



# Dropped Object Protection System

DROPS Forum Aberdeen  
27<sup>th</sup> 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

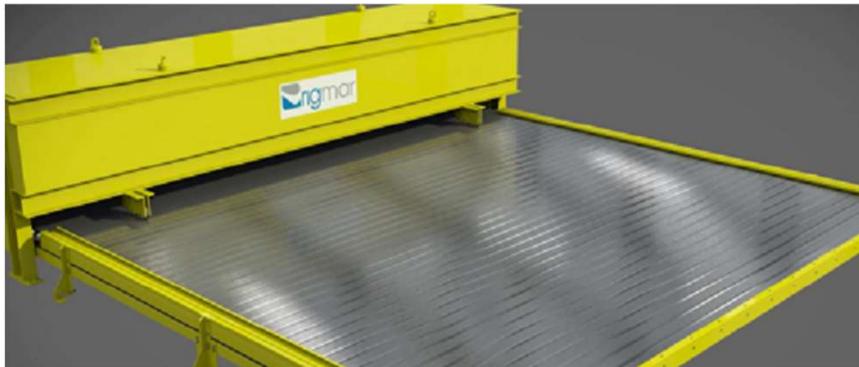
An animation of Rollsafe dropped object protection system can be viewed here:

<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

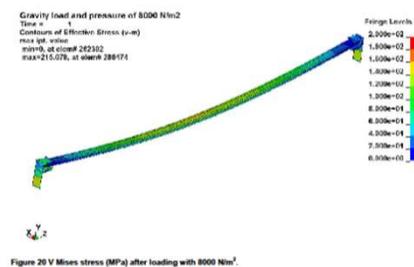
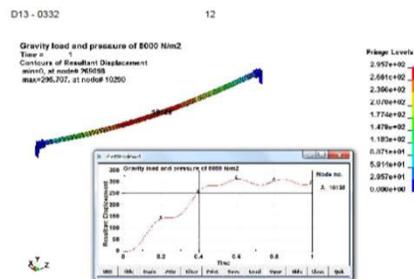
Carried out by: Steven Bunting  
 Witnessed by: Ahmad Kurric  
 Signed: [Signature] Company: rigmar  
 Signed: [Signature] Company: LSW

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.
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 localised 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/m<sup>2</sup> before collapse, Extracts below from FEM Study showing impact testing

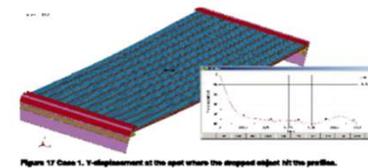
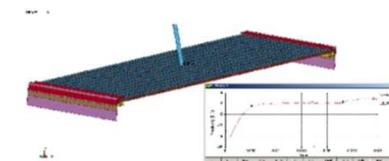


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## 6 Results

### 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*



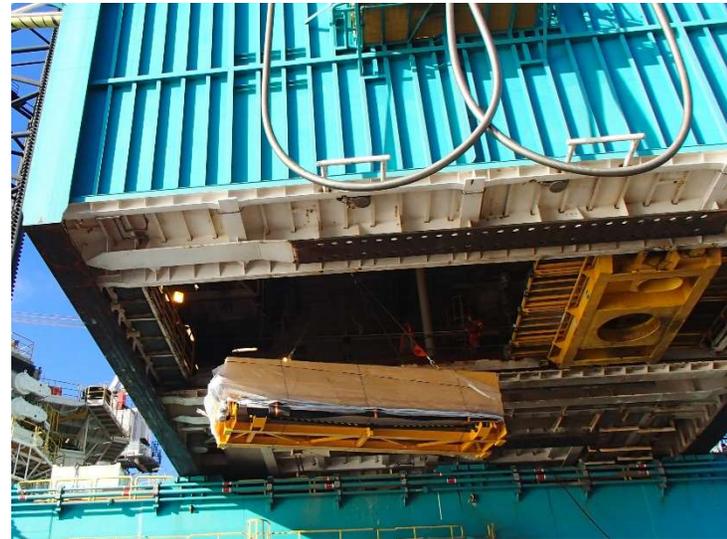
# Installation and Commissioning

## 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.

