

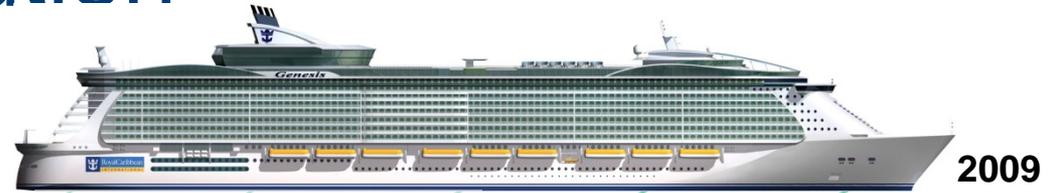
Operation of world largest cruise ship Oasis & Allure of the Seas



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Fleet Captain
Royal Caribbean Cruises Ltd.

NTSB Cruise Ship Safety Forum
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Cruise Ship Evolution



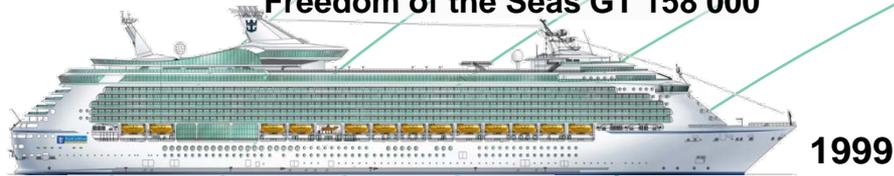
Oasis of the Seas GT 225 000

2009



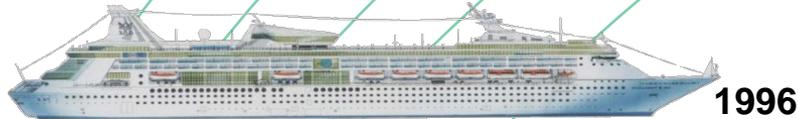
Freedom of the Seas GT 158 000

2006



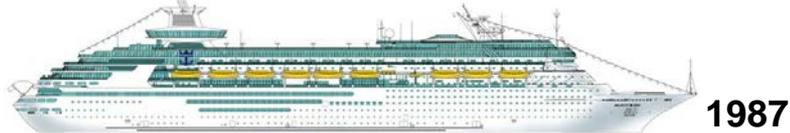
Voyager of the Seas GT 137 300

1999



Grandeur of the Seas GT 74 000

1996



Sovereign of the Seas GT 73 192

1987



Song of America GT 37 600

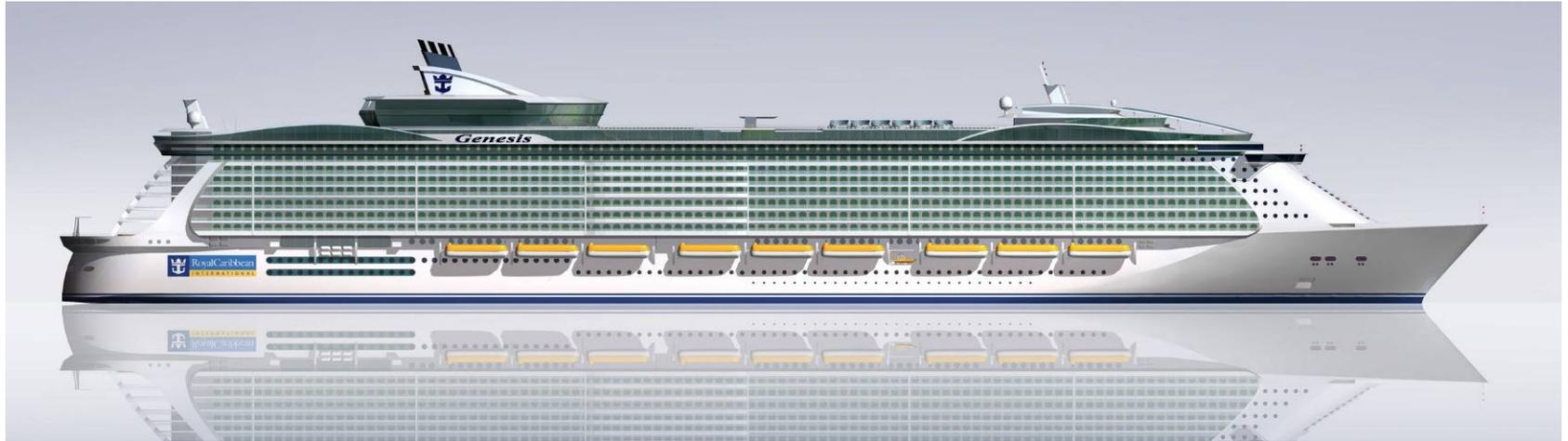
1982



Song of Norway GT 18 400

1970

Oasis of the Seas

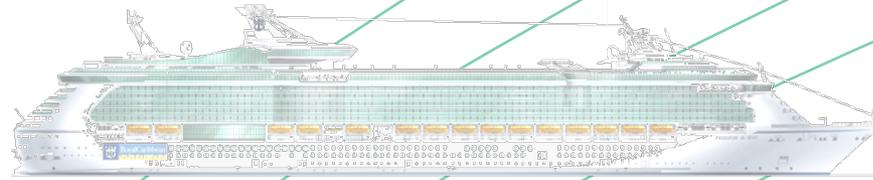
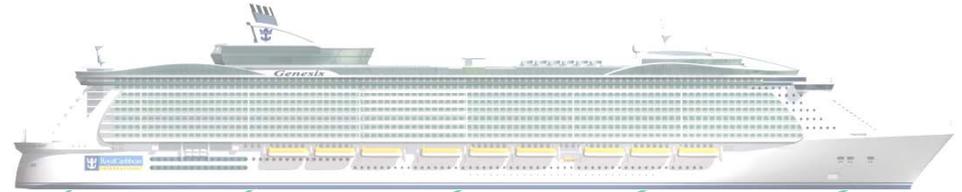


Gross Tonnage 225 000

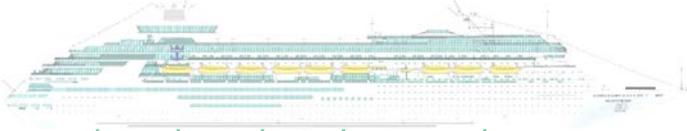
DNV ✕ 1A1, Passenger Ship LCS-DC, FUEL, ECO, RPS, F-M, DYNPOS-AUTR, COMF(V)1, CLEAN, BIS

Delivery: November 2009
November 2010

- Length 361 m
- Breadth 47 m
- Draught 9,15 m
- LSA Capacity 8460
- Passengers 5400



“ Oasis of the Seas demonstrates that larger cruise ships offer a better platform to achieve higher safety standards ”



Safety by Design – New Solutions

IMO Goal, "Ship is its best lifeboat"

In the event of casualty, persons can stay safely on board as the ship proceed to port.
 Improve ships survivability in the event of collision, grounding, fire or systems failure.

Safe Area Concept

Casualty threshold is the amount of damage a ship is able to withstand and still safely return to port.

Casualty threshold not exceeded

Safe return to port concept.

Essential systems to remain operational.

Casualty threshold exceeded

Time for evacuation and abandonment

Fire Protection

Alternative Design

- apply Ch. II-2 Reg.17
- length and area can be increased

Genesis

- Hull beam = 47 m
- Zone length ≈ 41 m

Damage Stability

IMO probabilistic rule

- required index R
- $R = f(\text{Length, Pax})$

Genesis

- $R = 0,88$
- $A = 0,91$

Safe Return to Port

DNV RPS notation

- machinery in two compartments
- three propulsion units, all steerable

Essential safety systems

Comfort systems

Essential Systems

Essential safety systems

Failure resistant design

LSA

Large lifeboats

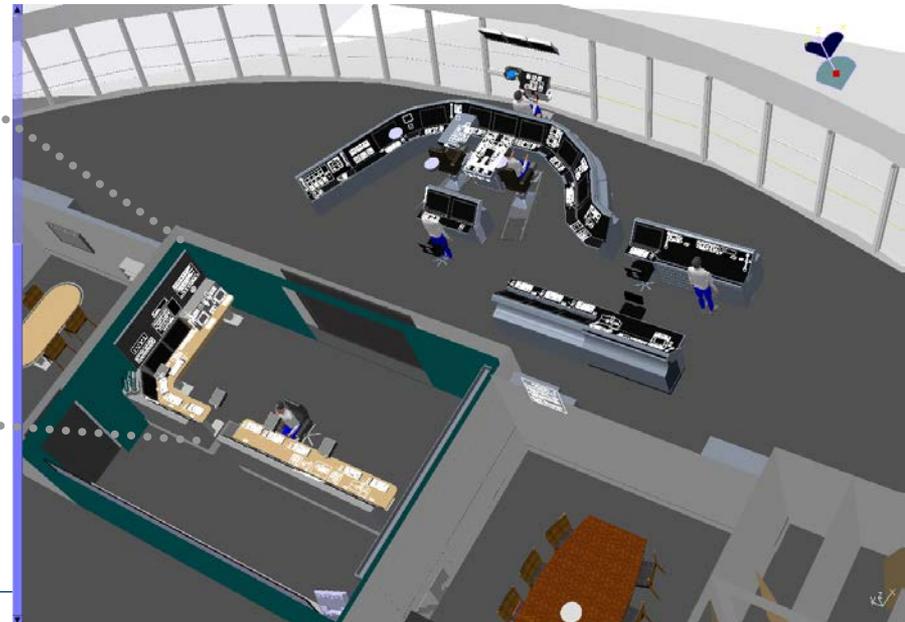
- 370 persons
- boarding in stowed position

Large MES

- 450 persons
- boarding through chutes

Bridge Operations & Safety Center

- Integrated and redundant navigation system with a cockpit layout
- Safety Center adjacent to the bridge
- Safety management / decision support system
- Improved ability to manage safety and security incidents while keeping navigation focus.



Maneuvering Capabilities

All RCL ships since 1999 have exceptional maneuverability due to pod propulsion and bow thruster power.

First ship with three steerable pods and four bow thrusters.

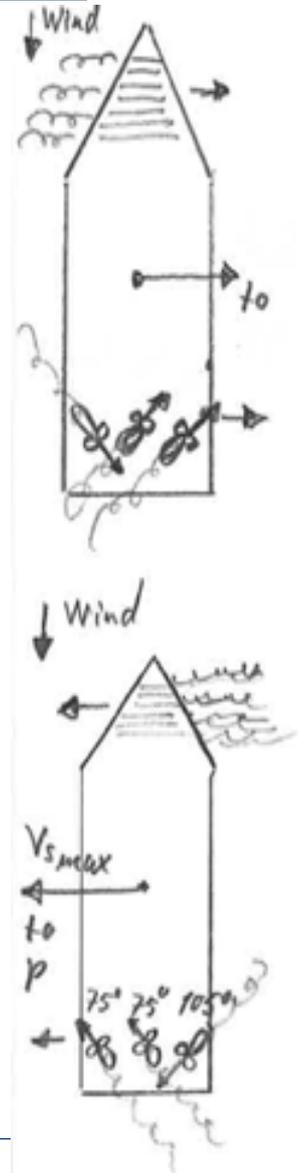
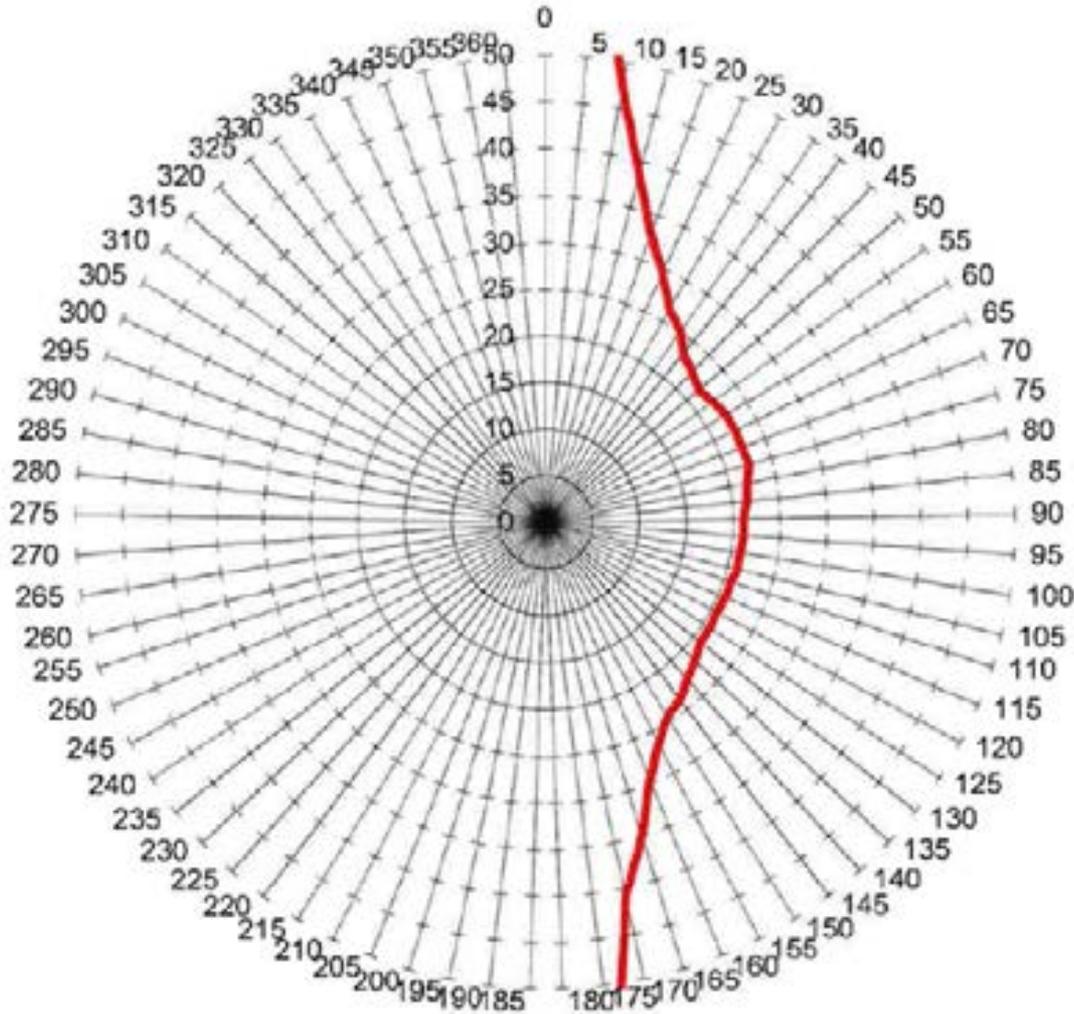
Comprehensive studies validated superior maneuvering capability.
Integrated navigation and Dynamic Positioning System



” Exceptional maneuverability through technology and design
can be achieved on large ships ”

Exceptional crabbing ability: 22 m/s

M/S Oasis of the Seas: 4*5.5 MW



Navigation: Port Transits

Benefits

Exceptional maneuverability through technology and design.

Adequate power to keep ship with high precision up to 40 Knots side winds.

Very good course stability and steering capacity at all speeds.

Lower crabbing angle than previous classes.

Minimum use of RPM due to Azipod technology

No need to use tug boats

Considerations:

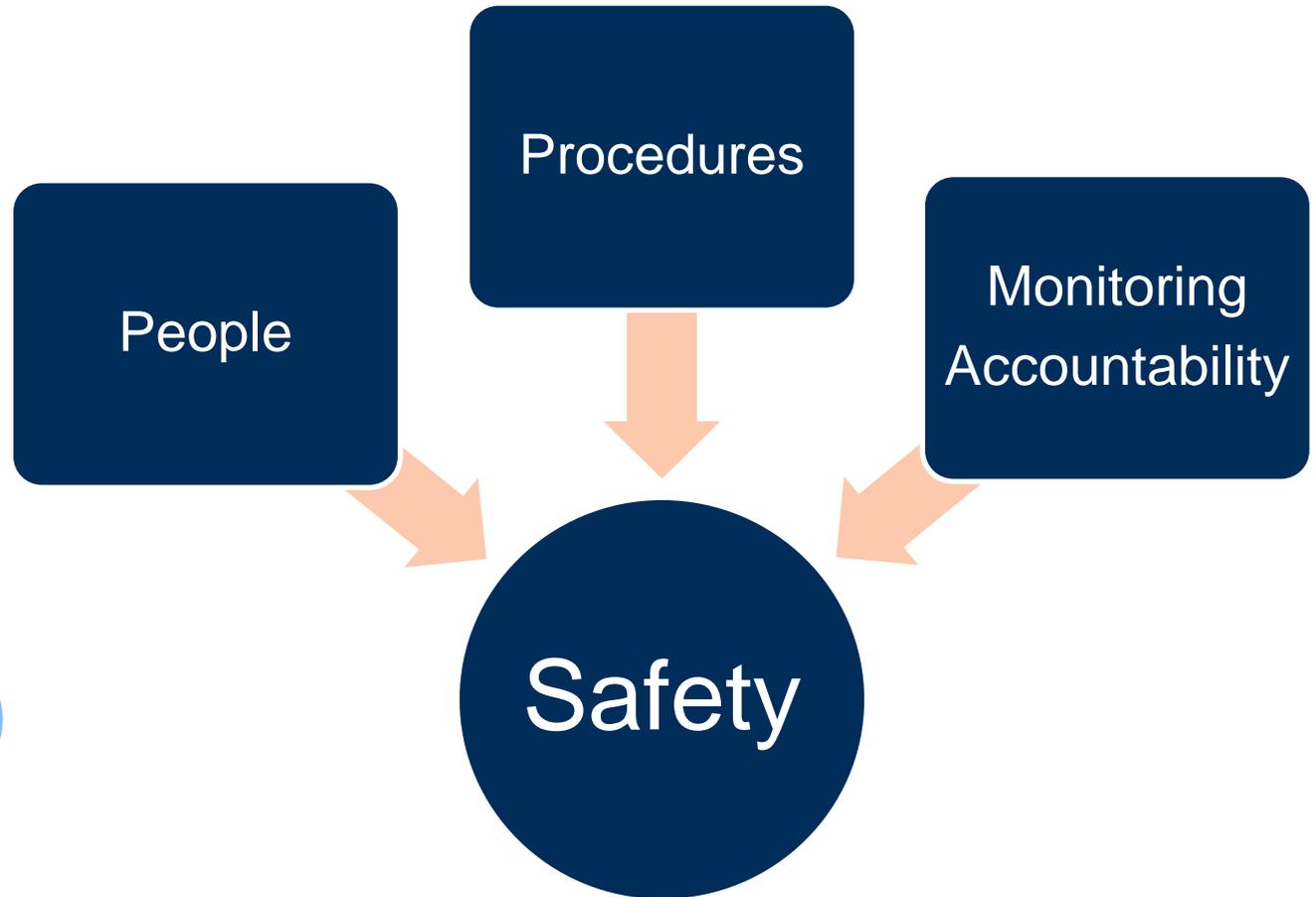
Smaller margins require more precise ship placement.

High focus on changing environment and drift angle.

Quick response needed to keep proper ship placement using all means available.

Bridge team and Pilot interaction is critical.

Safety Culture Fanatical Focus



Summary: Safe Operations

- Ship evolution reflects continuous improvement and superior safety due to use of modern design tools and technology
 - "Safety by Design" led to Oasis exceeding requirements on:
 - Fire Protection,
 - Stability,
 - Survivability,
 - Maneuverability,
 - Machinery Systems availability,
 - Evacuation and Life Saving.
 - A combination of adequate Human Resources, best procedures and proper monitoring and accountability creates right safety culture required to maintain desired safety standards.
- “ Project Oasis demonstrates that larger cruise ships offer a better platform to achieve higher safety standards ”



Thank You