Equivalence Analysis for Fire Zones

One of the biggest cruise vessels: The Ocean of the Seas

- Analysis verifying the equivalence of alternative designs with designs based on prescriptive/deterministic rules, e.g.
  - Oversize of main vertical zones
  - Large fire protection closures
  - Usage of innovative materials

- Applicable SOLAS Regulations
  - SOLAS Ch. I Reg. 5 (in general)
  - SOLAS Ch. II-2 Reg. 17 (fire safety)

- Widens the design and solution space, e.g.
  - Large spaces
  - Wide open rooms

- Shipowner benefits from more attractive, competitive designs

- Yards benefit from more efficient production by use of alternative design or materials
Benefit Case - Equivalence Analysis for Fire Zones

SITUATION AND CRITICAL ISSUE

Fire protection

Increase capacity of cruise ship design by extending the length of one Main Vertical Zone. The maximum length of the considered Zone exceeded 48 m. Thus, an equivalence analysis according to SOLAS II-2/17 and MSC/Circ. 1002 was required.

DNV GL SOLUTION

- Performance of risk analysis according to MSC/Circ.1002
- Failure Mode and Effects Analysis (FMEA) was carried out
- Event Tree Modelling was required
- Fire Simulations are used to quantify the risk
- Evacuation Analysis is performed to determine the evacuation time required

VALUE DELIVERED

- Proof of equivalent level of fire safety for alternative design
- Taking additional risk mitigation measures into account, the alternative design had better fire safety than the reference design
- Elaboration of risk mitigating measures
- Customer followed DNV GL’s (FutureShip’s) recommendations and achieved class, flag state and USCG approval

For more information please contact: Daniel.Povel@dnvgl.com
Equivalence Analysis for Life Saving Appliances

- Analysis verifying the equivalence of alternative designs with designs based on prescriptive/deterministic rules, e.g.,
  - Use of large life or tender boats (>150 Persons)
- Applicable SOLAS Regulations
  - SOLAS Ch. I Reg. 5 (in general)
  - SOLAS Ch. III Reg. 38 (Life Saving Appliance)
- Widens the design and solution space in terms of e.g.,
  - Innovative constructions
  - High capacity of persons
- Shipowner benefits from more attractive and competitive designs

Large tender boats on a cruise vessel
Benefit Case - Equivalence Analysis for LSA

SITUATION AND CRITICAL ISSUE
Increased the capacity of the life boats of a cruise ship

The capacity of life boats exceeded 150 persons, thus an equivalence analysis was required
The shipyard asked DNV GL to quantify the risk for the reference and the alternative life saving appliance design, performing an evacuation analysis

DNV GL SOLUTION

- Performance of engineering analysis according to MSC/Circ.1212
- Failure Mode and Effects Analysis (FMEA) was carried out
- Event Tree Modelling was required to quantify the risk
- Evacuation Analysis is performed to determine the evacuation time required

VALUE DELIVERED

- Proof of equivalent level of safety for alternative LSA design
- It was proved that the alternative design shows a better evacuation safety than the reference design
- Elaboration of risk mitigating measures for alternative design
- Customer followed DNV GL’s recommendations and achieved class approval

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