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A rear wheel of this Dingli BT30RT boom punched through a pavement in Edinburgh, Scotland

AVOIDING TURN OVERS

It has been almost 20 years since the first C&A outrigger pads and ground protection mat feature, and while there is much greater awareness regarding their use, there are still far too many incidents involving the overturning of cranes and access equipment due to a total lack of pads/track or using inadequate items.

To be fair, most users of equipment with outriggers carry and use pads/mats. More of a problem today appears to be with the larger wheeled powered access equipment - booms - with users not appreciating the total weight of the machine and the massive difference in the forces exerted during operation. A JLG 1500 telescopic boom for example weighs about 22 tonnes however depending on the position of the boom, most of this may be concentrated over one wheel. Even moving the boom can have its problems.

A good example of this happened a few months ago in Edinburgh, Scotland when a large Dingli BT30RT punched through a pavement. The boom had been driven onto the pavement - after being unloaded or ready for collection - and one of its rear wheels found a void and sank. The rear wheels carry more weight when in the transport position because of the position of the base boom and counterweight. The machine has an overall weight of 19 tonnes so rather than 4.75 tonnes per solid poly filled tyre, the rear wheels probably carry almost six tonnes. Thankfully no one was hurt, and the damage was limited to the pavement assuming there were no sewage drains or gas mains below.

Knowing the load bearing pressure of the ground is always an issue. A few weeks ago a crane

operator in Waterford, Ireland had a lucky escape when the 50 tonne crawler crane he was working with overturned. The crane was installing sheet piles when the ground appeared to have given way causing a bank to collapse and the crane to go over. Again, thankfully the operator was unhurt but the incident could have been so much worse.

THE UNKNOWN ELEMENT

The awareness of the 'unknown' element when working on any ground surface - including concrete and tarmac - is perhaps the reason why mat manufacturers such as Timbermat have seen a change in the market over the past 12 months with customers requesting thicker, heavier duty timber mats, particularly made from tropical hardwoods which offer a more robust roadway. Azobe (Ekki) mats are the most popular due to its strength and durability in all weather conditions.

Perhaps it is also because of the increasing amount of extreme weather conditions both in the UK and around the world with increased rainfall and flooding in many areas affecting ground stability.

Timbermat is one of the UK's leading independent suppliers of temporary roadways and ground protection solutions.

"More and more customers are currently requesting bespoke sizes over and above the standard sizes within our industry, which we



A crane operator in Waterford, Ireland had a lucky escape when his 50 tonne crawler crane overturned when the ground gave way



Azobe (Ekki) mats are popular due to their strength and durability in all weather conditions



200mm wide by six metre long FSC certified mats from Timbermat used on a barge protection at London City Airport

can offer with our in house manufacturing," said Timbermat managing director John Roberts. "Our FSC certification also gives our customers the peace of mind that all our timber products are sourced legally and from sustainable sources."

Based out of Manchester, with depots in London & Edinburgh, Timbermat's ground protection mats or bog mats have been tested and approved by both the Utilities and Rail industries through the UVDB and Link Up Supply chain network.

"We have an extensive stock whether it is for a one tonne excavator or a 250 tonne crane and can usually have mats on site the same day, or within 24 hours of the enquiry," he said.

The company also offers a ground protection mat installation service consisting of articulated loader crane mounted vehicles operated by qualified staff. A complete design package, risk assessment and method statements are provided, and all works are carried out to comply with current health and safety regulations and any site rules provided by the customer.



A stricken excavator rescued using timber mats

NEW PARTNERSHIPS

Finding the right dealer to distribute can also be difficult. Earlier this year Dutch outrigger mat manufacturer Nolim appointed Access Platform Sales as its UK distributor.

Nolim mats and pads are manufactured in Europe from high molecular polyethylene (HMPE), which it says guarantees product consistency and durability. The lightweight material does not absorb moisture and will not break or splinter. It also withstands diesel oil and most chemicals. Nolim says that in the 30 years since it has been producing the mats it has never received a report of one of its mats breaking. It also adds that they are highly sustainable, given their long service life. Based in Tilburg, the Netherlands, Nolim has stepped up production following a move to a new larger facility in 2021 which is twice the size of its previous premises. The company hopes that the



Nolim's outrigger mat sales rose by 15 percent in 2022

partnership with APS will allow it to significantly extend its reach in the UK market at a time when sales across other markets is also growing.

Nolim is part of APS' recently formed parts business which will stock a range of its most popular outrigger mats in order to guarantee delivery within three to five working days.

Nolim Chief Executive Rogiér de Laat said: "Our outrigger mat sales rose by 15 percent in 2022. We have been selling into the UK market for eight years, but with APS now behind us, I am confident many more customers will get to use our products."

MASTCLIMBER PADS

Another recent partnership is between US outrigger mat and rigging block manufacturer Dica and Canadian mastclimber manufacturer Hydro Mobile, to develop 'Safetytech Support Pads' for mastclimbers. Each pad/mat weighs around 26.5kg and features four recessed Hi-Viz green 'TuffGrip' handles for easier handling and storage.



Dica and Canadian mastclimber manufacturer Hydro Mobile developed the 'Safetytech Support Pads' for mastclimbers

Dica chief executive, Kris Koberg said: "When Hydro Mobile wanted a single pad design made from our patented thermoplastic material that was lightweight, durable, and would work with all four series of its mastclimbers, we knew we had a challenge. We worked with them to define their needs and ground bearing pressure criteria to ensure the support pad could work in multiple

configurations based on the equipment being used."

Rob Faro of Hydro Mobile added: "We started working with Dica in 2017 to develop a pad that would provide effective support for our M2 series platforms. Earlier this year, we decided to partner with Dica again to modify the Safetytech to work with all four of our product lines."

The Safetytech Support Pads are designed for the Hydromobile M series mastclimber



In September Dica appointed Ingo Schiller as a strategic advisor. Schiller was previously chief executive of Tadano America for more than six years but left the business in January of this year. In his new role he will be responsible for helping the company expand its distribution programmes, advising the sales team and expanding previously established Dica/OEM partnerships.

HALF LOADER SPREADER MODULE

Another new product was launched at Vertical Days earlier this year. Alimats' Half Load Spreader Module was designed using Finite Element Analysis (FEA) specifically for use with mobile cranes to achieve a more even load spread and higher safe working outrigger loads. The Half Loader spreads the outrigger load across two locations rather than one and replaces crane pads in the Alimats system.

Weighing 48kg the Half Loader is manufactured from EN AW 6005TA T6 certified high-grade recycled aluminium and comes with CO2 per life cycle stage analysis.



Alimats' Half Loader spreads the outrigger load across two locations rather than one

"Once we had the idea for the Half Loader, we carried out further FEA on our existing Alimats system," said the company. "By going through a Safe Working Load process with FEA, and then a theoretical design, it proved that if we removed the outrigger load location away from the centre of the mat by distributing it across two locations, we could achieve a significantly lower applied pressure, and better load spread distribution below the mat surface."

"During development, we wanted to understand what was going to be the stiffest Half Loader profile, yet still be handleable for two operatives. We achieved it by reverse engineering from a defined weight of 48kg that we were not willing to exceed. Next, we had to come up with the stiffest profile possible based on an extruded



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OUTRIGGERS & PADS

aluminium truss design. Then we talked to our manufacturing partner in Belgium, to see what was physically practical to produce out of the eight profile shapes we analysed. Structurally, some of the most beneficial truss profiles may perform brilliantly in simulation but aren't possible to manufacture, something we had to embrace."

"We ended up with the Truss Profile 7. The selection came about through a beam bending test where we loaded the profile as a simply supported beam in the middle. When we analysed deflection from those tests, it proved that Profile 7 is three times stiffer than a standard Alimats profile. For completeness, we carried out a compression test to ensure high outrigger loads would not punch through, specifically when modules are sited on hard ground. The results far exceeded any loads that would be applied from mobile crane outriggers."

The new module is fully patented and moves the load way from the centre of the mat system, subsequently reducing the pressure applied to the supporting ground. It is suitable for use with cranes, access platforms, concrete pumps and scaffolding.

NEW RESOURCE FOR DETERMINING SOIL BEARING CAPACITY

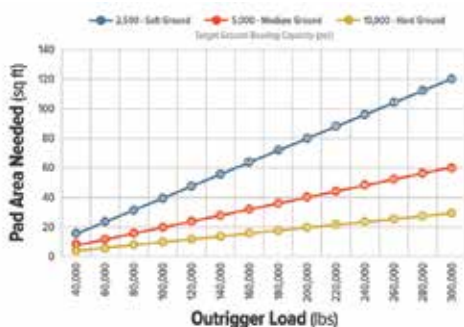
In an effort to help users better assess and understand ultimate soil strengths and allowable ground bearing pressures, Dica has released a new resource page 'Determining Your Soil Bearing Capacity'.

Before setting up a crane or other equipment with outriggers, it's essential to evaluate the ground conditions to properly position the equipment and to use appropriate pads (size/area, strength and stiffness) to ensure it can operate safely. Knowing the strength of the ground helps planners and operators identify the pad area needed to reduce bearing pressures to levels the ground can withstand.

"Undersized outrigger pads create risk and can lead to unstable conditions," said Kris Koberg, head of Dica. "However, oversized pads increase weight, product cost, and ongoing transportation costs. Dica uses its 'Everyday Fitting Process' to help owners and users determine and define assumptions, which result in identifying the correct outrigger pad or support system."

The resource page defines important terms such as Ultimate Bearing Capacity and Allowable Ground Bearing Pressure. It also includes a Soil Bearing Capacity Chart (see below) that outlines the Ground Type and Density of State to determine the Ultimate Ground Bearing Capacity and the Allowable Ground Bearing Capacity. ■

Outrigger pad sizing graph



Alimats' Half Load Spreader Module was designed using Finite Element Analysis (FEA) specifically for use with mobile cranes to achieve a more even load spread and higher safe working outrigger loads

10 MOBILE CRANE SAFETY TIPS FOR A SUCCESSFUL CRANE SETUP

1. Know your responsibilities.

In the U.S., OSHA states that cranes must be assembled on ground that is firm, drained and graded sufficiently in conjunction with supporting materials - such as blocking, cribbing, pads, mats - to provide adequate support and levelness. (OSHA 1926.1402)

ASME states that outrigger blocking or cribbing must have sufficient strength to prevent crushing, bending or shear failure. And it needs to be of such thickness, width and length as to completely support the float, transmit the load to the supporting surface and prevent shifting, toppling or excessive settlement under the load. (ASME B30.5-2011)

In the UK under the Health and Safety at Work, etc. Act 1974 (HSWA) and associated regulations employers have to ensure the safety of employees and others not in their employment (including members of the public). Part of that duty is ensuring the stability of construction plant on site by assessing and managing the ground on which it stands. In addition, plant manufacturers, plant dealers and rental companies have a duty under both HSWA (Section 6) and the Supply of Machinery (Safety) Regulations to provide adequate information to enable a piece of construction plant to be used safely. This will include the loads imposed by the machine on the ground in all possible configurations.

2. Know the bearing strength of the ground and soils.

Because this is an extremely complex combination, it's a good idea to seek the advice of a geotechnical engineer. A low-cost way to determine ground conditions is to use a Dynamic Cone Penetrometer, which is portable and easy-to-use. This information can be compared to ground bearing pressure charts for different soil types.

3. Identify any sub-surface hazards and avoid if possible.

4. Evaluate and improve the ground if needed.

Ways to improve the ground include compaction, removing un-compacted surface layers, or bringing in rock or other dense inorganic material. If the ground is wet, allow time to get the moisture out.

5. Know the maximum pressure the crane/access platform will exert on each outrigger during the operation, or the maximum outrigger reaction force.

Manufacturers provide this information for each model which is generally found in the operation manual. Many also offer free software solutions that allow you to input the lift data, which then outputs the outrigger reaction forces that will be generated.

6. Select the right size outrigger or crane pad.

Undersized pads can put the machine in an unstable condition, but oversized pads are inefficient in terms of purchase, installation and transportation costs. Several sizing methods are commonly used in the industry and one should be chosen that takes into account ground conditions (ground bearing capacity), and actual outrigger loads.

7. Choose crane pads or outrigger pads that are designed and constructed to meet or exceed the bearing, flex and shear strength required.

Their purpose is to distribute the load from the outrigger float over a large enough area that the bearing pressure to the ground surface is acceptable. They must be stiff enough that the equipment will not go out of level as the load swings.

8. Never place blocking, cribbing, pads or mats under the outrigger beam - use only under the outrigger pads.

9. Monitor every lift.

If the outrigger pad or crane mat is showing significant deflection or bending, stop the lift - the outrigger force is greater than the pad and ground can support. Additional appropriate blocking or cribbing should be added. If the pad or mat is being driven into the ground, stop the lift - the pressure under the pad exceeds the ground bearing capacity. A larger pad, blocking or cribbing is needed to spread the load over a larger area, or the ground needs to be improved to adequately support the load.

10. Use common sense.

If it doesn't look right, stop. If it doesn't act right, stop. If it doesn't feel right, stop. Products are never a replacement for common sense.

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POWERED ACCESS SOLUTION AT LONDON'S EUSTON STATION

Outrigger mat company Brilliant Ideas/Alimats created a tracking and operating load spread solution for three large, powered access machines working for Premier Modular - one of the UK's leading offsite modular building specialists - at Euston Station in London, UK. Roughly 75 metres long, the track was made up of 354 Alimats interlocking mats in three module sizes - 1,740mm, 3,480mm and 2,175mm. For good practice, the company also put down a compressible layer of 164 Ethafoam sheets to sit under the mat surface allowing the modules to deflect and therefore correctly spread the load.

"The Alimats extra-long modules were set-up to accommodate the three onsite machines - two articulated booms including a 20.4 tonne, 135ft Genie Z135 and a 4.4 tonne, 34ft JLG 340AJ - and a 26ft Genie 2669RT Rough Terrain scissor weighing 3.2 tonnes - with varying track widths," said Dan Westgate at Brilliant Ideas/Alimats.

"We set the modules at an angle to make sure the load spread occurs across the interlock as it spreads perpendicular to the direction of travel. This will also mitigate any rippling that could occur if the system was installed straight. If the system is rippling then the tracking load is not being spread. For the operating loads - which were significantly higher than tracking loads - we introduced an additional layer, so the system works as outrigger mats, but under the wheels. The temporary works design required a minimum 2.01 square metres and we provided a top layer of

modules which provided 2.52 square metres once installed."

The enquiry, load spread solution and purchase order were all completed within one week, including completing Premier Modular's comprehensive Pre-Qualification Questionnaire. The Brilliant Ideas/Alimats inhouse team installed the system.

"The Alimats interlocking modules enable load spread, load transfer and access track solutions for access platforms and other powered access," said Westgate. "Developing load spread solutions can be complex, involving a great deal of temporary works which is why we often visit site and work with clients to calculate the loadings based on the machine spec, taking into account the machine weight, track width, wheelbase, maximum wheel loads and wheel contact area. We follow this up with an Alimats working drawing and pricing and install the system." ■



Roughly 75 metres long, the track was made up of 354 Alimats interlocking mats in three module sizes





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