

ALL THE ORIGINAL INGREDIENTS

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Almost but not quite...

Elsewhere in this issue of **Cranes & Access** we feature a niche product that has not reached anywhere near its full potential - mobile tower cranes. Unfortunately, mastclimbers also fall into that 'almost but not quite' category.

Like the mobile tower cranes - and also spider cranes - the benefits mastclimbers can provide those that work at height on certain types of construction or refurbishment projects are enormous, yet all too often more traditional forms of access equipment such as façade scaffold or swing stage suspended platforms are used - even when the mastclimber could transform productivity, safety and convenience. Mostly this is due to a lack of knowledge or lack of available equipment.

Perhaps one reason they are not as popular and more widely used is that some people view mastclimbers with suspicion - assuming that they are overly complicated or too expensive. Nothing could be further from the truth. A mastclimber is simply a platform with one or two masts and a rack and pinion drive system that could save the client - those two magical words - time and money.

Not even scratched the surface

If we look at the UK for example, while the handful of rental companies offering mastclimbers have seen a noticeable improvement in the awareness and usage over

the past few years, there is still a long way to go. The sector has only made a fractional percentage of penetration into the façade access market. Historically poor rental returns in the sector led to a general lack of investment in new equipment, along with a lack of the engineering skills required to plan and adapt equipment to the varying size and complexity of many building designs.

The decision on whether to use scaffolding, hoists or mastclimbers is never straightforward and often results in a combination of two or all three being used. Crash decks and pedestrian access cover at street level can be easily carried out with scaffolding, but then a choice of scaffold, mastclimbers or suspended platforms could be used above that. Providing the best mastclimber/scaffolding combination depends on height, length, contract time and schedule of work. There is never a straightforward solution. And far from being only ever used on straight façades, mastclimbers can be adapted to go round corners as well as on curved and circular structures.

When to use a mastclimber?

There are no fixed rules on which



c&a

mastclimbers



type of access to use for a particular contract. Some companies say mastclimbers should be used on projects more than 20 metres high, however façade scaffolding is generally considered to be cost-effective up to 45 metres. Obviously the taller the project the more the advantage swings towards the mastclimber.

We have used this example before but it does illustrate the possible benefits: When constructing a building 100 metres long and 25 metres high i.e. 2,500 square metres the mastclimber solution is said to offer a cost saving in the region of 60 percent. Alternatively, construction time may be the crucial deciding factor. For example, if the contract needs the access system for more than 20 weeks then façade scaffold might prove to be more cost effective (depending on the type of construction and scheduling of the works). It should always be remembered that higher scaffolding usually requires a hoist to move people and materials from ground to platforms, along with an operator all of which has to be factored into the costings. Also a method of distributing the materials once they are delivered to the correct floor.

When all is taken into consideration the 20 week contract length tends to offer the most accurate decider.

Other factors such as aesthetics or security

Even after all this there are still other factors that may affect the choice including the aesthetics of the building which can be very important during refurbishment work particularly on large residential tower blocks and historic or landmark buildings. The more discreet mastclimber is infinitely more preferable than looking at a scaffold-clad building for weeks or months on end. Whereas when the mastclimber platform is usually parked in the lowered position when not in use, it is often difficult to see the masts on the building elevations.



Mastclimbers use a platform, one or two masts and a rack and pinion drive system

Mastclimbers also have another advantage in that there is less repair work to the building after the masts have been removed because of the reduced number of anchor points. Where space on the ground around the building is in short supply, mastclimbers can use a cantilevered gallows bracket allowing them to be positioned further up the face of the building - say on floors one or two - leaving the ground clear. A mastclimber also leaves the building more secure overnight than a scaffold which provides access to upper floor windows.

One platform or two?

Double stacking platforms on the same mast or masts is also possible but often not as appealing as it might at first seem. Not a common sight it can only be used on relatively tall buildings where different trades are working at different levels at the same time. However, platforms must be at least three metres apart and the lower deck must have protection from falling materials from above. Add in how you get materials to the upper platform and often there are more

cost effective and efficient solutions. It is also usually better to have several machines along the building facade rather than fewer longer platforms. More machines allow different trades to work at different speeds, with a great deal more flexibility than tie every one up on one long platform and reducing efficiency.

Not a regular rental machine

But perhaps one of the main restrictions to the growth in mastclimber availability is the amount of support and back-up they require. It is not a piece of equipment that can just be hired out - there has to be an approved design, and erection and dismantling by trained operatives. This is also true of traditional scaffold, but a substantial infrastructure and industry is already in place and ready to compete with anyone looking to muscle in with mastclimbers.

Mastclimbers are more popular in certain regions and countries. North America has always been keen, with a strong tendency towards all

forms of powered access, so too the Netherlands, Scandinavia and surprisingly Eastern Europe. In Western Europe main contractors are still learning although this is improving as they move between projects and see more of them in action or experience their benefits directly.

A range of duties

As mentioned at the beginning mastclimbers are relatively simple machines, however given their wide variety of applications they are used for, from bricklaying and cladding to painting and fixing windows - several types are available, including heavy, medium and light duty. The difference in 'duty' indicates the platform capacity that each can handle, particularly when heavy materials such as bricks are stacked on the platform.

As in many industries there is also a wide variety in purchase price



Mastclimbers provide far better building aesthetics and security than scaffold

and quality, growing even wider as Chinese-built machines become available. However most established rental companies/mastclimbing contractors are not tempted because the cost saving can be quickly eaten up by poor quality and reliability.

The following three job stories illustrate a range of solutions found to carry out specific tasks. There is often far more than one solution for a project but sadly too many contractors stick with the method that they have always used rather than risk trying something new. As with all equipment choices, an open mind may well be the best way forward.



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Brogan at Battersea

UK based Brogan Group is currently providing an all-encompassing access solution incorporating mastclimbers, scaffolding and goods/passenger hoists on Phase 1 of the Battersea Power Station development on London's south bank.

Circus West, designed by Simpson Haugh Architects and de Rijke Marsh Morgan, consists of two blocks - known as RS-1A and RS-1B - which include a mix of 866 apartments including 11 penthouses, retail facilities, theatre space and business studios. The blocks vary in height from eight storeys at the southern end of the site to 18 storeys at the north and are built on a podium with two levels of basement parking.

Brogan - in conjunction with Carillion and Network Rail - designed the scheme and erected a large gantry to support the various mastclimber platforms used for cladding the elevation that runs parallel to the Battersea Park station to Victoria rail line. Mastclimbers were chosen for this task because of the close proximity of the building perimeter to the rail line, as well as the programme schedule, safety (the avoidance of anything falling from height onto the railway line) and to minimise risk of distraction to train drivers.

A combination of twin and single mast machines have been installed, several of which have sliding platforms to allow those using them to navigate past protruding balconies. The building also curves slightly so the mastclimbers were

erected to follow the line of the building. As standard mast ties would have interfered with the fixing of the glazing and copper façade panels, specially fabricated brackets that rake down to the top of the balcony locations were designed and installed as an alternative.

Brogan has also supplied 17 hoists to feed both RS-1A and RS-1B blocks. The hoists tie into the recessed fissures in the staggered buildings enabling works to continue on the surrounding facades. With maximum payloads of 2.7 tonnes and various car sizes and capacities ranging from 3.2 to 3.8 metres in length, the hoists allow for the fit-out on all floors. Several of the hoists are brand new, have recently been purchased as part of the company's renewal and update investment plans to offer the latest generation of equipment.

Kenny Ryan, Carillion project director on site said: "Brogan won the contract through a competitive tendering process showing innovative solutions to the interfaces between the concrete frame and external cladding. We carried out a factory visit to view the proposed new hoists prior to placing the order and believe that we have bought an excellent product with good run time. Brogan Group is a collaborative



Mastclimbers and hoists at Battersea Power Station

contractor which works well with other contractors to achieve project success."

Brogan's design and fabrication team has provided innovative solutions compared to conventional systems, with significant programme enhancements and cost savings thanks to the combination of mastclimbers and scaffolding. For example on Archway Tower - a 17 storey tower refurbishment project that sits directly above the live Underground Station at Archway, North London - Brogan is providing five, double-stacked mastclimbers mounted on heavy duty scaffold gantries. The platforms are operated independently on twin masts. Due to the location, the platforms could not be built from ground level or from the existing station roof. To overcome this, Brogan designed a cantilevered soldier bracket system fixed to the building façade - located above the station roof - which supports the mastclimbers at four separate locations.

Each mast location required bracket supports to accommodate the four tonne mast loads with fixings back to the structural columns. In addition, the absence of cranes on site required a full deck to be erected across the elevation over the roof, using the same soldier system. This enabled the mastclimber units to be driven into position before being erected to the façade's full height, with an additional function of providing a protection and access deck over the station roof. The stacked platform mastclimber configuration allowed two crews to work simultaneously on the same elevation.



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Over the last 12 months, Brogan has seen a substantial increase in demand for mastclimbers and hoists and is continuing to invest a substantial proportion of its capital expenditure in fleet expansion. The company is also looking to recruit additional staff such as contracts manager, fitters and installers as part of this expansion, while maintaining its zero Accident Frequency Rate achieved throughout 2015 in both the UK, Ireland and the UAE. To date it has clocked up more than 1.2 million man-hours without a reportable accident.



A cantilevered soldier bracket system fixed to the building façade - located above the station roof - supports the mastclimbers at four separate locations.





**Double Stacked Mast Climbers
Archway Tower**



**Heavy Duty Mast Climbers
Tower West, Liverpool**



**Twin Passenger/Goods Hoists
Battersea Power Station**

- "One Stop Shop" Access solution for the building envelope
- Extensive fleet of Mast Climbers, including heavy duty units with 5t capacity
- Large number of passenger/goods and goods only hoists with various payloads and cage sizes
- Pre tender assistance - 2D & 3D scheme development and budget planning
- In-house design fabrication team
- IPAF approved training centre with qualified trainers
- Nationwide Mast Climber and Hoist coverage

Spider solution in New York

Seattle-Spider - a division of SafeWorks - provided a complex access solution for the challenging façade installation on Columbia University Medical Centre's new, 14 storey art education centre in Washington Heights, New York.

The building's unusual architectural design consists of irregularly stacked glass panels supported by delicate glass fins on the south end and an aluminium curtain wall on the north end. The building is made up of a number of concrete floors interconnected by stairs and ramps, creating a vertical campus within the building. To accomplish the design's long cantilevers, the floors are formed of bonded post-

ensioned concrete slabs with a slab void former system used to reduce the self-weight of the slabs.

In the early planning stages of looking for an access solution, specialist cladding designer and manufacturer Josef Gartner USA - part of the Permasteelisa group - contacted Spider to meet all of its rigging and access requirements.

The building's complexity inspired the development of Spider's System Group, a team of suspended access experts which manage complete solutions from concept to completion on the most challenging jobsites. The group - led by Clint Ramberg - worked closely with its engineering team, local New York operation centre and the customer to design a complete access solution.

A custom porch design was constructed on the building's south end for the installation of the large glass panels. Then a monorail system with swing-stage, outrigger suspension and 900kg capacity



CUMC during construction



A monorail system and a material hoist worked in conjunction to safely manoeuvre the panels into position

material hoist worked in conjunction to enable the crews to safely manoeuvre the panels into position while overcoming the multiple, random overhangs of the structure. Three additional custom monorail systems - ranging in length from six to 18 metres - were installed and equipped with material hoists for the curtain wall installation on the north end.

Because of its location on the

windy west bank of the Hudson River, Spider engineered custom catch baskets for electrical cables and double wire rope winders that eliminated the need for safety lines. These features simultaneously protected workers and the delicate façade from dangling equipment. The solution also included eight SC1500 traction hoists, gantries and a custom trolley for the material hoist controller.



Spider's solution included eight traction hoists, gantries, max reach assemblies, OBS frames, and a custom trolley for the material hoist controller.

Alimak at 3WTC

Fourteen Alimak passenger and materials hoists will be used during the construction of Three World Trade Centre (3WTC) - a skyscraper under construction as part of the rebuilding of the World Trade Centre site in Lower Manhattan, New York City. The project needed the largest high speed hoists available and lifting heights of up to 318 metres. The 80 storey building - to be completed in 2018 - is to be 329 metres high and has already reached the 20th floor level.

Of the 14 Alimak construction hoists, six dual hoists are installed with access to shared custom-built aluminium towers. Two of the dual hoist systems are configured with different car sizes to offer the maximum versatility. One car primarily for staff measures 1.5 x 5.0 x 2.3 metres while the larger car on the opposite side of the tower measures two by five by 2.8 metres is mainly for materials but can also carry people during peak start and finish times, helping improve productivity.

3WTC is the first project in the world to use Alimak's specially designed Scando 650 FC-S 32/50 large, high-speed construction hoist. The 100 metres a minute speed reduces the time spent transporting people and materials, particularly beneficial towards the upper floors. Its 3,200kg capacity and extra-large five metre car length means that it can cope with almost all load requirements.



Three World Trade Centre will use 14 Alimak hoists during its construction