LASSTEC presents the smart twistlock load sensing system

An intelligent system for safer load sensing and accident prevention

Lasstec Sarl, Sciez, France

LASSTEC technology is the first to measure the load "where it really happens," which is directly in the twistlock of the spreader. A specially designed sensor is inserted into the centre line of the twistlock, which measures the elongation of the twistlock shaft when under load. The load data is sent into the crane PLC and is displayed on the monitor in the crane cabin. The system can be installed into new and existing spreaders, and does not require any twistlock or spreader modifications.

The ultimate benefits of the LASSTEC system are:

1. Accurate container weighing and load eccentricity determination in single-, twin- and tandem-lift configurations.
2. Multiple accident prevention advantages.
3. Twistlock and spreader lifecycle monitoring.

Using the spreader twistlock to measure container weights has been tried before with conventional strain gauge technology or with hydraulic load cells. However, excessive torsional and bending forces, as well as dynamic and shock loads prevent these methods from providing consistently reliable and accurate long-term results.

The only area on the twistlock where no torsional or bending forces are present is in the neutral centre line. Fibre optic sensor technology measures elongation of the twistlock and therefore can measure container weights. The advantage of fibre optic over conventional strain gauges is that fibre optics require very little space, are inert to EMI and do not corrode.

The LASSTEC sensor has a diameter of only 3mm and the hole in the twistlock has therefore no measureable effect on its strength. The inserted sensor is encased in steel and the net loss of the cross-section of the twistlock is practically negligible. The patented sensor is of a solid design and totally shockproof. It is bonded into the twistlock with conventional adhesive and cannot be recuperated when the twistlock is replaced. The sensor is therefore conceived as a replaceable item, another feature possible only with fibre optic technology. The accuracy and load-reading repeatability is well within +/-100kg per twistlock. The LASSTEC-developed sensor compensates for the temperature fluctuations of the twistlock.

Making the sensor an integral part of the twistlock allows the lifecycle of each twistlock to be traced. Twistlocks are replaced when they have completed their lifespan and not when the replacement date arrives. Lifecycles are stored and can be retrieved for planned maintenance and accident investigations, if required. Overload situations can be spotted and twistlocks can be replaced to prevent failures.

The cost of the sensor is largely compensated with the optimised usage of the twistlock. An analysis of 4,000 container moves in an RTG application has shown that 25 percent of all moves are below two tons per twistlock (empty containers), and 45 percent are below three tons. Empty containers are not considered as real load cycles. Spreader-makers propose to replace twistlocks after a certain number of container moves, whether these containers have been loaded or empty. On the other hand, a twistlock that has been stretched due to an accident can be spotted right away and replaced. The LASSTEC system therefore makes better and safer use of the twistlocks.

A significant advantage of using twistlocks for weighing containers is that in a twin-lift or tandem mode, all container

The systems detects when a road trailer or railway wagon is still attached to the container, even if only one or more corner is attached.

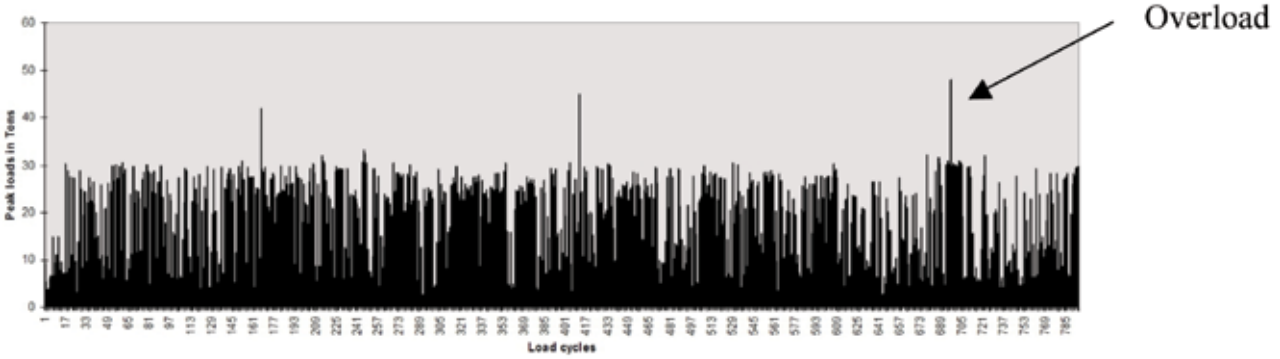
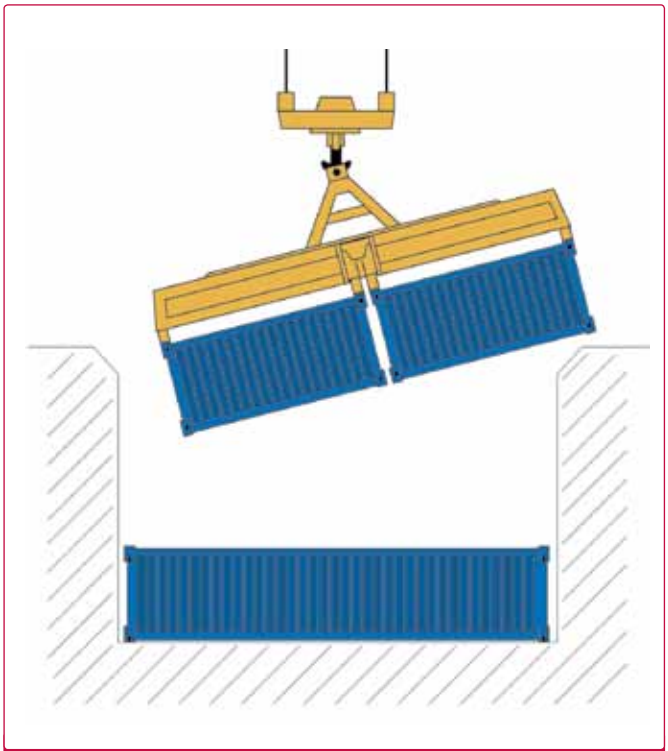


Figure 1. Each line represents a load cycle. Overload situations can be spotted right away.



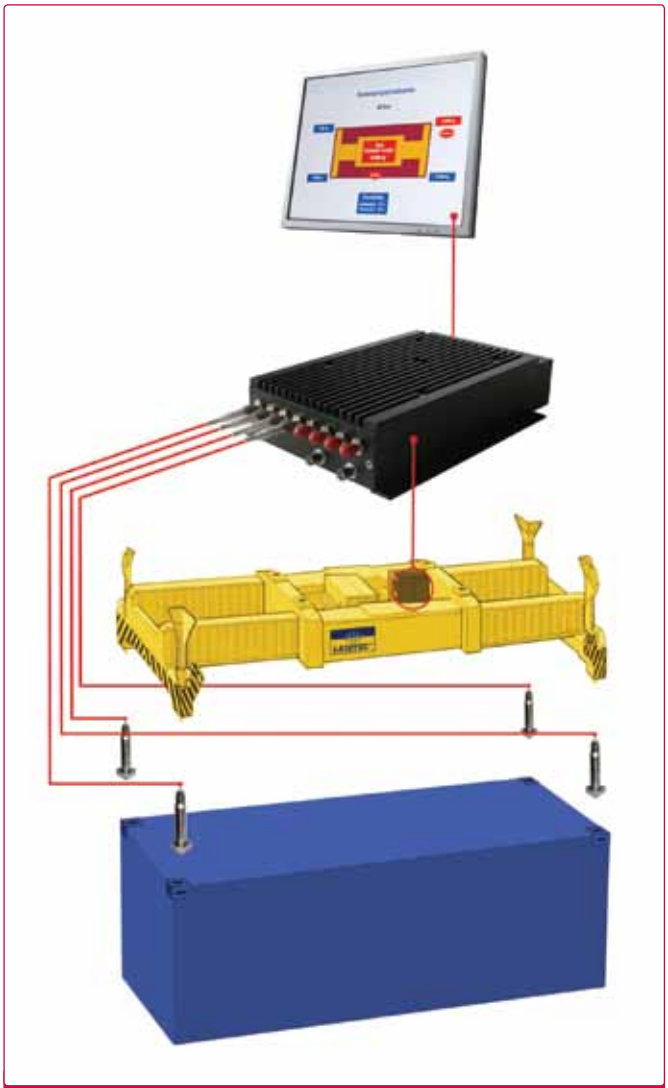
The LASSTEC system detects load eccentricity allowing the spreader to be adjusted to stabilise the load.

weights are taken simultaneously. The eccentricities can be taken into consideration for optimum hoist trolley travelling speeds, during loading and unloading vessels.

In addition to weighing containers, the LASSTEC system provides a whole range of accident prevention features:

- **Snag-load detection in ship to shore applications:** Measuring a snag-load on a twistlock is faster and more sensitive than detecting it on top of the hoist trolley. If one corner of a container is still attached to the stack below when picking it up, it can be detected immediately. This helps to prevent a potentially serious problem, especially in twin-lift or tandem operations.
- **The LASSTEC system detects if a road trailer or railway wagon is still attached to the container, when picking it up.** A container may be empty, in which case a crane's overload detection system may not detect it. The system also detects this potential accident if only one or more corner is attached.

The interrogator is placed in the spreader's electrical cabinet and processes optical signals into CAN-, Mod- or Profibus output signals.



The signals from the interrogator fitted on the spreader are fed back to the user interface, allowing overloads and other safety issues to be quickly identified.

- **Load eccentricity is detected by the system, allowing the crane operator to adjust the tower of the spreader so that the load remains stable during lifting.** Picking up eccentrically loaded containers in ship cells with a mobile harbour crane spreader can be dangerous, and jam when exiting the ship cell. This can be hazardous in twin-lift applications if one container is empty and one is loaded.
- **LASSTEC can also detect if a spreader has landed on the ground or bottom of the vessel hull, to avoid continuous unreeling of the hoist ropes.** In such a situation, the landed pins of the spreader would not be activated and don't signal to stop the hoist system. This feature also allows interlocking twistlocks that have been accidentally left on top of a container corner to be spotted, and does not allow the spreader twistlock to enter the corner pocket when picking up the container from the vessel.

Here the LASSTAC load sensing system is installed in a protective cabinet on top of the spreader.

The LASSTEC system is sold as a 'plug and play' system. It can be added to the spreader by the terminal or by the LASSTEC agent, or it can be integrated into the spreader during manufacture.

The interrogator processes the optical signals into CAN-, Mod- or Profibus output signals. Conversions into mA output signals are optional. The interrogator is either placed in the spreader's electrical cabinet or, if the system is added to an existing spreader, it is placed in a protective cabinet on top of the spreader.

The system was patented in 2006 and has been through rigorous testing and continuous development. Actively marketed since early 2009, the product is now widely accepted by equipment makers and terminals worldwide.

ABOUT THE AUTHOR

Beat Zwygart is Managing Director of LASSTEC Sarl and has patented and developed LASSTEC. Prior to establishing LASSTEC in 2004, Beat Zwygart was the Director of the marketing company of ELME's crane spreader division, which he founded in 1994 together with the Swedish mother company. Beat was born in Switzerland and has a degree in Mechanical Engineering. He is also a member of the ICHCA Panel and of PEMA.

ABOUT THE COMPANY

Lemantec International Sarl patented the LASSTEC (Load And Strain Surveillance Technology) load-sensing and accident prevention system in 2006. The product is now marketed under the brandname LASSTEC by the company LASSTEC Sarl.

ENQUIRIES

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