

Jetty management systems

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Much has been written about mooring and monitoring LNG vessels at both their export and import terminals, but quietly in the background oil terminal operators have been looking to upgrade their facilities to take larger vessels without the need to carry out major construction work.

As the company that originally developed mooring load monitoring (MoorAlert) in the early 1970's and subsequently developed the first fully integrated berth management system (BerthManager) in 1990, Strainstall is in a unique position to offer a complete solution with a proven track record to jetty owners and operators. The combined ability to design and manufacture both the quick release hooks and instrumentation has been a significant factor in the success Strainstall has experienced in the number of oil and gas projects both currently in hand and expected within the next few months. An example of Strainstall's success in a demanding workplace is the supply of over 30 MoorAlert systems to import terminals in Japan since 1980, which are the only approved systems in use. Strainstall is also currently upgrading the electronics on a number of early terminals.

An example of a current project is the upgrade of an oil receiving terminal where the old hooks and separate capstans are being replaced, and a BerthManager is being supplied for two adjacent VLCC jetties. The owners decided they wanted quick release hooks with integrated capstans, electric local/remote release, mooring load monitoring, speed of approach, a large digit display to provide the vessel data on speed of approach and distance, an integrated berth management system in the main control room and the ability to display and control the system from a jetty office in a hazardous area on the loading platform. The system integrates both jetty systems on one display system in the control room.

Quick release hooks

The basis of any safe mooring system is the quick release hook. The Strainstall quick release hooks are unique as they have been designed to provide full mechanical protection to the release mechanisms and to incorporate load monitoring. The hooks selected for this project are double and triple configurations and include integrated capstans, electric/remote release and load measuring pins (see Figure 1). The electric release activation device is completely integrated into the hook



Figure 1. Jetty fitted with quick release mooring hooks.

assembly. There are no protruding parts that can be damaged by the mooring lines, and in addition there is a direct connection between the hook release mechanism and the release activation device. The hooks are fitted with a non-contact sensor to monitor the status of each hook, i.e. whether open or closed.

Each hook is proof tested to 150 per cent of its rated load and the release mechanism is tested at full load rating in our own test facility, witnessed by a surveyor from an independent Classification Society. They are supplied with complete material certification and traceability.

The hooks can be released locally by activating a button on the hook motor starter enclosure mounted on the rear of the hook, and remotely from the control room and jetty office (see Figure 2) through the software, or in the unlikely event of a computer failure, through a hard wired emergency release.

MoorAlert - mooring load monitoring

The load measuring pins are designed and installed into the quick release hooks to provide a constant real time monitoring of the loads on the hooks directly due to the tensions in the mooring lines.

Strainstall has been designing and manufacturing load measuring pins for nearly 40 years and the design utilises the almost unique experience gained over this period and provides a reliable, totally environmentally sealed unit that will perform reliably over the life of the installation (see Figure 3).

The signals from the load pins, together with the hook status sensors, are conditioned by a network interface mounted in the hook starter enclosure on the rear of the hook. This then allows the digital signals from all the hook sensors, together with all other system sensors, to be transmitted over a simple two wire loop to an interface unit on each jetty. Due to the distance between the jetties and the control room a fibre optic system is used to transmit data from the jetties to the control room and from the control room to the jetties.

DockAlert - speed of approach

DockAlert provides protection of the jetty infrastructure by indicating the approach speed so that it may be kept within the jetty operating

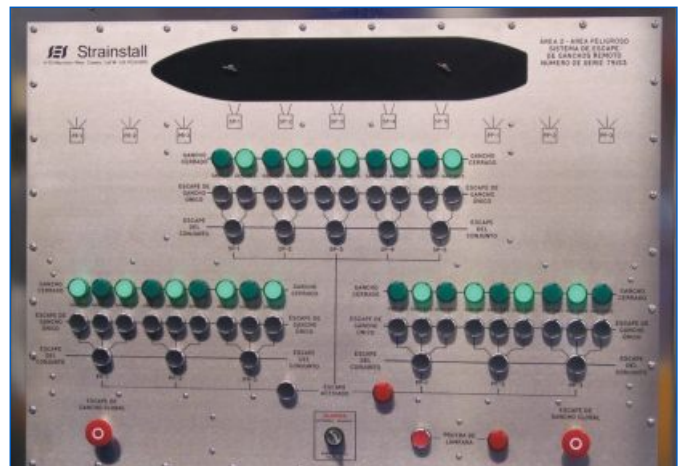


Figure 2. Remote hook release panel.



Figure 3. Load pins with network interface unit.



Figure 4. Eye safe laser unit.

parameters. Once the vessel is safely moored the system will also monitor any drift-off of the vessel and provide warning to the operators. The system has two eye-safe laser units (see figure 4) installed on each jetty and aimed perpendicular to the berthing line. These measure the distances of the bow and stern from the jetty and calculate the speeds, together with the relative angle of the vessel to the berth. Data from the lasers and from the hook sensors is incorporated into the network loop for transmission to the control room display.

DockAlert - large digit display

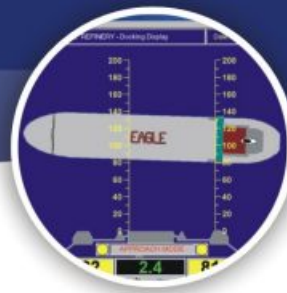
A large digit display is provided to give the pilot and vessel captain information on the speed of approach to and distance from the jetty. The display is visible from the vessel at 200+ metres and provides distance from and speed of approach to the jetty of the bow and stern of the vessel, and also the relative angle of the bow and stern.

The Integrated Approach to Total Jetty Monitoring & Management

- Mooring Load Monitoring
- Speed of Approach Systems
- Environmental Monitoring
- Load Arm Position Monitoring
- Berth Management Systems
- Quick Release Mooring Hooks
- Quick Release Towing Hooks

Strainstall monitoring and management technology is amongst the most advanced available in terms of flexibility and functionality in use.

Installed in many oil & gas terminals worldwide, we provide real-time interactive data during the critical phases of vessel approach and mooring management. Our systems not only improve terminal efficiency, but also ensure that safety requirements are met and any potential risks reduced.



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The world of load measurement and stress analysis

Incorporated in the display are arrows indicating whether the vessel's speed is increasing or decreasing and 'traffic lights' that provide warning of speed against user-defined alarm set points. If the speed is within safe parameters green lights show, if the speed is approaching the alarm level the yellow warning lights show, and if the speed exceeds the alarm level the red lights are illuminated and an audible warning sounds.

As the two jetties are side by side and docking will only take place at the jetty one at a time, only a single display is supplied. This is mounted on a pedestal incorporating an electric motor and turntable that allows the display to be rotated to suit either jetty. The rotation is controlled either locally on the display pedestal, or remotely from the display computers.

Hazardous area remote display

Strainstall is supplying a PC suitable for use in Zone 1, which will be installed into the jetty office on the loading platform linked to the main workstation in the control room via fibre optics (see Figure 5). This will provide the operator on the jetty head with full graphic displays and control over the system and release.

BerthManager - Integrated jetty management

In addition to reliable sensors gathering data on and around the jetty, a user-friendly interface for the operators with clear displays of data, an alarm facility and data recording is provided. This comprises a DeskTop PC for the main control room running Strainstall's BerthManager software.

This user-friendly software package interfaces the sensors and displays on both jetties so that only one PC is required. This software package allows the operator to store and recall mooring configurations and alarm levels for all parameters; log all data on the PC hard disc; view trends of any measured parameters, output reports, alarm logs, etc., Via a printer and control remote release of the hooks. (A separate emergency hook release is also provided so that in the unlikely event of PC failure the hooks can always be released if an emergency occurs). The system provides outputs to the facility ESD.



Figure 5. Computer suitable for use zone 1.

ABOUT THE AUTHOR

Sandy Thomas is Marine Director at Strainstall UK Ltd. An Engineer by profession, with a qualification in Mechanical and Production Engineering, Sandy has been involved in the design and implementation of advanced Berth Manager systems for over 20 years.

ABOUT THE COMPANY

Strainstall UK Ltd is a specialist designer and manufacturer of load monitoring systems and quick release mooring hooks, and in addition to those described here also supply systems for tendon and riser tension monitoring for offshore oil and gas structures, crane and winch load monitoring and silo content monitoring for both on and offshore use, and the StressAlert II hull stress monitoring system. The company's experience, expertise and application skills have made them world leaders, and they are constantly striving to improve, enhance and develop their systems. Strainstall are registered to ISO 9000:2000.

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