitable in deep water	Not dependent on water depth
Seabed environment	Not feasible if there are subsea cables and pipes	Not limited by obstructed seabed
Systems	No complex systems	Requires a lot of sensors and various technical redundancies
Set Up	AHT are required to anchor the vessel. Time to anchor requires several hours to several days	Quick set up, no AHT required
Maneuverability	Limited maneuverability once anchored	Excellent maneuverability; can change position any time
CAPEX	Lower cost	High initial costs of installation
OPEX	Only need to change	High fuel costs
Running Off	No chance of running off position by system	Chance of running off position by system
Maintenance	Replacing of worn mooring ropes	Higher maintenance of the mechanical systems
Proximity	Not able to keep close proximity to platforms or other vessels	Able to keep close proximity with other platforms and vessels

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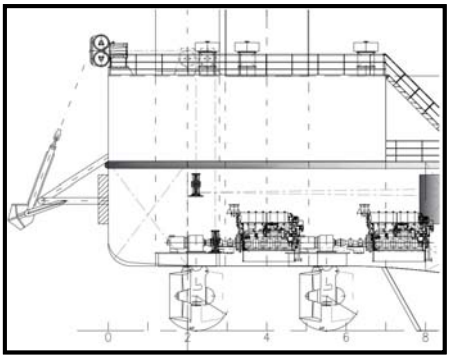
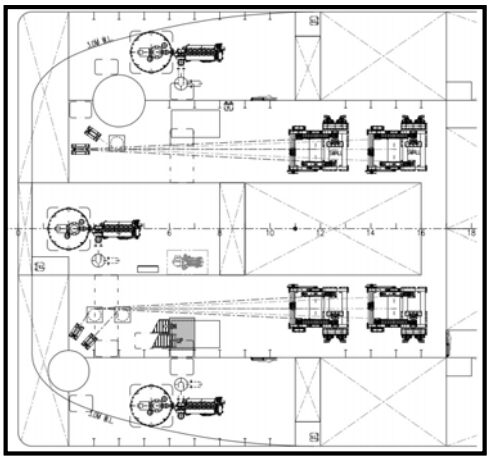
Semi-DP

- Vessel is spread moored
- Thrusters may be considered if
  - The moorings are inadequate and/or
  - They enable more uptime
  - There is a trade off of cost vs risk
- Thrusters used to improve the station keeping performance
- Thrusters assist flotels to move into location for moorings

Semi-DP





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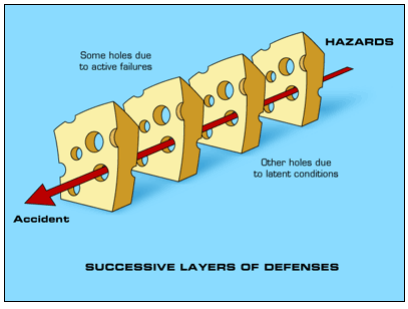
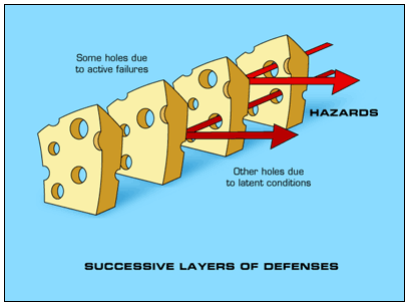
Barriers Management

- Swiss Cheese Model
- Risk of threat is mitigated by differing layers and types of defenses
- Control integrity of barriers at all times
- Continuously monitor and analyze barriers





Barriers Management

- Two types of barriers

Control Barriers – Preventive measures, reduce likelihood

- Alarms
- High pressure interlock
- Pressure relief valve

Recovery Barriers – Re-active measures, Mitigate consequences

- Gas detection alarm / operator response
- Emergency response

Reducing CAPEX and OPEX

- Direct diesel drives to reduce OPEX
  - Able to maintain DP3 system and still have reduced energy consumption
- Monitor unmanned spaces with CCTV
  - Reduce the number of manning required
  - Everything can be monitored from the control room

Conclusion

- Current regulations not specific to accommodation units
- Applicability of current regulations not clear
- Definition of persons on board to include industrial personnel
- Regulations have huge impact on design
- Designers must participate in relevant rule development

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Thank You