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Early HBC controllers



CONTROL EVOLUTION

Since the turn of the millennium, there has been a radical change in the way several crane types and models are operated. Will North spoke to Potain's Remi Deporte about the changing face of remote controls in the self-erecting tower crane market.

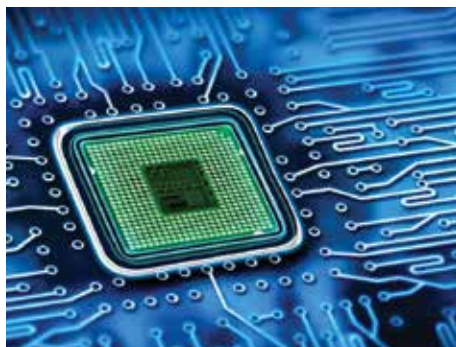
For those of us in our forties and older, there is a deeply nostalgic charm to the recent crop of 1980s set shows like *Stranger Things* or *The Americans*. For a while, we are returned to a world where phones had curly cords and if you wanted to know something, you had to ride your BMX to the local library and perhaps use a microfiche to look it up. For a younger generation, it must be somewhat mystifying to think that anyone ever got anything done in such a slow and laborious world, or to conceive that we had parents who never knew what it meant to swipe right.

NEW TECHNOLOGIES - IMPROVED PRODUCTS

A bundle of related technologies including silicon chips, more reliable wireless communications, efficient data compression and encryption, and high resolution display screens, have propelled these changes and have in recent years, reached a degree of maturity and rugged reliability. In most of the last decade, a new mobile phone

would always feel significantly better than one purchased a couple of years earlier: the screen would be sharper and unlock more easily, the built-in camera gained big camera resolution, apps became mainstream and were more responsive. Today, for most users, even a cheap phone will do pretty much everything you need, and only be worth replacing when it is broken. Only the most ardent technophiles or professional users will have any real reason to be excited about the more incremental changes now seen in the latest products.

While this bundle of technologies has radically changed our lives and been increasingly adopted across a wide range of consumer products, how has it changed the way cranes are operated? A growing number of lifting products including loader cranes, tower cranes, spider cranes and even All Terrains, now feature a radio remote controller with a high definition colour screen, and it is rapidly becoming the default way of operating such cranes.



REMOTE CONTROLS

Only a few years ago, wireless communications were often unreliable, data fed back from the crane would be limited and would be displayed using LEDs or on a low resolution black on grey LCD. That has now all changed with reliable wireless communications taking in a wide range of data from sensors throughout the crane, even employing high resolution video cameras to display specific views in real time on an easy to read screen.



WITNESSING 24 YEARS PROGRESS

Remi Deporte is senior product manager for the Potain self-erecting tower crane line at Manitowoc. He joined the company in 1988, the same year that early PC networking company Quantum changed its name to America Online, or AOL, and set out on a path that would see it send out the tens of millions of CD-ROM installers that would give most users their first experience of 'surfing' the World Wide Web.



When Deporte joined the company, crane controls were also on the brink of a technological step change. The standard controller for a self-erector even late in the 1980s was a push button or joystick pendant control. Even that gave operators a new freedom: many operators had previously worked from a standing platform on the crane's slewing base. The arrival of a cable allowed them

An early picture of engineers working on tower crane controls



to move a little distance from the crane, for a slightly better view of the lift.

"If the operator wanted to be closer to the load, they had to step away from the crane and use the wire, although the link between the transmitter and the crane was really difficult to work," says Deporte.

Through the late 1980s and 1990s, wireless controls became more commonplace on consumer products, but data was still expensive and cumbersome to transfer wirelessly. Pagers, the closest thing most people would come to mobile communications, could send a string of maybe 16 numbers. Likewise, Deporte says, while wireless remotes began to be offered on cranes in the 1990s, they were still an expensive option, suitable for only specialist applications.

"We started to have the radio remote control as a standard part back in 2000 when we launched it with the Igo range", he says. "Since then we have really moved to make this a standard part of the Potain self-erector."

The difference between the operator experience on a larger top slewing tower crane, and a bottom slewing self-erector, is stark. "For a top-slewer on a big job site, we have always said that the best position to drive a crane from is the cab, because you have the best view of everything," says Deporte.

If you are working with a jib of 60 metres or more, it is far better to be above the site, to see where you are picking up the load and where you are putting it down. For a self-erector, with a jib of half that length, and perhaps not using all of that, it is far more practical to walk with the load.

TOP SLEWERS OR SELF-ERECTORS

"For a self-erector, the sites tend to be different, a bit smaller, often a low rise housing development. In this case, we think that being close to the load is even better, giving more accuracy. It's a real advantage."

There is another significant difference between self-erectors and top slewing tower cranes. Operators working on large tower cranes will always be skilled specialists. With self-erectors, operators have usually received some level of training, especially on sites run by larger contractors, but they are rarely dedicated tower crane operators and will often work on other tasks, employing different skills, as well as using the crane.



"We make the radio remote control simple enough for those people," says Deporte, "so they can easily use it to place a load from point A to point B. But the big advantage is that they are also able to do something else on the job site. This really boosts productivity and is ideal for the sort of customers we are targeting with small self-erecting cranes."

On those first wireless remote controls, functions were quite limited, both to keep the crane easy to use, but also because of the limits of a system based on levers and joysticks. Only so many controls could be squeezed into one transmitter, without it becoming cumbersome or complicated.

A Potain modern remote being used by Remi Deporte





One of the challenges crane designers face when they look at the latest technological changes, is that this is a fairly small low volume industry. No one, for example, is going to invest in designing effective battery power for roadgoing cranes alone, instead, the mobile crane industry must wait on the larger automotive manufacturers and their suppliers, for suitable batteries to come to market.

VFD AND SCREENS - GAME CHANGERS

Variable frequency drives (VFD) first came to the market in the 1980s. Prior to that, industrial

motors had only two modes: off and on. VFDs can accelerate and decelerate smoothly and progressively as required. Initially, they were restricted to larger applications, but soon became small and cheap enough to be used across the electric drive sector. When they were introduced to the crane industry, they could be combined with proportional joysticks on a control box, giving the same responsiveness as a fully hydraulic control lever. This has clear advantages when trying to avoid load sway, for example, but could not have been developed for the crane industry alone.

The same was true of display screens. Even in the decade following the millennium, displays on remote controls were only just beginning to come to market. Flat screen TVs and computer monitors had entered the market in the 1990s, while the iPhone, with a screen size more comparable to that which would fit on a crane control, was launched in 2007. Soon after that the production of increasingly high resolution full colour small display screens became a big business.

The development of these screens led to another step change in crane control systems. In the cab, operators now use touchscreens to switch between functions, view data and input settings. Touchscreens are markedly less useful outside the cab, where operators may be wearing gloves and the job site is often muddy or dusty with very bright light.

But high resolution screens alone, combined with simple controls like joysticks, levers and dials, can still make controls much more useful. When switching between modes, the controller can display the changing function of each control mechanism. Sometimes, line of sight obstacles between operator and load mean that it is still tough to see the full load path. With a camera and screen, the operator can still have a clearer view of the load as they work.

When Potain launched the Igo range, its first remote control included a display. "It was not a big display," Deporte says, "but the operator

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could read the main indications for the radius, the height of the hook, the crane's load moment, the maximum load of the crane, the wind speed and some other information too."

With the launch of the Hup range, first shown in prototype form at Bauma 2016, the remote control included a 2.4 inch full colour display screen. "This really made a big difference with compared to the Igo. We use it to give information to the crane operator, but we also use it to give indication and notification to the crane installer who is erecting the crane."

It's now a key selling point of the Potain self-erectors, he says. "We call this the smart set-up function and it is available on the Igo T 99 but also on Hup 32-27, Hup 40-30, and also on the small Hup M 28-22. The installer is guided step by step through the erection process of the crane." Like any good on-site supervisor, it doesn't just tell the fitter what to do and show them how it is done, but keeps a friendly eye on their work, making sure that nothing important has been missed.

"Through this interface, we ask them some questions, which they sometimes have to validate," adds Deporte. "For example, we make sure that they have put the right quantity of ballast on the crane. We cannot measure it exactly, but we ask through a pictogram. 'Did you make sure that you put on the right quantity of

ballast?' and the crane fitter has to say yes, and to validate. This is a way to make sure that they are doing the right thing at the right moment and it is a way to avoid any wrong manoeuvres."

In the decade leading up to the mid 2010s, crane manufacturers like Potain made use of newly abundant VFDs, proportional joysticks, colour screens and reliable radio communications to

transform how cranes are erected and controlled. Today, we can see another bundle of new technologies on the near horizon, including AI, digital modelling and reliable long distance, large scale, data transfer, beginning to transform our daily lives. In the next article, we'll take a speculative look at how these might be implemented in the crane industry. ■



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