



Dropped Object Protection System

DROPS Forum Aberdeen
27th February 2018

Background

- Rigmar was approached by a major drilling contractor with a requirement for a dropped object protection system
- Our remit was to:
 - Provide a solution to close off the moon-pool, protecting workers below and removing the risk of losing dropped items in to the sea
 - Additional Key Requirements
 - Must not hinder the movement of the trolley drill platform
 - be 'man-safe', allowing access for maintenance
 - provide protection against the elements in harsh environments
 - be certified by DNV
- The involvement of a company with experience of advanced shutter door technology was required and System 2000 proved to be the perfect partner



Animation

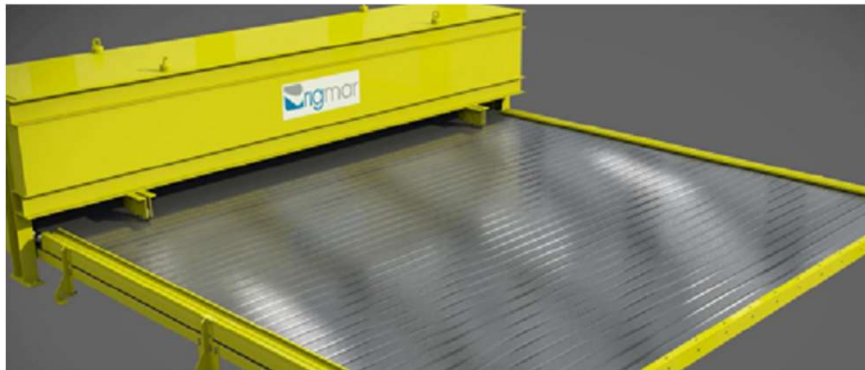
An animation of Rollsafe dropped object protection system can be viewed here:

<http://www.rollsafedeck.com/>



Key Features

Based on System 2000's unique design, the Rollsafe system laths were extruded from marine grade aluminium and anodised



Rollsafe Shutters are housed in cassettes, designed to be installed in a single lift



Key Features

The closing and opening mechanism is driven by Atex Zone 1-rated, IP55 electric motors, with manual override



Additional plating around the moon-pool is required to ensure 100% drops-free protection



Design and Development



The system is designed to withstand a 25kg object falling from 16 metres
 Test weight: Steel bar Ø75mm
 Image taken post impact testing

DNV verified design calculations and witnessed for seven physical trials

rigmar
 Rowan Norway - Dropped Object Test

Specification: Start: 8.0.0.000
 Range: 2000
 Weight: 25.0kg
 Load concentration: 25mm

Date: 22nd November 2012
 Location: Rigmar Administration, Dundee

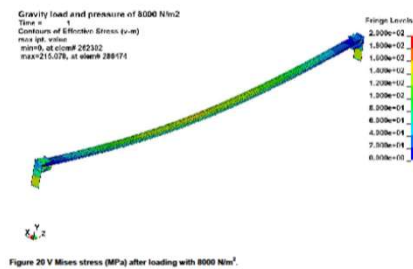
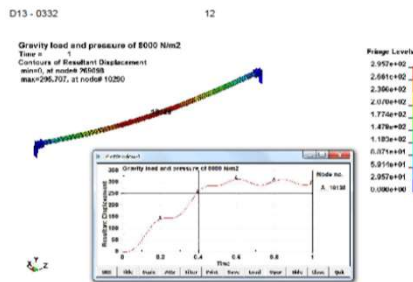
Carried out by: Steven Bunting
 Witnessed by: Ahmad Kuric
 Signed: [Signature] Company: Rigmar
 Signed: [Signature] Company: LSW

| Step | Weight | Height | Object | Location | Damage |
|------|--------|--------|----------------|--|---|
| 1 | 25kg | 16m | BCP Stud | Centre of 7th bath | 70 degrees of shear damage to top skin. Shutter still operates with no resistance to motion. No damage to axles. |
| 2 | 25kg | 16m | BCP Stud | Centre of 2nd Lath | 120 degrees of shear damage to top skin. Shutter still operates with no resistance to motion. No damage to axles. |
| 3 | 25kg | 16m | BCP Stud | 6th Lath, 500mm from datum guide | No shear damage to skin. Axles buckled. Shutter still operates with negligible effect to rolling resistance. |
| 4 | 25kg | 16m | BCP Stud | 2nd Lath, 100mm from datum guide | No shear damage to skin. Axles buckled locally. Shutter still operates with negligible effect to rolling resistance. |
| 5 | 25kg | 16m | BCP Stud | 6th Lath, 100mm from datum guide | No shear damage to skin. Axles buckled locally. Shutter still operates with negligible effect to rolling resistance. |
| 6 | 50kg | 20m | Circular Plate | 5th, 6th & 7th Lath, 4m from datum guide | No shear damage. Minor impression over diameter. Irregular surface damage to axles. Shutter still operates, some resistance. |
| 7 | 185kg | 20m | Pipe | 5th Lath, 2 metres from datum guide | 180mm impression left on both upper skin. No shear damage. Further uniform damage to axles and some localized to datum guide. Shutter still operates. |



Design and Development

An independent third party FEM study demonstrated that the structure can sustain a pressure of at least 8000 N/m² before collapse, Extracts below from FEM Study showing impact testing

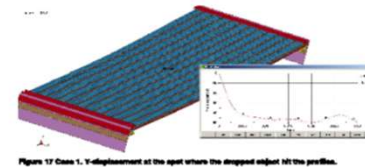
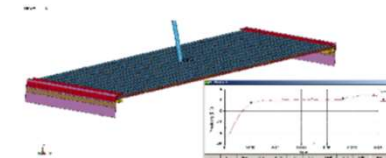


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6 Results

6.1 Case 1

Figure 16 shows the velocity of the dropped object during the simulation. Figure 17 shows that the maximum deflection is approximately 30 mm. The maximum plastic strain is 47%, see Figure 18. Figure 18 shows the effective stress. The highest value is around 350 MPa. Figure 20 shows the deformed profile after impact. Notice that the lower surface is not deformed.



Drop Testing

Physical Dropped tests can be viewed here:

<http://www.rollsafedeck.com/dnv-drop-tests/>



185 Kg Tube From 20 Metres after successfully testing to clients requirements



Manufacture

Cassettes during Final Assembly



Completed Rollsafe Cassettes being prepared for shipment



Pre - Installation

Pre-installation Survey

- Confirm availability of material handling facilities
- Potential obstructions
- Confirm routing for electrical wiring
- Information to contribute to preparing lift plans
- Our survey will identify any modifications that may be required for each individual installation



BOP Gantry Crane



Installation and Commissioning

The installation team comprises:

- Supervisor
- Rope Access Rigger
- Two Rope Access Welder
- Rope Access Plater
- Senior Rollsafe Engineer
- NDT Technician

Post Installation

- System 2000 carry out the commissioning of the system and provide training for the installation personnel
- Service agreements available



System Delivery

Rollsafe Systems can be delivered within 12 weeks from receipt of purchase order

This allows us to commit to the long-lead items

During this period we will:

- Carry out the site survey
- Procure all fabrication and installation components and materials
- Plan the installation, carrying out risk assessments, developing procedures and work packs, select and brief the team



Applications and Key Benefits

Applications:

- Moonpools
- Cargo Hatches
- Survey Decks
- Deployment Areas

Key Benefits:

- Dropped Objects Protection
- Personnel Protection
- Environment / Spills Protection and Containment
- Weather Protection for Equipment & Personnel
- Mansafe Access for Maintenance



Questions

Rigmar Services operates across the oil and gas, renewables, marine and civils industries, carrying out inspection, maintenance and modifications, supported by in-house engineering and specialist access services.

System 2000 Group was founded in 1970 and is widely acknowledged to be one of the UK's leading companies in the field of high security shutters, grilles, doors and anti-ram-raid systems. The company operates from centrally located premises in Birmingham and provides an extensive range of security products.

