EXAMINING SYSTEM FOR MONITORING OFFSHORE STRUCTURES

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Abstract:
Offshore production is the system of structures and facilities in a marine surroundings, generally for the development and transmission of energy, oil, fuel and different assets. Production and pre-commissioning is commonly accomplished as tons as viable onshore. To optimize the fees and dangers of installing large offshore platforms, distinct creation techniques were developed. Offshore structure and pipeline device are located at the undulate ocean - vulnerable to plenty of uncertainties. Plenty of injuries that result in fatalities, environmental damage or property harm have took place. Failure effects from statistical versions in masses and structural load bearing talents. The main motive is to construct a device that may capable of examine the energy of the shape. So the extent of the damage could be decreased. The gadget could be implemented on the unmanned vehicle which is operated by using remotely.

Keywords: offshore, marine cars, load and bearing and many others.

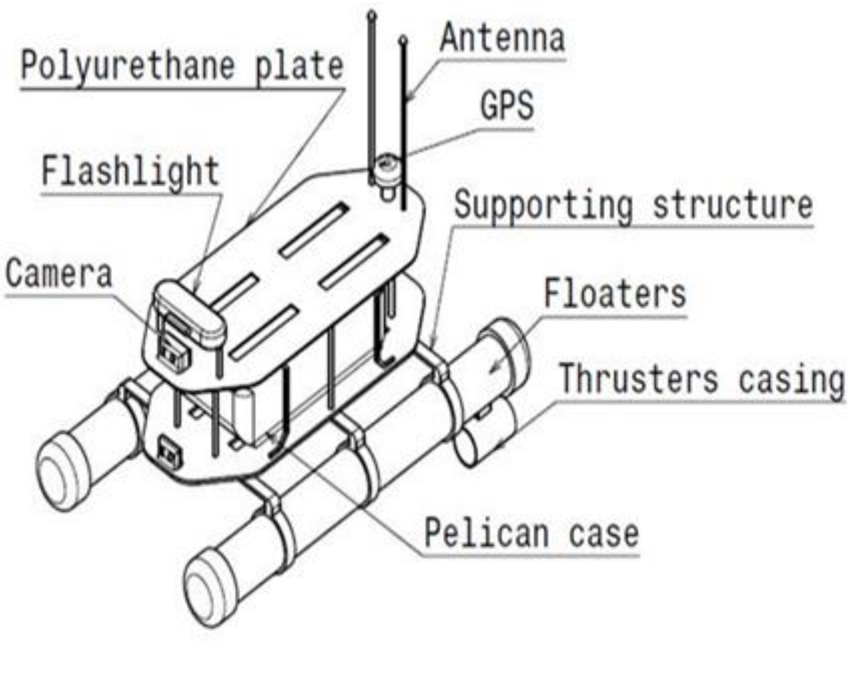
1. INTRODUCTION

Offshore structures have developed swiftly over the last 3 to four many years. Plenty of this has been pushed by using the want to exploit deeper waters because of depletion of shallow water clean-to-attain fields, buoyed via a normally continually growing charge of oil and, greater recently, gas. On occasions, but, serious falls inside the oil rate have punctured these trends occasionally substantially, leading to principal consolidation within the industry This need for deep water traits and, as nicely, a desire to continue to take advantage of depleting shallow water reserves has spawned new kinds of offshore structures for manufacturing, which includes manufacturing semi-submersibles, tension leg structures in a selection of styles and sizes, monohulls (ship-shaped devices), spars, minitowers’, and production jack-ups. Jackets have endured to be exploited in a spread of approaches using extraordinary construction techniques, all aimed at rushing up design, fabrication and set up.

The layout, modelling, and analysis of latest complicated offshore platform structures constitute a chief capital funding in offshore oil and gas production. The use of advanced finite detail analysis equipment, you may design and analyze complicated offshore structural structures with self-belief to make certain compliance with industry design codes. This integrated structural modelling, evaluation, and simulation surroundings permits you to layout offshore structures to meet nearby operating situations from wave, wind, modern, and seismic loads.
The complexity in design of offshore structures and related offshore structures are to demand the crucial analysis of all process of the constraints. This evaluation validates that offshore structures meet all operating conditions with safety and integrity throughout the lifestyles of the asset. By means of designing, analyzing, then simulating the running conditions and traits of your models, you can improve and optimize your structural designs to make universal integrity. Integrated equipment let you create and take a look at structural fashions combining wind and gravity load evaluation to make certain global design code compliance.

2. DESIGN METHODOLOGY

The construction of the device is to determine the rust beneath the bridges under any stipulated radius of the prescribed location. The initiation of this device construction is by connecting the hulls to the body of the device, these hulls are connected parallel on either sides, the pelican case is placed which holds the battery and other electronic gadgets waterproof. The base consists of the floaters and the supporting structures to enable the movement of the device under water. The flashlight and camera is used for the detection purpose. The pelican case is a protective cover to the gadgets present for the detection. The GPS and antenna helps in determining the location or spot for the peculiars under water.



Isometric view

The above shown picture is the isometric view of the overall design of the device. This clearly the projects the overview of the components used and its purposes for proper operation of the device.

3. DESIGN CONSIDERATIONS OF SURFACE VEHICLE

3.1. *CALCULATING THE BUOYANCY FORCE*

The buoyant force comes from the pressure exerted on the object by the fluid. Because the pressure increases as the depth increases, the pressure on the bottom of an object is always larger than the force on the top - hence the net upward force.

FB = ρ x V x g

(FB) states that the upward force exerted on an immersed object is equal to the density (ρ) of the fluid multiplied byboth the fluid's displaced volume (V) and the gravitational acceleration (g), or.

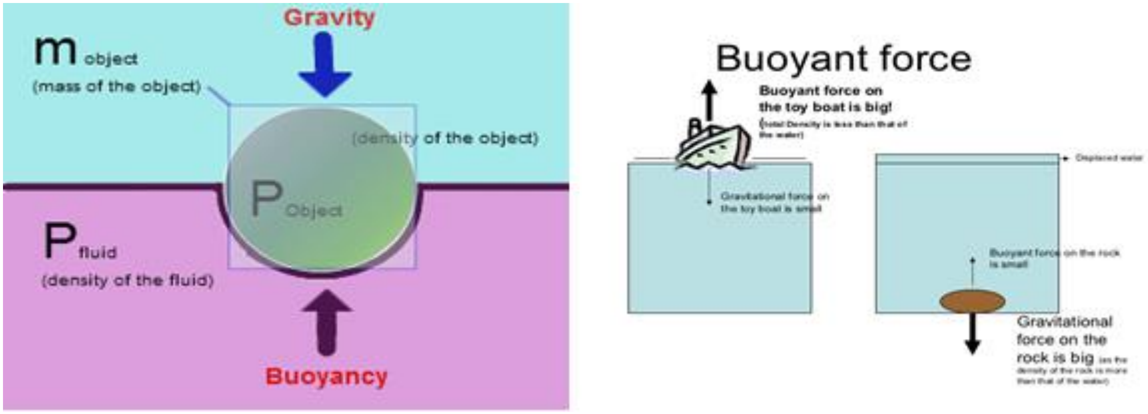


Fig 4.1 Buoyancy overview

3.2. *BUOYANCY FORCE IS CALCULATIONS*

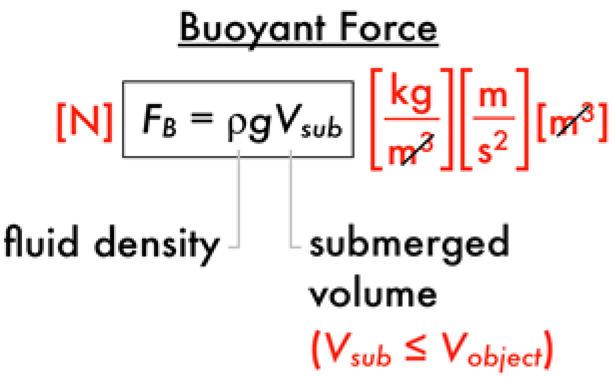


Fig 4.2 Buoyancy Force Calculations

At 60% submerged volume, freeboard is 81.1mm, buoyancy force will be 240.16kg
At 80% submerged volume, freeboard is 40.7mm, buoyancy force will be 320.22kg
At 100% submerged volume, freeboard is 0 buoyancy force will be 400kg

3.3. *DRAFT CALCULATIONS*

Draft at

1. Waterline Width(Beam) : 206.3mm
2. Waterline Length(LWL) : 1200mm
3. Total Weight of Boat : 30kg

	fresh water	salt water
Calculated draft at 30kg weight value is	121.92mm	119.38mm
Calculated draft at 40kg weight value is	162.56mm	160mm
Calculated draft at 50kg weight value is	203.2mm	198.2mm

At 50kg draft will be zero maximum weight should not excess 50kg including all components.
8 INCH PVC PIPE Used for floating purpose

Dimensions of PVC pipe	
Diameter	203.2mm
Length	1200mm
Thickness	5mm

Draft calculations are done by using On-line Boat Design Calculators ''Blue Heron's Nest''
PARAMETERS REQUIRED:

1. Waterline Width(Beam)
2. Waterline Length(LWL)
3. Total Weight of Boat

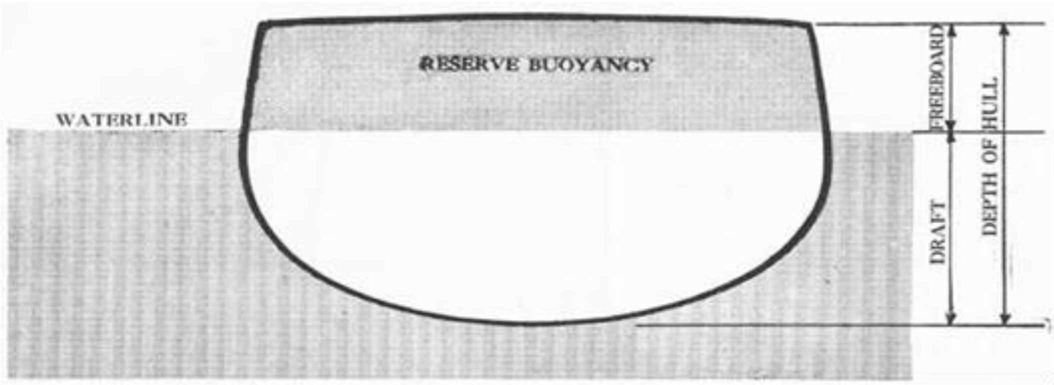


Fig 4.3 waterline

4. RESULT AND DISCUSSION

Hydrostatic Results

Structure ship1

Hydrostatic Stiffness

Centre of Gravity (CoG) Position:	X: 0. cm	Y: 0. cm	Z: 3. cm
	Z	RX	RY
Heave (Z):	-20.406944 N/cm	7.4902048 N/°	-4.8251e-7 N/°
Roll (RX):	429.15714 N.cm/cm	-145.01535 N.cm/°	5.1458e-6 N.cm/°
Pitch (RY):	-2.7646e-5 N.cm/cm	5.1458e-6 N.cm/°	-272.06985 N.cm/°

Hydrostatic Displacement Properties

Actual Volumetric Displacement:	-18156.25 cm³		
Equivalent Volumetric Displacement:	29268.293 cm³		
Centre of Buoyancy (CoB) Position:	X: 1.4947e-5 cm	Y: -21.029909 cm	Z: -4.7659316 cm
Out of Balance Forces/Weight:	FX: 2.9565e-2	FY: 1.1371e-8	FZ: -1.6203384
Out of Balance Moments/Weight:	MX: 13.045682 cm	MY: -0.2833714 cm	MZ: 0.621752 cm

Cut Water Plane Properties

Cut Water Plane Area:	-2030.1749 cm²	
Centre of Floatation:	X: -1.3547e-6 cm	Y: -21.029955 cm
Principal 2nd Moment of Area:	X: -1691810. cm^4	Y: -69730.727 cm^4
Angle Principal Axis makes with X(FRA):	-90.°	

Small Angle Stability Parameters

CoG to CoB (BG):	7.7659316 cm	
Metacentric Heights (GMX/GMY):	85.414658 cm	-3.9253409 cm
CoB to Metacentre (BMX/BMY):	93.180588 cm	3.8405907 cm
Restoring Moments about Principal Axes (MX/MY):	-272.06985 N.cm/°	12.503324 N.cm/°

The depicted results are to show that the buoyancy of the device is capable to bear the sheer stress from all the x,y and z co-ordinates. This is done by using the ansys software and the buoyancy is calculated with respect to the depth of the water into which the device is immersed.
The results of the hydrostatic stiffness and displacement is evaluated and studied with gravity position and the actual and equivalent volumetric displacement. The above results represents that this device is efficient enough to detect the rust in the bridge under water. □

5. CONCLUSION

Present concept had implemented and fabricated with the help of analysis results, but still the platform should be modified in the design and various fabrication point of view. This will be done in the future improvement. By this we can easily find out damage in the off shore structures as well as pollution monitoring system can be rectified by using this platform.

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