Risk-based Ship Design, Approval and Operation


SAFEDOR facts
Motivation and expected benefits
SAFEDOR Vision and roadmap
Challenges and expectations
Outlook

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SAFEDOR facts

SAFEDOR is an integrated project in the 6th framework programme of the European Commission (CEC).

- Project start: Feb. 2005, duration: 4 years
- Project volume: €20m, of which €12m funding by CEC
- Participants: 53 organisations representing all stakeholders of the maritime industry
- Coordinator: Germanischer Lloyd
What is risk-based ship design and approval?

A new methodology integrating probabilistic / risk-based approaches in the design process for ships and ship systems

Safety is one additional design objective along traditional objectives such as speed and cargo capacity

Risk is used as measure to evaluate effectiveness of design changes with respect to safety

Risk-based approval is the process of approving risk-based designed ships and their intended operation
Motivations to use risk-based approaches

Implement a new and safe solution which cannot be approved today

- example: alternative design and arrangements for fire safety

Optimise an existing solution which is in range of being approved today

- example: probabilistic damage stability

Both ideas need

- a new design approach that includes safety as objective
- a modern regulatory framework
Expected benefits

Owners and operators benefit from improved economics of novel solutions
- example: more cabins with balcony on a cruise ship with larger than prescribed lifeboats

Yards and equipment manufacturers benefit from sustained competitive position
- example: offer innovative layouts for cruise ship super structures
- example: offer new ship systems with increased safety performance
- example: reduce production costs with new fire insulation layout

With proof of safety compliance becoming more complex, patenting new solutions becomes more attractive.
The vision of SAFEDOR

ENHANCE SAFETY THROUGH INNOVATION TO STRENGTHEN THE COMPETITIVENESS OF THE EUROPEAN MARITIME INDUSTRY
The SAFEDOR-roadmap

Risk-based design (concept, methodology, framework, risk-cost models, design environment)

Safety-performance prediction tools

Concepts for safety-critical technologies

Innovative ship designs

FSA studies

Risk-based regulatory framework

Selection of the two best designs

Demo

Benchmarking

Final designs

Approval in principle

year 1

year 2

year 3

year 4

Training

Dissemination and exploitation

Methods and Tools

Regulatory Framework

Application

Supporting Actions

Demo

Safety through Innovation
Challenges and for risk-based design

Availability of advanced simulation software and experimental tools to predict ship and system performance at sea in extreme and accidental conditions

Determination of involved uncertainty through tool validation and benchmarking

Harmonisation of risk models to ensure consistent application

Parametric modelling of ships and integration of tools to fully exploit optimisation potentials
Challenges for risk-based approval

Formal establishment of risk-based regulatory framework at IMO linked to Goal-based Standards and the Safety-Level Approach

Uniform interpretation of modern regulations to ensure consistent application to increase ship safety

Agreed top-level risk acceptance criteria at IMO

Derivation of lower-level functional risk acceptance criteria through continuous submission of Formal Safety Assessment studies
Expected effects on ship operation

Operation must reflect any relevant assumptions used in the design and approval process

Special training needed for owners and crew to learn the risk-based approaches involved

Clear and concise documentation in an agreed format needed onboard the vessel to ensure that PSC does not lead to vessels being delayed or detained

Integration with other risk-based approaches in ship operation like ISM, risk-based inspection and reliability-centred maintenance
Outlook

Risk-based approaches for shipping industry are being implemented today

- most large passenger ships have some risk-based elements

- several new projects are in the pipeline with greater challenges

- high priority for European maritime industry documented in Vision 2020

SAFEDOR presents more results at an open workshop in Tokyo, 22+23 May 2007.
Thank you for your kind attention! Visit www.safedor.org.