MARIN

FPSOs' rational Inspection, Repair & Maintenance (IRM)

3rd generation software for Advisory Monitoring Systems obtainable from MARIN and Amarcon

Background and objectives

From the very beginning of offshore exploration it has been well-known that permanently moored offshore installations are continuously subjected to sea actions. However, this has not prevented many FPSOs suffering from fatigue damage and costly repairs. These failures often come as a surprise to operators because there are no hull integrity monitoring systems installed. In addition, industry records show that many structural monitoring projects have floundered because they did not provide effective data processing and interpretation tools. The Monitas project has changed this situation.

Advisory Monitoring Systems (AMS)

AMS comprises a Hull Monitoring System which includes software named OCTOPUS-MONITAS. This software shows, explains and advises on fatigue integrity of FPSOs. It explains reasons for potential deviation of the actual fatigue consumption from design predictions and translates the monitoring data into operational guidance and advice in an easily understandable format. As a consequence it also provides the designers with feedback on the quality of their design tools.

Status

The Monitas project includes development of specifications and methodology for the implementation of AMS onboard an FPSO. In addition MONITAS software has been developed in cooperation with Amarcon and WaveForce Technologies. This dedicated software is set-

up and operates within the widely used OCTOPUS framework, which originates from Amarcon. The MONITAS software can easily be tailored for any particular FPSO. The system has been validated with success on the Bluewater FPSO Glas Dowr FPSO by installing AMS on board. The software will be ready for the market on 1st July 2010.

Software operation

The OCTOPUS-MONITAS software obtains input from several measuring devices, like 20-30 strain measurement gauges on dedicated spots of the FPSO, motions measurements of all six d.o.f. of the FPSO, wave radar to determine the wave systems in the nearby area, down looking radars to determine wave height around the FPSO, GPS for heading information and draft information from the FPSO's loadmaster. The OCTOPUS-MONITAS software obtains all data from the data acquisition system and calculates the fatigue consumption on the selected spot of the FPSO on a monthly basis using the fatigue design tool of the FPSO. The fatigue information is made easily understandable in graphs, tables and percentage bars. One of the views of the OCTOPUS-MONITAS software shows a graphical representation of the Life Time Consumption during the past year.

MARIN
P.O. Box 28

6700 AA Wageningen
The Netherlands

T +31 317 49 39 11
F +31 317 49 32 45

E info@marin.nl
I www.marin.nl

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For the FPSO Glas Dowr the Life Time Consumption is checked depending on the following parameters:

- Wave conditions
- FPSO's draft
- Hull girder bending loads
- FPSO's motions
- Relative wave heights

The effect of each parameter on the Life Time Consumption is calculated and displayed visually.

The number of parameters is determined on the basis of the design software, which is normally provided by the FPSO owner or operator.

In the OCTOPUS-MONITAS screen below the user can easily see the effect on the Life Time Consumption for each parameter in relation to the design values, and this for each measurement location.
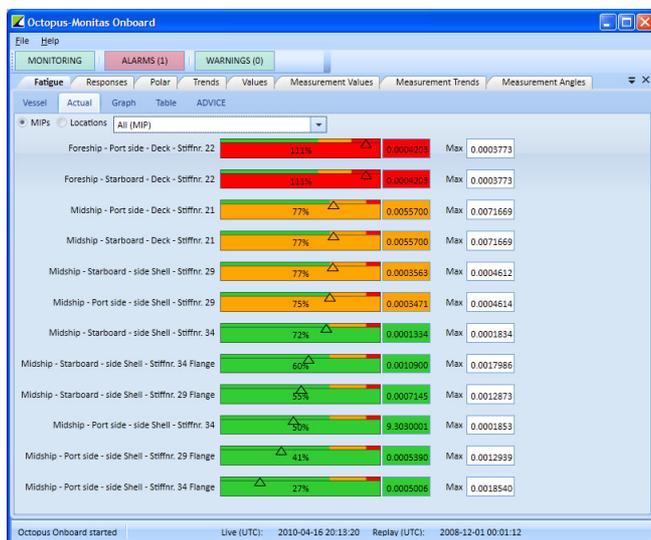
The design software tool provided by the owner or operator are incorporated into the program. The OCTOPUS-MONITAS software also contains its own fatigue calculation algorithm based on the Rain Flow Counting method. Measured strains directly contribute to this algorithm and fatigue damage is also made visible in the graphs and tables.

Software features

The OCTOPUS-MONITAS software features:

- Detailed Life-Time Consumption on a monthly basis.
- Continuous comparison with the Life-Time Consumption calculated at the design stage of the FPSO.
- Advisory remarks for the operator to adjust the FPSO's operation to reduce fatigue damage.
- All data is available in easily readable graphs, tables or percentage bars.
- Easily accessible data with user friendly pull-down menus.
- Easily selectable period in time to track down detailed information.
- Windsea and swell separation and fitting using XWaves from WaveForce.
- Incorporation of design software of the FPSO's owner or operator for calculation of the fatigue damage.
- Independent fatigue calculations based on the Rain Flow Counting method.
- Warning for end-users in case of disordered sensors.
- Time traces of main sensors to determine degree of potential malfunction of a sensor.

For more information:
www.fpsoforum.com
www.marin.nl
www.amarcon.com
www.WaveForceTechnologies.com

For more information please contact MARIN Trials & Monitoring;
Pieter Aalberts
T +31 317 493 478
M +31 652 036 530
E p.j.aalberts@marin.nl