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ANSI model shown.

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Going down and under

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underbridge

Given the colossal numbers of aging bridges, particularly in Europe and North America, coupled with the increasing popularity and adoption of powered access you would think that underbridge work platforms would be a rapidly growing market. Yet in spite of all the factors suggesting otherwise, underbridge platforms are relatively uncommon. Cranes & Access investigates.

In many ways, the underbridge work/inspection platform is similar to the mobile tower crane. Both are quite complicated designs, produced in small numbers and therefore expensive to purchase. Both are the best and most efficient solution to carry out the work for which they were designed. While there are alternatives - large truck mounted platforms and large All Terrain cranes - none come close to carrying out the work with the same speed, safety and efficiency.

So like the mobile tower crane, one has to ask the question why are they not more popular? Much of it is down to the fact that this type of equipment tends to be rented when needed, rather than purchased.

Specialist, almost dedicated equipment such as the underbridge inspection unit does put a lot of companies off, particularly those with large fleets of 'regular' general purpose platforms. Specialist equipment needs specialist operators, technicians and because of the niche market it is aimed at, specialist sales personnel. And in the case of most underbridge units if there are no bridges to inspect they sit which is all too much trouble for the 'average' rental company.

Underbridge units are, as we have said, expensive and yet rental rates and utilisation are currently too low to make a decent return on investment, making it difficult to re-invest in new equipment. It is fortunate therefore that most underbridge units have a realistic operational life in a rental fleet of around 25 years.

More recently the development and increasing popularity of larger truck mounted platforms, spider lifts, boom lifts and scissors have offered a more general purpose alternative for many bridges where inspection can be carried out from below.



A Barin basket machine

While the rental costs of some of these alternatives may often be similar or even more than a specific underbridge unit, the fact is that these units are far more readily available and in some cases can offer the advantage of not blocking a lane on the bridge itself by working from below. There is also an increasing number of truck mounted and spider lifts that have the ability to work below ground level at least making them viable alternatives for inspection work.

This 'make-do' attitude of many companies using equipment not designed for the job may be based on using equipment they are already familiar with, even if it is not the best tool for the job. But beware! Approaching bridge inspections from below can have its problems - tricky access, poor ground, water and obstructions are just a few - and with that comes the increased risk of an accident and not completing the task safely and efficiently.

Bridge of size

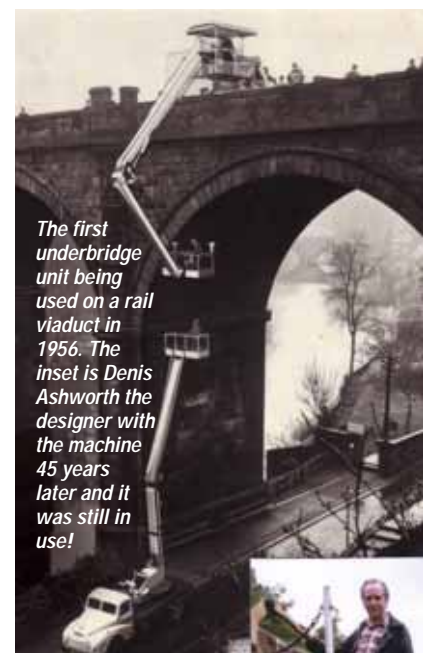
In order to gauge the size of the potential market we looked at the number of bridges and structures in the UK. While we could not find a single national register, Kent County Council has more than 4,000 - owning and maintaining about 2,800 - while the remainder are the responsibility of others such as Network Rail and the Highways Agency. In North Yorkshire it is thought that there are 2,800 bridges. With 27 county councils and a conservative estimate of 3,000 bridges per council, there are about 80,000 bridges that need an annual visual inspection and a six yearly 'hands-on' inspection. Just taking the six yearly full structural inspections means that almost 40

bridges should be undergoing this inspection every day (assuming that each bridge takes just a day to inspect).

As mentioned before, there will be many smaller bridges that can be inspected using more conventional aerial work platforms - the infamous Spaghetti junction in Birmingham for example has at least one truck mounted platform permanently on hire patrolling under the motorway bridge system. All bridge owners have a responsibility for their structures such as carrying out day to day inspections and organising maintenance. This includes operational maintenance - essential for the safe use and operation of a structure - routine maintenance to combat normal wear and tear and protecting the structure over time and structural maintenance and upgrading needed as a result of external factors, such as exposure



A Moog 230 working on Blackfriars Bridge in London



The first underbridge unit being used on a rail viaduct in 1956. The inset is Denis Ashworth the designer with the machine 45 years later and it was still in use!

to extreme conditions, old age, change of use or change in structural standards.

A disaster waiting to happen?

Lack of maintenance and inspection can have catastrophic results such as the collapse of I-35W bridge in Minneapolis in 2007. The 581metre long eight-lane steel truss arch highway bridge which crossed the Mississippi River experienced catastrophic failure in its 305 metre long main span. Of the 111 vehicles on the span there were 13 fatalities and 145 injuries. Although the key conclusion was that the collapse was primarily design driven, the official report indicated that more inspections by better trained inspectors may have identified the issue prior to collapse.

Bridge inspection

As can be seen in the table below from the UK - which is similar for all of the EU - there are various categories of structure, all of which must be inspected at regular intervals. For highway structures in the UK there should be a general inspection of not more than every two years consisting of a visual inspection of all parts of the structure that can be checked without the need for special access equipment or traffic management arrangements.

UK inspection times for various structures:

Type of Structure	Detailed inspection	Visual inspection
Tunnels (excluding shafts and earthworks associated with tunnel portals)	12 months	12 months
Shafts	6 years	12 months
Parts of bridges, retaining walls and coastal, estuarine and river defences (except Culverts) which are under water in a watercourse, and where the depth of water prevents a visual examination	3 years	12 months
Bridges, Culverts (excluding those whose primary method of support is by arching action) and structures supporting buildings over operational lines	6 years	12 months
Retaining Walls (other than minor retaining walls)	6 years	12 months
Coastal, Estuarine & River Defences (except parts of defences which are underwater in a watercourse and where the depth prevents a visual examination)	12 months	12 months
Boundary or freestanding walls	6 years	12 months
Various supporting structures identified within standard RT/CE/S/092 such as advertising hoardings, cable bridges, CCTV supports, customer information screen supports, lighting support structures, straight signal posts etc.	-	12 months

All highway structures should have a principal inspection at least every six years. This consists of a close examination - within touching distance - of all accessible parts of a structure and where relevant, including underwater parts and adjacent earthworks and waterways, utilising suitable access and/or traffic management works as necessary.

A principal inspection may include a modest programme of tests, e.g. hammer tapping to detect loose concrete cover or half-cell and chloride measurements to enable risk of reinforcement corrosion to be assessed, when considered necessary.

Underbridge types

There are various types of platforms for underbridge work, including road-based units, road/rail units and tunnel inspection units. Here we will concentrate on the road-based units which include trailers, bucket and platform/maintenance units.

Bucket units

As the name suggests, the bucket units use a basket type platform rather than a continuous deck and are therefore popular for all types of maintenance and structural inspections particularly on smaller or narrower bridges where the articulated boom design allows down and outreach.



The 581 metre long, eight lane section of the I-35W bridge in Minneapolis collapsed in 2007. Of the 111 vehicles on the span there were 13 fatalities and 145 injuries



In the UK the compact Simon UB40 is still a very popular unit allowing underbridge access and bridge inspections from within a single lane and reducing the disruption to traffic flow. Maximum horizontal outreach is 6.1 metres, with a maximum lowering depth of 8.2 metres and the ability to overbridge almost two metres and reach over a maximum parapet height of 1.8 metres. Basket size is 900mm x 1.7 metres with a capacity of 225kg and the whole unit takes just 2.5 metres of lane width.

Although there are several of the aging UB40 units still operating in the UK, they have not been made for many years. The largest specialist underbridge manufacturer is the southern German manufacturer Moog - its version of the bucket platform is the MBL series which can be mounted on road, road/rail or rail chassis depending on the application. The four model range - MBL 1200T to MBL 1750T - use a three arm system giving maximum lowering depths from 15.7 to 21.1 metres and 12.0 to 17.5 metres horizontal range with 280kg platform capacity.

Platform units

Platform or extending deck units provide a larger work/inspection area and can be mounted on a truck, trailer or in a few cases crawler tracks and offer continuous platform lengths of up to 25 metres. This type



Although now aging, the Simon UB40 is still very popular for underbridge inspections



Platform or extending deck units provide platform lengths up to 25 metres

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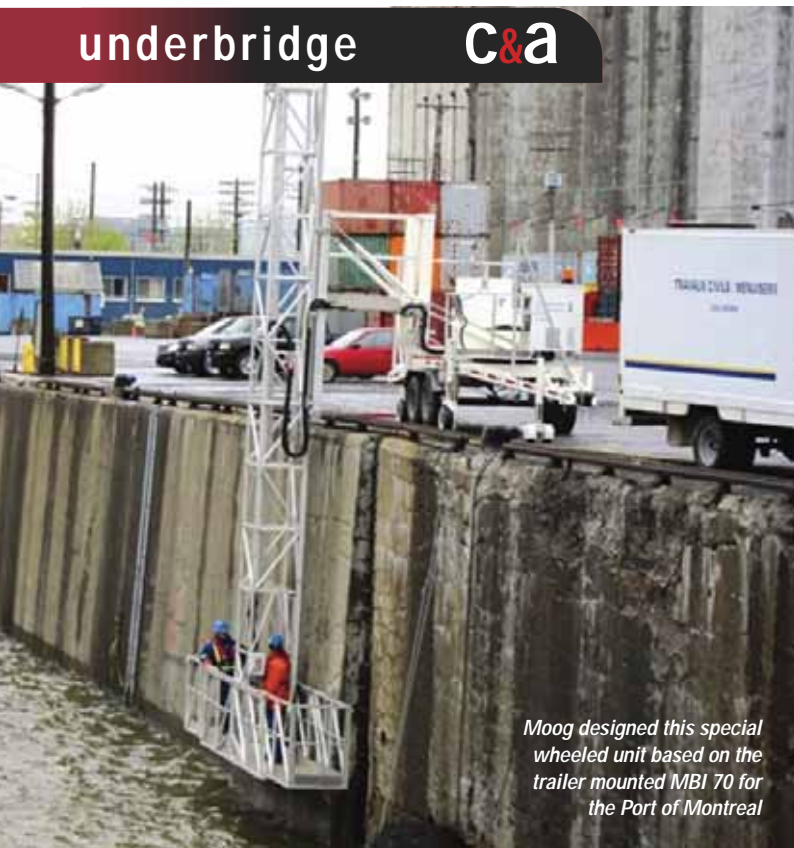


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PERFORMANCE



Moog designed this special wheeled unit based on the trailer mounted MBI 70 for the Port of Montreal

of inspection unit is probably more useful for carrying out repair work than the bucket type, thanks to its greater floor space.

Moog for example, has a range of 10 platform units available as either truck or trailer mounted. The smallest unit - the MBI 50-1/S can also be mounted on tracks which is a result of an enquiry from the Port of Montreal, when Moog designed a special platform based on its trailer mounted MBI 70. The customer required a minimum six metre long platform to work on the face of the piers (concrete, ladders and fenders).

A telescopic cylinder allows the platform to be lowered as far down as eight metres below the piers' upper level, giving them access to all areas. The Port also wanted the machine to be able to move forward and backward including a steering function during operation. The design was discussed with the customer in detail before manufacturing the unit and the result was a 4.4 tonne lightweight trailer with an upper structure mainly manufactured out of high-strength aluminium. An on-board generator powers the machine's hydraulic system as well as the electrical sockets down on the platform. The platform length can be increased up to 6.4 metres by installing two telescopic platforms. With a platform capacity

of 400kg up to four people can work at the same time. Equipped with a hydraulic creep speed the machine can be moved along the pier without needing any adjustments to the stabiliser system.

Additional equipment

Once the platforms are in position under or alongside the bridge, there is often a requirement to view a raised soffit, too high to reach from the platform. In these cases there are two options - a podium type tower that sits on the platform offering about five metres of working height or an electric powered telescopic AWP type platform which can give up to six metres additional work height above the platform.

The larger inspection platforms - such as the Moog MBI 250 - have an under reach of almost 25 metres which is enough to inspect a four lane bridge in one pass.

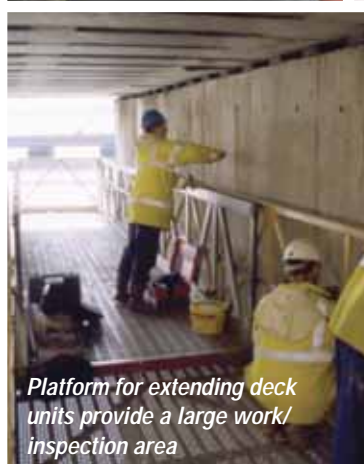
Although not applicable in many European countries, Moog also has a range of maintenance units aimed specifically at the very high pier bridges found in mountainous regions such as the Alps. These units combine underbridge inspection units with smaller platforms (up to 12 metres long) suspended up to 100 metres below - ideal for the inspection of piers and arches.



Some truck mounted platforms may be used for certain bridge inspections



A podium type tower or electric/pneumatic powered telescopic AWP type platform can give additional work height above the platform



Platform for extending deck units provide a large work/inspection area



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Biggest in Europe?

Europe's largest underbridge rental company, Wemo-tec, operates a fleet of around 70 units. The German-based group has subsidiaries in Italy, Netherlands, Poland, Portugal, Spain and the UK. Mark Darwin headed to North East England to talk to Wemo-tec UK's Christopher Sandford.

As well as underbridge units, the group's various subsidiaries specialise in other types of equipment including scaffolding, freight hoists and lifts, tunnel inspection units, access platforms, mini cranes and mast type forklifts. The UK operation however specialises in underbridge platforms.

Darlington-based Wemo-tec UK was launched in January 2011 by current commercial manager Christopher Sandford and industry veteran Peter Rees. Initially it bought a Moog MBI 250 and Simon UB40 from ES Access after it went into administration and then added a Moog MBI 150 from Italy. With the group very particular about maintaining equipment to very high levels, all machines were immediately sent to Germany for a complete refurbishment before being made available on the UK market.

After a year in business it formed a rental partnership with Nationwide Platforms whereby Nationwide would retire its two underbridge units and supply existing customers from the Wemo-tec fleet. The deal - which has a further year to run - also meant that any powered access requirements of Wemo-tec customers would be serviced by Nationwide Platforms.

Current day to day business is controlled by commercial manager Sandford who began his access career as a hire controller with truck and underbridge specialist ES Access Platforms in 2003. After moving through the ranks to become general manager he left the business around 18 months before it went into administration. Sandford covers the north, Scotland and Northern Ireland, while James O'Grady covers the south with further assistance from Mirko Jahn at Wemo-tec Germany. "Although not an easy market, we



Christopher Sandford

have expanded our customer base to the point where we have now worked for about 90 percent of the highway contractors in the UK," says Sandford. "We are getting there slowly but surely."

The UK division has five underbridge units, but can draw on the groups diverse and numerous fleet of equipment for bridges and tunnels from lightweight towable units weighing just 2,000kg to the MBI 250 with a 25 metre under reach.

Most units in the group fleet are manufactured by Moog although some Barin machines were acquired with the purchase of Roggermaier's underbridge fleet a few years ago. It also added its first new Barin - an AB19 bucket machine - earlier this year.

German HQ

Although head office is in Germany, the company covers all mainland and Eastern Europe (including Russia).

"With the relatively small amount of work around for large underbridge units you have to cover a huge area to keep utilisation high," says Sandford. "In the UK we often bring in a machine specifically for a job - currently we have a 20 metre machine owned by the Portuguese subsidiary that has finished a big contract. Machines are moved



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around wherever they are needed."

"The UK as a whole has a total population of about 10 machines - Wemo-tec has five and Facelift four - and there is enough work to keep them all reasonably busy. However as we only specialise in one product we do suffer if the market is quiet. In mainland Europe they have a 'work' season which starts about April and ends in November, allowing machines to be repaired through the winter. In the UK we work all year round so work can be a bit sporadic. If we did diversify I think the small truck mount sector would be the way to go."

Despite the high initial purchase cost of the underbridge machines - a new Moog MBI 250 is around the £700,000 mark for example - rental rates are well below say that of a 90 metre truck mounted platform.

Low rental rates

"The day rate of our largest underbridge unit is about one third of the price of a large truck mounted platform," said Sandford. "If a new company was looking to enter the market buying new equipment, the rates just don't stack up. However Wemo-tec has a continuous new purchase policy as well as buying any second hand machines that come onto the market. So if we use slightly older machines - which have an operational life up to 25 years - then it works."



"Our three original machines - the Moog MBI 250, Moog MBI150 and Simon UB40 - carry out many weird and wonderful contracts, from inspecting and clearing ivy from an Asda carpark retaining wall to working in an oil refinery. You really have to be open to any type of work," he says. "Our success in the UK is a result of a team effort with everyone - operators and office staff - doing what needs to be done to keep customers happy."

