



# **Fast rescue craft recovery by installation crane**

Phase 2 study

Prepared by **MB Mechanical Handling Consultants**  
for the Health and Safety Executive 2006

**RESEARCH REPORT 447**



# Fast rescue craft recovery by installation crane

## Phase 2 study

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This project is a continuation of a previous HSE (OSD) introductory feasibility study (phase 1) which reviewed the possibility of using existing offshore pedestal type cranes for the launch and recovery of fast response craft (FRC's). Phase 1 concentrated mainly on the environmental and operational problems associated with launch/recovery of the FRC that was commissioned by HSE (OSD) in response to the then industry project which was reviewing the possibility of scaling down the number of stand by vessels operating in the United Kingdom Continental Shelf (UKCS).

One such concept was the permanent stationing of a FRC (or FRC'S) on a fixed offshore installation that could be launched/recovered by the platform cranes for emergency rescue and other forms of installation support.

This phase 2 study focuses in more detail on the sole issue of the suitability of existing pedestal cranes on fixed installations to safely launch and recover a FRC.

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## EXECUTIVE SUMMARY

This project is a continuation of a previous HSE (OSD) introductory feasibility study (phase 1) which reviewed the possibility of using existing offshore pedestal type cranes for the launch and recovery of fast response craft (FRC's) that could be used as an alternative means of providing emergency rescue and field support services. Phase 1 concentrated mainly on the environmental and operational problems associated with launch/recovery of the FRC such as pendulum effects, uncontrolled swinging, single point suspension and attachment of the crane hook to the craft especially in heavy sea states.

The phase 1 study was commissioned by HSE (OSD) in response to the then industry project which was reviewing the possibility of scaling down the number of stand by vessels operating in the United Kingdom Continental Shelf (UKCS) and replacing these, where suitable, with alternative means of support and rescue. One such concept was the permanent stationing of a FRC (or FRC'S) on a fixed offshore installation and these could be launched/recovered by the platform cranes for emergency rescue and other forms of installation support. It was the problems associated with this type of operation that the Phase 1 study primarily addressed. Also the study looked at the overall concept and the general operations of the FRC, Daughter Craft (DC) and the pedestal cranes and highlighted some potential key issues, which are listed below.

(a) The operational limiting factors of a safe recovery of personnel directly from the sea, into the fast rescue craft and back to the installation or Daughter Craft, was largely opinion based, however, the general consensus was, that safe rescue could be achieved in seas of 5.5 significant wave height and in winds of up to 50/60 knots. The ultimate sea-state limit remains unknown because there have been relatively few actual rescues in extreme weather conditions and validation of limiting sea-state rescues by actual sea trials is not practical since the hazards and risks to personnel associated with this exercise are not acceptable.

(b) The orientation of the suspended craft would need to be controlled. For DC the correct orientation is usually effected via the connection of fore and aft lines, keeping the craft parallel with the side of the vessel. For FRC launch/recovery from a fixed offshore installation such lines may not be used and the side of the platform structure would most likely be used to control its orientation in this configuration.

(c) The latching mechanisms on FRC /DC is usually an integral part of the craft that is operated by crewmembers. Any mechanism that is incorporated on the FRC should allow quick release of the connector but should be safeguarded against inadvertent operation. Dynamic loads may be induced in the craft and the crane at the point of release this should be ascertained by practical tests.

Phase 1 also included a wider and more detailed review of the existing pedestal cranes that could be identified for the launch and recovery of the FRC, in line with the Lifting Operation and Lifting Equipment Regulation 1998: SI 2307 (LOLER) and the HSE document "*Technical guidance on the safe use of lifting equipment offshore*" reference HSG221 specifically the section titled "Equipment for Lifting People". The HSE technical guidance and the phase 1 study set down the parameters of the work activities for this phase 2 study which focuses in detail on the sole issue of the suitability of existing pedestal cranes on fixed installations to safely launch and recover a FRC.



# 1 INTRODUCTION

The phase 2 study is based on the two scenarios that would require the need to launch and recover a Fast Rescue Craft (FRC) by installation cranes, these being Man Over Board and Helicopter Ditch.

Consultation with the FRC manufactures indicated that to cover the majority of operations within the UK sector of the North Sea the FRC would have a physical size of 9.5m to 11.5m overall length, and a beam width of 3.2m, the total weight was in the region of 4200 to 6750 kgs (this weight includes 15/16 person capacity). The environmental operational limiting factor for the safe recovery of an FRC is deemed achievable in seas of 5.5 SWH and in winds of up to 50/60 knots.

Consultation with Crane Manufactures covering three types of crane design and models (King post, wire rope luffing and ram luffing) was undertaken to identify the hazards and risks associated with launch and recovery operations involving FRC's and the safety devices and systems currently fitted on each crane type.

There are on some fixed installations pedestal cranes that have been deemed suitable and are presently used for man riding operations. These pedestal cranes may fall short on incorporating the necessary safety devices and system requirements that would be considered essential prior to evaluating and allowing the pedestal crane (if at all) to be used for the launch and recovery of FRC's. The findings will give a general overview and considerations on the requirements that will be required to be addressed, if the pedestal cranes are to be considered fit for purpose and use to facilitate FRC launch and recovery operations.

It should be noted that on certain installations it might be impracticable to provide facilities for FRC handling and storage. This study also only looks at FRC's on fixed installations and does not cover mobile installations such as semi-submersibles and jack ups.

## 2 METHODOLOGY

The methodology behind the Phase 2 study was to identify the hazards associated with the launch and recovery operation of an FRC using the existing pedestal crane on a fixed installation. A review of the pedestal cranes safety systems and devices in line with the Lifting Operation and Lifting Equipment Regulation 1998: SI 2307 (LOLER) and the HSE technical guidance document HSG 221 specifically the section titled “Equipment for Lifting People” produced the following scope of work.

Verify that all cranes identified as suitable for man riding comply with the requirements in the HSE technical guidance document HSG 221.

Check that failsafe and emergency brake systems are situated at or in the vicinity of the winch boom and hoist drums.

Identify any part of the mechanical and hydraulic transmission where component and/or system failure would mean uncontrolled load drop.

Look into how the FRC could be recovered in the event of a complete prime mover failure.

Compare the crane environmental limitations such as wind speed, wave height etc with that of the FRC.

Look at power requirements, hoist speed, offlead and sidelead angle.

Look at the possibility to override the auto tension, GOP and anti-sag systems when handling the FRC.

Look at methods of connecting the crane to craft.

Look at the training requirements of personnel.

A general risk assessment was undertaken for the launch and recovery operation of an FRC. (See Appendix A Lifting Operation Risk Assessment). The criteria used for the risk assessment was that the FRC had a physical size 11.5m overall length, and a beam width of 3.2m, the total weight was taken as maximum which was 6750 kgs this included 15person capacity. The limiting sea state of 5.5 SWH waves and in winds of up to 60 knots was considered acceptable.

### **3 STUDY FINDINGS AND RECOMMENDATION**

#### **3.1 VERIFICATION OF THE CRANES COMPLIANCE WITH TECHNICAL GUIDANCE DOCUMENT HSG 221**

There are 27 fixed installation in the UK sector of the North Sea that operate 60 pedestal cranes supplied by 9 different manufactures which are currently deemed suitable, either by the manufacturer or the duty holder, for manriding operations.

A total of 16 pedestal cranes were selected for the review and verification (see table 1). The 16 cranes consisted of 3 King post, 7 Ram luffing and 6 wire rope luffing type, and all of different models.

**Table 1**

Verification of Compliance to Technical Guidance HSG221

Compliance = Y Non compliance = N Not Applicable = N/A

W = Weighting: Essential – 5, Crane should not be used for man riding operations if this feature is not present  
 Desirable – 3, Every effort should be made to gain compliance where this is possible, where not possible operational limits may have to be applied.  
 Non-critical – 1, Would not prevent crane being used for man riding operations

Technical Guidance HSG221 requirements	King Post				W				Ram Luffing				W				Rope Luffing				W
Marked as suitable for man riding	N	Y	Y	1	N	N	N	N	N	N	N	N	Y	1	N	N	N	N	N	N	1
Controllers must be positively centred to neutral position	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	5
Two independent fail safe braking system	Y	Y	Y	5	N	N	N	Y	Y	Y	Y	Y	5	N	N	N	N	N	Y	5	
One brake as near to drum as possible	Y	Y	Y	3	N	N	N	Y	N	N	Y	3	N	N	N	N	N	Y	3		
No dis-engaging of drive possible when operational	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Recovery of carrier possible if prime mover fails	N	N	N	5	N	N	N	N	N	N	N	5	N	N	N	N	N	N	5		
Two independent means of starting diesel	N	Y	N	3	N	N	N	N	N	N	N	3	N	N/A	N	N	N	N	3		
Emergency stop in operator's cab	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	5		

Factor of safety 10:1 on wire ropes	N	N	N	3	N	N	N	N	N	N	N	3	N	N	N	N	N	N	3
Interlock required if constant tension system fitted	Y	N	N	3	Y	Y	Y	N/A	N/A	N/A	N/A	3	Y	Y	Y	Y	Y	Y	3
Interlock required if gross overload protection fitted	Y	N	N	3	Y	Y	Y	N	N	N	Y	3	Y	Y	Y	Y	Y	N	3
One mode selection for dual speed winch motors	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
High boom hoist limit automatically activated	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	5
High hoist limit automatically activated	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	Y	5	Y	Y	Y	Y	Y	Y	5
Boom backstops to prevent boom flip over	Y	Y	Y	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y	5
Slewing limits if possible to slewing into structure	Y	N	N	3	Y	N	Y	N	N	N	N	3	Y	Y	Y	Y	Y	N	3
Positive lock holding on luffing ram(s)	N/A	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y	Y	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grooved or lagged winch drum(s)	Y	Y	N	1	Y	Y	Y	Y	Y	Y	Y	1	Y	Y	Y	Y	Y	Y	1
Slack wire rope prevention	Y	N	N	3	Y	N	Y	N	N	N	N	3	Y	Y	Y	Y	Y	N	3

The table demonstrates that the current compliance with the technical guidance on manriding operations fails by some 41% of the cranes safety systems and device requirements. The weighted index is the value given to each guidance requirement, which provide a future benchmark for pedestal cranes that may be required for man riding operations.

### **3.2 POSITION OF FAILSAFE AND EMERGENCY BRAKE SYSTEMS IN RELATION TO BOOM AND HOIST DRUMS**

The study showed that the primary failsafe brakes used in today's boom and hoist winch are internally positioned, and being of multiple disc type brake installed between the hydraulic motor and the winch gear. This type of braking system is acting as a static brake unit that is applied automatically on loss of pressure.

Dynamic braking is achieved by a different method, which depends on whether closed, or open loop hydraulic circuit technology is used. For closed loop hydraulic systems dynamic braking is achieved by modulating the pumps. A hydraulic lock valve is also included as an additional safety component in the event of a hydraulic hose failure. In open loop hydraulic systems dynamic braking is achieved by a motor control or counterbalance/lowering brake valve, which is normally fitted directly to the hydraulic motor ports.

The secondary brake on the boom winch could be regarded as the pawl and ratchet mechanism that is engaged when the control lever is returned to its neutral position or when the crane prime mover has been shut down, although the primary function of the ratchet and pawl is a parking brake which prevents boom creep when holding a load with the boom in the raised position. Manufacturers are now adopting the same concept of secondary braking to the boom winch as they have for the hoist winch, therefore doubling the number of static brakes on the boom winch.

The concept of secondary static or dynamic braking systems on the hoist winches varied with manufacture from using the hydraulic motor and a hydraulic lock valve, to an independent external mounted disc type calliper assembly to a band brake acting directly on the drum flange.

#### **Recommendation**

The requirement for secondary braking for man riding cranes has been generally accepted as in 3.2 above, however it is felt that for FRC operation the requirement should be, that the boom and hoist drums should incorporate two independent and separate fail safe braking system that could be capable of both dynamic and static operation. Also it is preferable that the hoist(s) and boom hydraulic transmission systems are independent and not interlinked.

This requirement for secondary braking could also be achieved if the hoist and boom winches incorporated two separate motor and gearboxes units provided the brakes are located as near to the drum as possible and each brake system can be independently checked for their correct operation.

### **3.3 MECHANICAL TRANSMISSION COMPONENT FAILURE RESULTING IN UNCONTROLLED LOAD DROP**

All the cranes selected within the study are of the 3<sup>rd</sup> generation type, this generation of pedestal crane reduces the number of possible component failure resulting in uncontrolled load drop as there are less mechanical components such as clutches, chain drives and manual hoist speed selectors.

A review of the mechanical transmission components pointed in the direction of the luffing and hoist winch which if failed could result in uncontrolled load drop. The components identified within the luffing and hoisting winch were the winch gearboxes and specifically the drive splines, and the gear drive shafts.

A review of all available incident data demonstrated that the overall safety of the hoist winch internal gearbox assembly as having a good track record. Where a winch drive component had failed this generally was down to poor/insufficient maintenance, inspection or bad misalignment during replacement of the gearbox, rather than attributable to a direct mechanical component failure.

### **Recommendation**

The fitment of an independent secondary brake directly to the winch drum greatly reduces the risk of uncontrolled load drop due to failure of say the hoist winch gearbox drive spline or other components.

A review of the pedestal cranes maintenance strategy and the requirements of the thorough examination should be risk assessed in line with the FRC operation to highlight the specific areas and to ensure that the inspection, maintenance and thorough examination programs are appropriate to reduce the possible failure of these critical components.

### **3.4 RECOVERY OF THE FRC IN THE EVENT OF A COMPLETE PRIME MOVER FAILURE**

The HSG 221 guidance requires that diesel powered cranes should have a secondary independent means of starting via a readily available power source other than that used for the primary starting system. This would allow the recovery of the carrier and its occupants to be readily returned to a safe area if the primary diesel starting system was to fail, however this section of the guidance also requires that if the diesel engine should fail to start or the transmission system fails completely i.e. hydraulic system failure, then a manual method should exist which allows the crane or load in an emergency situation to be recovered to a safe position by the lowering of the boom and hoist and with slewing both left and right capabilities.

A complete failure of the selected cranes prime mover or transmission system would lead to the FRC being suspended until the power supply was initiated and operation to recover to the safe heaven of the installation commenced. This is deemed as not acceptable and it should be noted that this feature is only present and functional on one of the pedestal cranes selected for this study.

### **Recommendation**

The HSG 221 guidance may be suitable for man riding when carrying out maintenance activities within the installation parameters, but manufactures are now taking the initiative in designing their cranes with the capability that when the prime mover fails a independent system is capable of lifting and lowering of the luffing and hoist systems, slewing both left and right and to operate at full capacity of rated load, but at a reduced speed.

Cranes that have an electric prime mover would be completely dependent on the installation mains power. To achieve a secondary independent means of starting the electric prime mover in the event of main power failure would be to have the pedestal crane connected to the installation emergency power supply. Note that the requirement for a manual emerging means of recovery of the load would still apply to cranes with electric prime movers.

Pedestal cranes that are provided with Programmable Logic Controller (PLC) system should have a fully independent hard-wired control system for emergency operations. This is required in case of a PLC or electronic card failure. If such a failure occurred it would not be possible to control either the normal or emergency crane functions

### **3.5 CRANE ENVIRONMENTAL LIMITATION**

The cranes environmental limitation ranges from wind speed of up to 20m/min (60 knots) and a maximum average 4 - 6m significant wave height. Operational limiting factor for safe recovery of the FRC has been deemed achievable in seas of 5.5 significant wave heights and in winds of up to 50/60 knots these factors are within the 16 selected cranes operation parameters.

However, notwithstanding the wave height and wind speed a governing factor for the launch and recovery of a FRC, in particular using a high pedestal crane during high wind speeds, is the effect on the orientation and pendulum movement of the FRC.

Although the initial effects of the pendulum movement might not favour the well being of the personnel within the craft, the problem is only apparent with single point lift which would be the primary method when connecting to the installation crane. Most modern day cranes now have responsive slewing and luffing system that enables the crane operator to reduce the pendulum effect relatively in a short time from the point of lifting from the sea. However the time necessary to achieve this degree of control time is very dependent on the experience of the crane operator, environmental conditions and the physical size of the FRC.

The orientation movement (spinning) of the FRC presents a risk to both personnel within the craft and the craft itself, this is not experienced by conventional davit launched craft such as TEMPC'S as connection in this configuration is by fore and aft wires.

#### **Recommendation**

Further discussion with manufactures on the orientation (spinning) of the FRC and the means by which this feature could be controlled would be required and perhaps simulation modelling may be required to look at the effects of a suspended craft effectively weather vaneing bow outward of the platform.

A davit launch company has pioneered an anti-pendulum system that dampens the swinging effect of the suspended FRC. Details of the system are currently not available.

### **3.6 CRANE POWER REQUIREMENTS**

The pedestal crane's which were reviewed all had hoisting speed, offlead and sidelead angles that were in accordance with Lloyds / DNV rules. The cranes hoisting speeds averaged from 45m/min for single fall and 23m/min for double fall hook blocks. This provides sufficient hoisting speed on a single fall configuration compared to the davit hoist launch speed range of 35 – 40 m/min.

## **Recommendation**

Details of the excursion envelope of the FRC station keeping should be determined in any given sea state and in-line with the offlead and sidelead parameters of the crane. The FRC should be capable of maintaining station during launch and recovery operation to ensure the load line remains plumb over the FRC, so that the craft can be lifted clear of the next wave without inducing unnecessary shock loading or increased stress levels to the structure of the pedestal crane or the FRC.

### **3.7 DISABLING SAFETY DEVICE AND SYSTEMS**

Some of the pedestal cranes reviewed have the function to be able to override the auto tension, gross overload protection and anti snag when carrying out man riding operation. This is generally a manual facility, which requires a deliberate act by the crane operator in order to override any of the above systems.

The European Standard prEN 13852-1 requires a mode selection where-by when it is selected for man riding operation all safety devices such as Automatic Overload Protection System (AOPS), Manual Overload Protection System (MOPS) and were fitted Active Heave Compensation (AHC), Active Rope Tensioning (ART), Passive Heave Compensation (PHC) and Passive Rope Tensioning (PRT) are overridden.

The API Specification 2C Fifth Addition does not require such safety devices and therefore disabling is not required.

## **Recommendation**

For FRC operation the requirement under prEN 13852-1 for the mode selector in 3.7 above should also have the capability to be interfaced with the rated capacity indicator (RCI) to change the operating parameters and the control system whereby reducing by 50% the hoisting factor value and also limiting the hoist winch speed.

### **3.8 METHODS OF CONNECTING CRANE TO FRC**

The simplest method of connecting the pedestal crane hook to the FRC single lifting attachment would be by suitable length pennant/forerunner attached to the crane hook, with a light weight ring type connector with grab handles. The problem arises when the ring connector has to be manual handled by personnel to connect to the FRC lifting attachment. The safety of the FRC crew and passengers when carrying out this operation result in exposure to a greater hazard especially when the recovery is being carried out in heavier seas.

A current method used to assist with the connection is by use of a haul down system, that comprises of a light weight rope that is attached to the connecting ring which enable the FRC crew to control the position of the connector ring to the FRC lifting attachment, however this operation in heavy seas is still somewhat hazardous to craft and personnel.

## **Recommendation**

For the safe re-connection of the crane hook to the FRC in a limited excursion envelope is extremely hazardous and the industry will need to address and possibly develop a method of automatically connecting the crane hook to FRC without the direct intervention of personnel.

### **3.9 PERSONNEL TRAINING REQUIREMENT**

Training is essential not only for the safe launch and recovery of FRC but also its operation. All personnel associated with the FRC activities, should be fully trained and qualified in accordance with the recognised standards laid down by the regulatory authorities

#### **FRC Crew**

The craft coxswain and boatman are trained in accordance with SOLAS and MCA regulation. There are additional training requirements for the crafts auxiliary equipment details of which are specified by the manufacture.

#### **Crane Operators**

Only crane operators who have the necessary competence and who are fully conversant with the crane type / model and its associated safety systems should be used. The crane operator should hold a recognised operator licence / competency certificate that demonstrate that they have obtained all the necessary skills and experience required to safely perform the launch and recovery operation.

#### **Deck Crew**

Personnel involved with the launching of the craft should be experience riggers and be trained on the inspection, maintenance and operation of the FRC lifting equipment and hook mechanism.

#### **Recommendation**

In addition to the training requirements, a programme should be established, by where assessments of the personnel duties can be verified. This should include frequent exercise and simulation to demonstrate the launch and safe recovery of the FRC in the event of a complete prime mover failure.

## 4 RISK ASSESSMENT FINDINGS

As can be seen from the Lifting Operation Risk Assessment appendix A. Five areas are deemed to be of high risk, these are:

- Pendulum movement of FRC when lowering or raising
- Rotational movement of FRC when lowering or raising
- Connecting crane hook to FRC attachment point for recovery
- Personnel security and safety when in the FRC
- Failure of communication

The above area's will require further review by the crane and FRC manufactures to reduce risk to an acceptable level if the installation pedestal cranes are to be safety used for the FRC launch and recovery operation.

## 5 CONCLUSION

This study was based on the probability of using existing fixed installation pedestal cranes to launch and recover a Fast Rescue Craft in the event of a Man Over Board and Helicopter Ditch. This concept was based on the presumption that cranes that are currently deemed suitable for manriding would have the necessary safety systems and devices to allow for a safe launch and recovery of a FRC operation.

The first issue is that some existing pedestal cranes have been deemed suitable for manriding operations either by the Duty Holder or the manufacture but rarely by a regulatory body. The current best practice has identified the pedestal crane as being safety critical equipment.

Therefore it is suggested that any type of lifting equipment used for manriding purposes should be deemed suitable for its intended purposes either by an Independent Verification Body (I.V.B) or by the Independent Competent Person (I.C.P) to ensure that the HSE technical guidance together with other appropriate documents have been implemented.

As demonstrated by the verification to compliance table 1 page 2 the existing pedestal cranes fail by some 41% of the required technical guidance on manriding operation and proposes the question as to the suitability of the current cranes. Only those that fully comply with all the technical guidance recommendations should be deemed suitable and used for FRC handling operations.

It has also highlighted the different interpretation of the technical guidance by the Independent Verification Bodies (IVB) in that it was possible for identical pedestal cranes to have different requirements for FRC operation.

To address this, it is considered that a pedestal crane, if required to be used for the launch and recovery operation of an FRC should incorporate the following safety devices and systems as being a mandatory requirement.

(a) Two independent and separate failsafe braking system with one brake preferably on the winch drum or as near to the drum as possible that would be capable of both dynamic and static operation. Also it is preferable that the crane should have independent hydraulic transmission systems. (See 3.2)

(b) Recovery of FRC from any position in the event of a complete prime mover failure by means of an independent system that is capable of lifting and lowering of the luffing and hoist systems, slewing both left and right and operate to full capacity of rated load, but at a limited speed. (See 3.4)

(c) Two independent means of starting prime mover, whether diesel or electric powered if item (b) above is not incorporated. (See 3.4)

In addition to the pedestal crane safety devices and system the FRC should also incorporate the following safety features that will ensure the risk to personnel and equipment is as low as reasonable practicable.

(a) An automatic haul down connection systems that requires little or no intervention from crew personnel.

(b) A system to reduce or eliminate the rotational and pendulum movement of the FRC when being launched or recovered.

Given that all the above safety systems and features require to be incorporated, it is unlikely that the majority of the current pedestal cranes have the necessary capacity or adequate redundancy in the structural members to be modified or retrofit the appropriate systems which would enable the pedestal cranes to be used for the launch and recovery of an FRC based on its environmental limitation of 5.5 SWH and 50 –60 knot winds.

However if the FRC operation is tailored to the installation operation requirements rather than an alternative method to supply vessel rescue, is to be pursued, then the pedestal cranes operating parameter should be identified giving the allowable wind speed, significant wave height and maximum working radius. This will allow the crane manufacture to carry out a feasibility study, which may concur that the cranes structure would be adequate but, may require changes to the hydraulic, winch and wire rope systems.

Although not all pedestal cranes would be required for launch and recovery operation, the industry has indicated that a possible two-tare system could be introduced. Whereby the criteria for personnel transfer by man riding operation would differentiate between static and dynamic lifting mode. This could lead to written procedures / guidance being produced for lifting operation and the lifting equipment used in the transfer of personnel in man-riding scenarios for Work Basket, Personnel Transfer Carriers and FRC handling.

## APPENDIX A

Lifting Operation Risk Assessment							
Location: HSE Bootle Office		Date: 24/05/2005		R.A number: OP-001-0505			Attendees:
Activity: To launch and recover a Fast Rescue Craft by means of pedestal crane on a fixed installation						Mel Block MHC Jim Macfarlane HSE Hugh Smallman HSE	
Task ID	Hazard	Hazard Effects	Existing Safeguards	(S)	(L)	Risk (S X L)	Additional Safeguards Required
1	FRC not ready when and or not adequately equipped	Safety of personnel	None	1	1	1	
2	Starting FRC engine		FRC to be used for recovery not evacuation	1	1	1	<i>Engine to be capable of been started prior to entering the sea</i>
3	Crane not serviceable when required	Safety of personnel	Daily checks and inspection carried out	1	1	1	
4	Environmental condition not favourable, wind speed, sea state and visibility (fog)	Safety of personnel and damage to equipment	Regulatory operating guidance parameters	2	2	4	
5	Connection of crane hook to FRC attachment point	Injury to personnel	Approved rigging/slinging methods and technique	1	2	2	
6	Failure of communication	Safety of personnel and damage to equipment	Radio and visual communication are established and maintained between crane operator and FRC	3	2	6	<i>Hands free radio on dedicated channel to be used</i>

7	Pendulum movement of FRC when lowering or raising	Safety of personnel and damage to equipment	Competent crane operators	3	3	9	<i>Anti-pendulum system?</i>
8	Rotation movement of FRC when lowering or raising	Safety of personnel and damage to equipment	None	3	3	9	
9	Personnel security and safety when in the FRC	Injury to personnel	None	3	2	6	<i>Compliance to LOLER Regulation 5(1)</i>
10	Recovery time (travel of FRC to sea level)	Safety of personnel	None	2	2	4	<i>FRC to be located as low as possible to reduce distance of travel from sea level</i>
11	Crane fails during lowering and raising operation (FRC left suspended)	Safety of personnel	Crane to be inspected prior to use (fit for purpose)	2	2	4	<i>Crane to have recovery of load facility on all motions and any position</i>
12	FRC detaches from hook assembly	Injury to personnel and damage to equipment		3	1	3	<i>Auto hook off load release system</i>
13	Failure to disconnect from crane hook after entering the sea	Injury to personnel and damage to equipment	Use of off load release mechanism system	2	1	2	<i>Manual release system to be operated at a safe position furthest from the attachment point</i>
14	Connecting crane hook to FRC attachment point prior to been recovered	Injury to personnel and damage to equipment	Manually haul-down using a lanyard type light line to guide hook to craft	3	3	9	<i>Automatic haul-down system</i>





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