

Operation Support Software

Introduction

The Operation Support System consists of program modules, dedicated to assist the operator of offshore units and work vessels.

The OSS provides support in the area of technical analyses that are either frequently done or are too complex to be done manually.

Examples are day-to-day load sheet calculations, mooring analyses, damage stability assessments or site assessments of jack-ups.

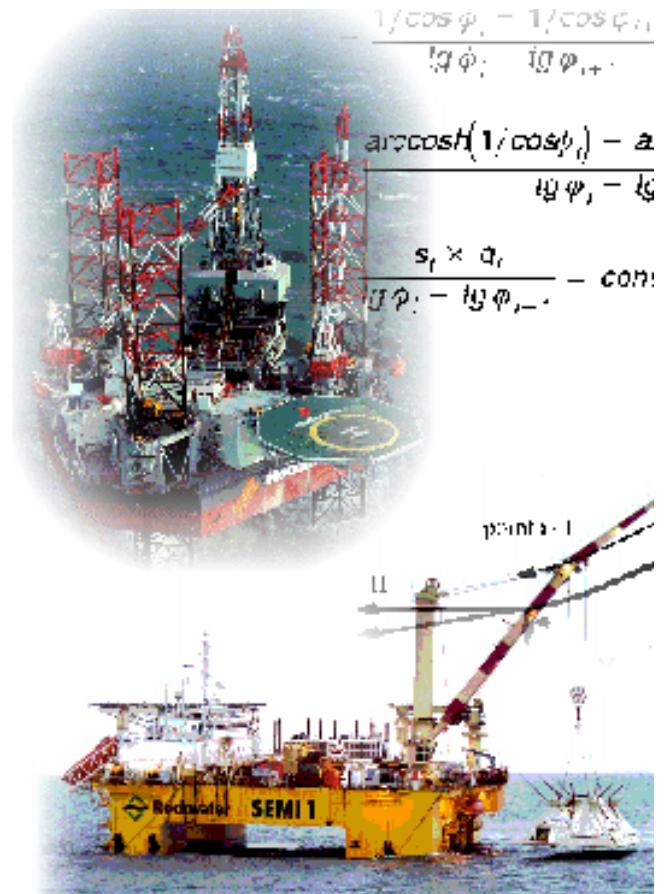
Available modules

Available modules are:

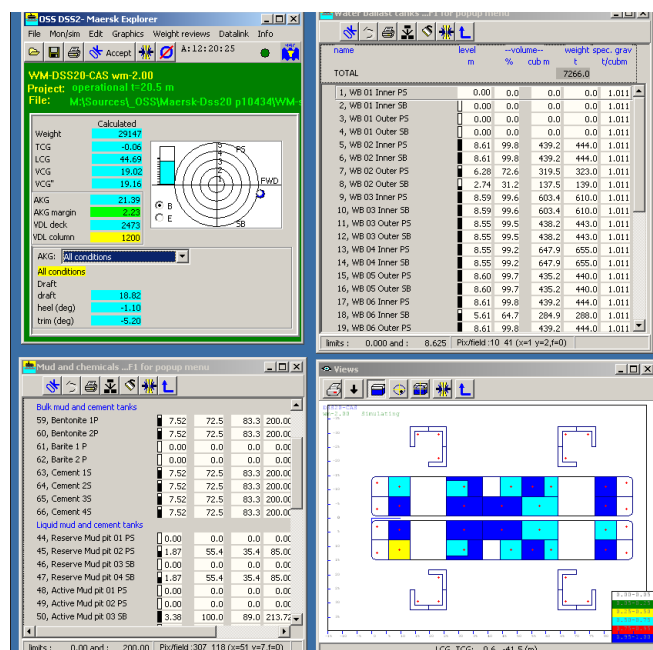
- Weight management
- Site assessment
- Hydrostatic stability
- Mooring analysis

GustoMSC

GustoMSC offers services in the field of marine technology from consultancy and design packages to contracting and building supervision. A significant number of basic design packages for new constructions of mobile offshore units have been delivered to shipyards or (drilling) contractors.



Weight Management



Functions

The Weight Management module is part of the total set of programs called OSS, Operation Support Software. The Weight Management module handles the daily loadsheet calculation. User input is limited to the basics like tank level, deck load in a particular area etc. Based on user input, the program determines derived data like weight and center of gravity of fluid in the tanks and total weight and its center of gravity. When afloat the draft, heel and trim is determined based on even keel hydrostatics. For jack-ups, when elevated, the leg forces are determined. Where possible, safety margins are indicated. Since after each change of the weight condition, draft trim and heel can be calculated quickly, the user can concentrate on the effect of these changes on vessel position. Using graphics, an efficient feedback mechanism is obtained.

The weight situation can be saved for later retrieval either on board or in the office. By reading a previous situation, keying in of the changes is sufficient to reach a new situation.

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For the specific mode of operation, the program checks if operational limits are exceeded like:

- Draft
- Allowable vertical position of the center of gravity (AKG) or:
- Leg loads
- Cantilever loads

Monitoring and simulation

It is usual that this program works in a simulation mode where the user keys in all the data. Where possible, a link can be made with a tank measuring system, so that the actual situation can be monitored. This can be achieved using a serial link or having the PC hooked up to a network.

Features

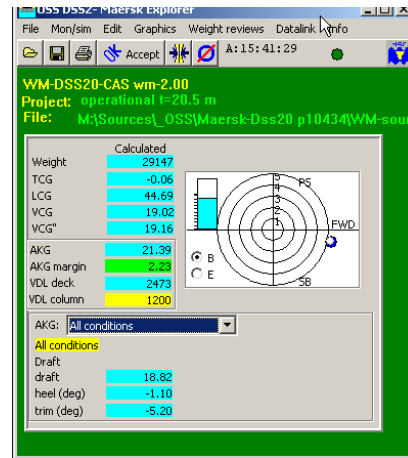
- Graphical user interface
- Data entry windows
- Several views
- Connects to tank monitoring system
- Uses tank tables
- Uses upright hydrostatics
- Optional use of hydrostatics for trimmed and heeled conditions
- Checks if operational limits are exceeded
- Saving to and restoring from file
- Print of extended and short load sheet

For jack-ups:

- Leg load distribution
- Preloading with optimized ballast water distribution

For semi-submersibles:

- Optimized distribution of ballast water



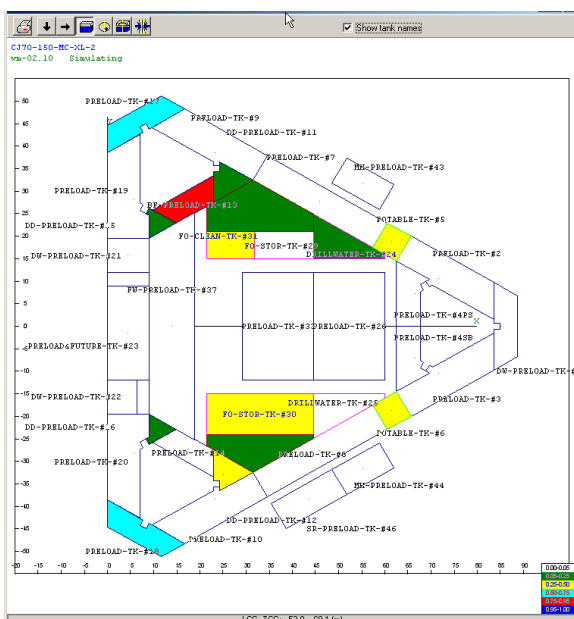
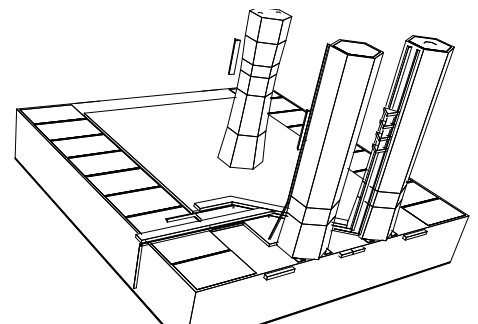
Hydrostatic stability

Functions

The stability module is a full featured hydrostatics program that can handle large heel angles and damaged situations. For this purpose, the shape of the unit is modeled by plane elements for which the program evaluates the hydrostatic force. The calculation module has been approved and accepted by the major class societies.

Features

- Subdivision in compartments
- Exact hydrostatic calculation
- Determination of equilibrium position
- Determination of righting arm curve optional with:
 - free trim
 - down-flooding
 - spillage of hoppers
- Determination of hydrostatics
- Intact and damaged conditions
- Compartments can be filled
- Fixed support points which are only active when compressed (i.e sea bed support)
- Springs
- Wire frame plot, optional hidden lines removed

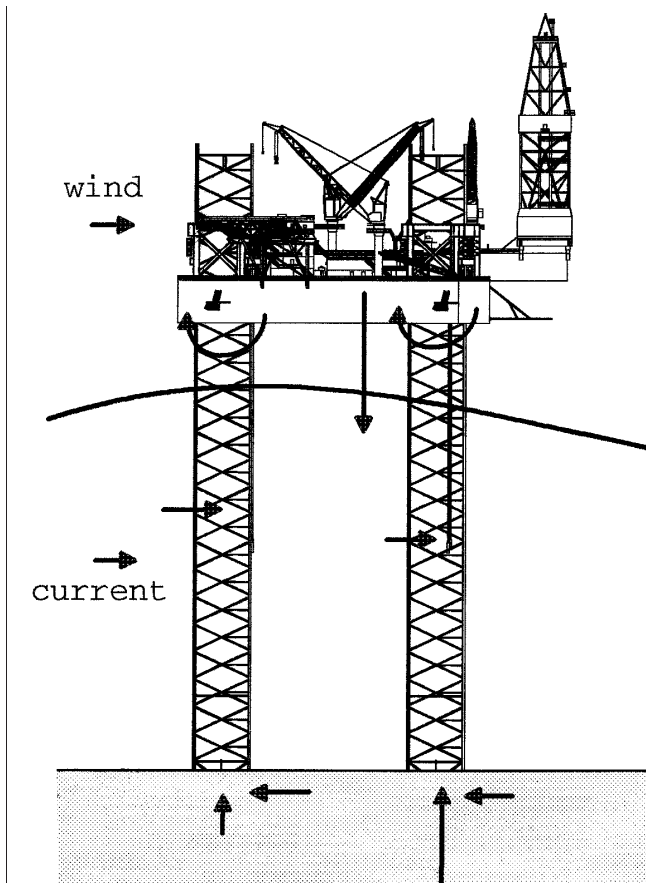


Site assessment

Functions

The purpose of the site assessment module is to analyze a jack-up's capability to sustain a set of user specified weather conditions. The analysis is done by applying the steady wind-current loads and letting the wave pass by the structure. This gives important data and response results like overturning moment, footing reaction, and leg bending moment. The program checks these parameters against the allowable values. These allowable values are related to the operating mode of the unit (jacking, preloading, operational, survival).

The use of this program is mainly for analyzing the fitness of operating the unit in a specific water depth and environmental conditions beforehand.



Features

- Regular wave, subdivided in 40 steps
- Appropriate wave kinematics model determined by the program (Stokes 3, 5 or Airy)
- Morison's equation (CM-CD)
- P- effect included
- Leg to hull connection included as rotational springs

- Current profile
- Calculation of natural frequency
- Use of dynamic amplification factor (DAF)
- Check on:
 - overturning stability
 - leg bending moment
 - leg sliding
 - pre-loading capability
- Saving and restoring of a situation on file
- Print of results in a report

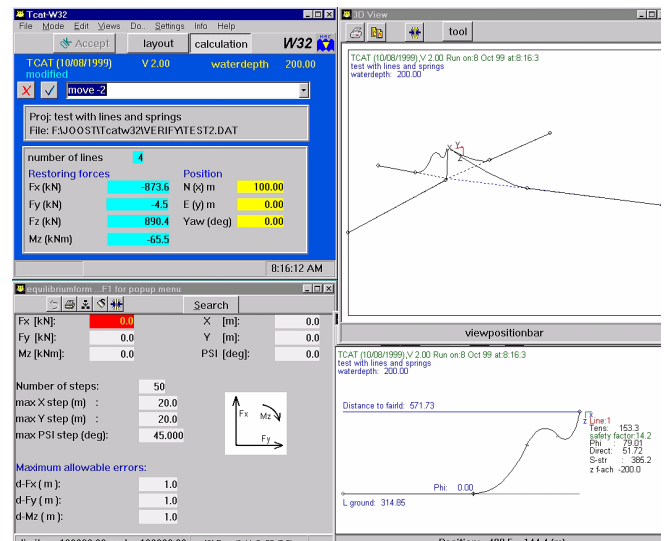
Mooring analysis

Functions

The mooring analysis program is used for analyzing the static behavior of mooring spreads. The user can specify the layout using pre-defined or customized line types. The program is characterized by a quick definition of the mooring system and a good control over the desired calculations. The program can also be used in a monitoring mode, whereby the mooring line tensions are fed in automatically.

Features

- Multi-component lines
- Elasticity is included
- Forced excursion
- Equilibrium calculation
- Slack lines
- Single line can be handled
- Interactive layout definition
- Broken lines



Dedicated software

GustoMSC's technical expertise extends beyond the given examples. By using existing program modules and our understanding, we can develop new software dedicated to a specific task.

In the past, GustoMSC has made several programs, such as:

- On-line motion analysis
- Interactive determination of towing resistance
- Determination of motions for a given sea state
- DP analysis
- Leg penetration calculation

Hardware, operating system

The OSS software runs on IBM PC compatible computers using the MS Windows operating system.

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