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Hi-tech aids performance and safety

Remote controls with built-in screens can integrate camera feeds.

It has been almost 50 years since man first walked on the moon - an amazing achievement at the time considering the technology of the day was analogue and the most basic of computers the size of a house. Since then technology has advanced beyond all recognition, with the arrival of the internet and smart phones and is millions of times more powerful than NASA's computers in the 1960's. The pace of development, far from levelling out is accelerating at a pace far faster than engineers can keep up with.

The lifting sector has seen more than its fair share of the changes, with new developments almost weekly offering better, more efficient ways to buy, rent, maintain, or operate equipment. The buzz word in recent years has been 'telematics' - a combination of wireless technologies and computational systems. The word itself is derived from the French word 'télématique' - a merger of 'telecommunications' and 'informatique' - coined in the late 1970s about the computerisation of society particularly the transfer of information using telecommunications. In the commercial market it now generally refers to vehicle telematics.

Development in all areas still continues apace but with other technologies now taking the limelight. If you thought Virtual Reality (VR) was the latest technology in the lift market, think again. Augmented Reality (AR) is now at the cutting edge with several access companies - such as Platform Basket and JLG - already working on integrating it into their product offerings - but it is still a little way off yet. The new technology sweeping in is aimed at providing easier, more cost-effective and efficient ways of carrying out everyday tasks. It is also no longer just about components but about how those components can connect with each other to create intelligent sub-systems that dynamically adapt and respond to machine and user requirements.

Today there is way more computing power in a child's pocket than scientists had to send a man to the moon

Radio remote controls

One of the first popular uses of telecommunication technology in the lifting sector was is the radio remote control of equipment such as loader cranes, self-erecting tower cranes and more recently aerial work platforms and spider cranes. On loader cranes take up for remotes now exceeds 60 percent and far higher on larger machines. While there are still users who prefer to keep equipment simple and supposedly more reliable and easier to fix, manufacturers know that the future is in the opposite direction and are driven to develop the very latest technology in order to keep themselves at the forefront of equipment design and production.

Remote controls are of course an extension of the main controls that simply allow the operator to position himself in the best location to see the lift, and even move around the work area to gain a better perspective of the operation or keep a safe distance from the machine when necessary.

Manufacturers have strived to make the remote controller consoles as all-encompassing as the main controls on the cab, with ever more comprehensive and sophisticated graphic-displays. Those with built-in screens are also able to integrate camera feeds to display interchangeable live video footage from a number of cameras mounted on the equipment, eliminating blind spots and giving the operator an even better view of the work.

Italian company Autec has been at the forefront of such controls for self-erecting tower cranes for a number of years. Its AIR Series now include dual band radio frequencies - 433MHz and 915MHz - automatic frequency search at start up, this together with automatic frequency search at start-up means better reliability, faster response to commands and fast switching in case of interferences. The AIR also

An Autec remote control

Autec has been at the forefront remote controls for self-erecting tower cranes for a number of years

includes a four light arrangement for system feedback, two or three-axis digital or analog joysticks, and a user identification function that allows the creation of individualised access avoiding unauthorised use and user tracking. The key holds the unique address of the radio control which is not reproducible and information that defines the operating mode. A tower crane for example typically has sensors that detect the weight lifted by the hook, the hook height, the position of the carriage on the jib, the load moment and the wind speed. Thanks to continual bi-directional communication, information on the status of the machine can easily be sent and displayed on the operator's remote control unit.

SiteZone personal safety monitors

Operator safety is currently one of the biggest drivers of new hi-tech products in the lifting sector. One of the latest to hit the market is SiteZone - a new telematics proximity warning system that uses sensors to alert site workers if they are straying too close to or in the vicinity of mobile cranes, telehandlers, aerial lifts and other vehicles or equipment. By combining it with Trakm8 telematics - which collects a huge amount of data used to score driver behaviour, monitor vehicle health and continuously improve the security and operational efficiencies of customers' vehicles - site managers can spot trends and eliminate potential accident hot spots.

SiteZone uses RFID (Radio Frequency Identification) to produce a detection zone around the machine or even a restricted area. Using vibration as well as audio and visual alerts, it warns the machine operator whenever a pedestrian is within the vicinity as well as warning the wearer that their safety is compromised.

OverSite - which combines SiteZone's RFID technology with telematics and Big Data analysis from Trakm8 - goes one step further, by providing real-time alerts on zone breaches to site managers, as well as the analytics that contractors can use to identify and eliminate bad practice. Hosted in the Cloud, users can remotely access OverSite via a dedicated log-in. A dashboard provides key performance indicators such as the number of unauthorised breaches of a safety zone and the amount of time spent within it. The user-friendly system also enables managers to quickly generate reports that highlight key issues and trends. This helps companies effectively monitor the interaction on site between vehicles, equipment and personnel. Managers can then use the information take steps to change behaviour or provide re-training. Hot spots - where equipment and people are frequently required to work in close proximity - are easily identified and monitored more closely to help reduce the risk of further incidents.

SiteZone alerts site workers if they are straying too close to working equipment

A VR headset

Virtual Reality and Augmented Reality - VR and AR

Over the past few years an increasing number of companies have been developing Virtual Reality systems, primarily for training purposes. Most of the pioneers have been the large manufacturers such as Liebherr, Manitowoc and Hiab, although more recently there has been an explosion in the number of smaller software companies developing systems.

A prime example of how the technology is changing helping change the way we work is Hiab's HiVision, a VR remote control system which is now in production and deliveries underway. Developed for operators using its forestry cranes in very cold climates such as in Northern Scandinavia, the system allows the operator to remain in the warm cab and operate the crane from the passenger seat with his back to the crane and the cargo, avoiding the freezing conditions and risks such as slipping on ice when climbing to the elevated operator crane cab. And by doing away with the external cab the weight saved means more timber can be carried.

The system uses a camera with wide angle lens mounted on its own folding mast which sits about a metre above the slewing axis of the crane, giving the operator a 270 degree view of the both the crane and work area. The live image is seen by the operator using VR goggles sitting in the passenger seat with a set of joystick controls to operate the crane. A year after it had its first public showing, Hiab delivered its first crane equipped with the system to a customer in Sweden. The customer says that it only took a short time to become accustomed to the new system and that in addition to the stated advantages it has helped improve productivity, not only saving the time to reach the external cab, but also speeding cycle times, possibly due to the improved view of the overall work.

VR training

The improvements in 3D graphics and software has provided developers with the ability to create life-like simulations, ideal for operator training of aerial work platforms and cranes etc... Now machine novices and the unexperienced can learn and experience real-life situations - some dangerous - in the safety of the training room environment. At Conexpo there were at least five companies offering VR training, some with compact light weight mobile units using a lap-top that can be used on any small table or desk with VR goggles, and others with full mock-ups of crane cabs or work platforms with motion seats or platform floors, both of which add a realistic feel to the audio visual output.

While the goggles are the best option in that no matter where the operator looks he remains in the virtual environment - this is particularly useful for crane operation when looking up to the boom nose and back down to the load is essential - some users can experience a sort of 'motion sickness' as the brain tries to

Riwal managing director Norty Turner trying out JLG's VR training set-up

straddle the real and the virtual.To this end developers find keeping the virtual slightly unreal is best. Even some of the systems that use the large screens, can cause issues as movements in the motion seat reproduce the feel of large variables such as wind speed leading the 'operator' to feel quite queasy. However overall, all of the latest VR systems we have seen and briefly tested provide excellent training on a wide variety of machines, so the system chosen is likely to come down to the user requirements and budget.

AR versus VR?

Many companies are currently working on AR - Augmented Reality - but what is it and how does it differ with VR?

AR and VR are dissimilar but they have one thing in common - they have the capacity to alter our perception of the world. VR can transpose the user to another place through goggles, visor or screens, blocking out everything around. Augmented Reality takes the current reality and adds something extra. One analogy may be comparing scuba diving to going to an aquarium. With VR you can swim with sharks, with AR you can watch a shark jump out of your desk.

Italian spider lift manufacturer Platform Basket - using a local software development company - is already demonstrating the first stages of an AR system which it plans to use to provide full information on each of its products. The long-term aim is to provide users with details about each machine such as workshop and parts manuals via a screen or Smart phone - all paperless.

Although still in the earlier stages it currently has all the performance information and a 3D scalable and rotatable image with features such as changing the colour schemes and adding or removing the various machine options, similar to an online car configurator. As the system advances it will include a breakdown of the machine with full parts diagrams and information on diagnostics and repairs.

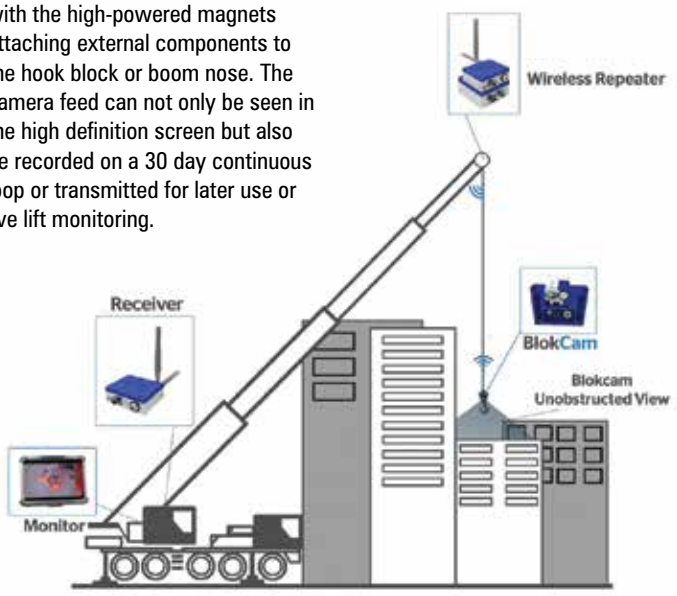
There are already a large number of systems that can collect an enormous amount of data from machines but what can we do with it? If there is a technical problem most machines can now generate a general fault code which can be transmitted remotely to the manufacturer or communicated by more traditional means. However, there are already products on the market, such as the Haulotte Activ Screen, that indicate exactly what and where the fault is with a full colour illustration and can even explain how to fix it! It is all about using the mass of data being generated in a user friendly interface.

Boom and hook cameras

While the original Orlaco boom tip camera has been on the market for more than 15 years, lower costs and high definition cameras are making the technology more widely available and adoption of such systems is on the increase making lifts safer and more efficient by giving the operator a clear view of the load and surrounding area, even when it is out of direct view. This is such an obvious benefit that it must someday soon become standard equipment.

BlockCam is one of the more recent wireless camera introductions, it can easily be installed to the hook block or boom tip of the crane with the live HD 1080p audio visual feed transmitted via an antenna system to a high definition screen in the cab. The information allows the operator not only to clearly see the load and surrounding area, but also hear what is going on and even receive instructions from the signaller/banksman without the need for a radio. A BlokCam system can be installed in about an hour with the high-powered magnets attaching external components to the hook block or boom nose. The camera feed can not only be seen in the high definition screen but also be recorded on a 30 day continuous loop or transmitted for later use or live lift monitoring.

VR can transpose the user to another place - Augmented Reality takes current reality and adds something extra



Wireless camera systems such as from BlockCam can easily be installed giving the operator a clear view of the working area from the cab

Improvements in communication technology, computing power, higher resolution cameras and vastly improved batteries, together with highly accurate GPS is changing the way machines are designed, work and interrelate at a pace which manufacturers are only just beginning to understand. Those who grasp the potential at the right time will reap the rewards.

Part of the OverSite system fitted to an excavator cab

The Haulotte Activ Screen indicates exactly what and where the fault is with a full colour illustration

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