Products & Practice

Mammoet's Zero-Emission Heavy Transport

Heavy lifting and transport company Mammoet has created a new zero-emission heavy transport vehicle, which can reduce the carbon impact of site transports when installing large infrastructure such as bridges, wind turbines, and power station components. Mammoet developed a retrofit kit to replace diesel engines in existing self-propelled modular transporters (SPMTs) with electric motors. Once converted, the SPMT works in the same way as before: transporting objects up to thousands of tonnes at a walking pace, using a remote control. The new SPMT also reduces noise levels at project sites, making working conditions quieter and safer. Communication between staff is clearer, while work can take place for longer at sites with sound restrictions.

This solution was partly financed by the DKTI, a Dutch government program to develop climate technologies and innovations in logistics. Mammoet worked with a leading provider of zero-emission powertrains for heavy industry to bring the electric power pack solution to market.

—Mammoet, **www.mammoet.com**

Safety Solutions from Doka USA

From product development and engineering to on-site training and field service support, Doka USA safety solutions make construction sites as safe as possible.

Protection screen Xclimb 60 is a full-area enclosure around a building's perimeter. A loading platform can be integrated into the protection screen for safe repositioning of slab formwork, tools, and other materials. The system is anchored to the structure at all times.

Safety Net Fans are triple-layered nets that provide protection from falling objects and debris. The preassembled units can be used on any structure and adapted to any shape. A 3 ft (1 m) overlap provides more protection between the units.

The Smart Edge protection/guardrail system features integrated green-red indicators that allow installers and inspectors to quickly confirm the correct installation of each post. Smart keys are required for setting and stripping posts, ensuring that only authorized personnel can modify or remove the edge protection.

Falpro is a mobile fall protection anchor point that protects construction crew members at leading-edge deck construction. Falpro reduces the need for a safety monitor or a temporary cable lifeline system on edge deck construction. It allows for worker safety near the slab edge without trip hazards because the anchor point is always above head height. Unrestricted freedom of movement is provided with 360-degree fall protection and a working radius of 30 ft (9 m).

—Doka USA Ltd., **www.doka.com**

Web Notes

Podcast: Opportunities for Innovation are Profound

A recent segment of the National Academy of Construction's "Get the kNACk" podcast features Ron Klemencic, FACI, Chairman and CEO of Magnusson Klemencic Associates, talking about advancing innovation in the construction industry with podcast host Jerry Eyink. One of the major topics facing the industry includes the effects of embodied carbon on climate change and "rethinking how we do what we do and the materials with which we do it." Klemencic said that in his experience, the ideas that have advanced the industry the most are those that are shared by a larger constituency of stakeholders. Collaboration can turn innovative ideas into reality.

NATIONAL ACADEMY OF CONSTRUCTION
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—National Academy of Construction, **www.naocon.org/get-the-knack/**

Products&Service Literature&Videos

Development of Large High-Strength Headed Reinforcing Bars with Standard Hooks and Heads

by Ali Banaeipour, David Darwin, Matthew O'Reilly, Rémy D. Lequesne, Andres Lepage, and Matthew Blessent

Hooked and headed reinforcing bars are viable alternatives for the development of reinforcing steel when member geometry does not allow for a straight deformed bar to fully develop its yield strength. Current design provisions in ACI 318-19, however, impose limitations on the use of hooked and headed bars larger than No. 11 (that is, No. 14 and No. 18 bars), mainly due to a lack of experimental data. This research continues a comprehensive study of the anchorage and development of high-strength hooked and headed bars to expand the available data to include No. 14 and No. 18 bars. Headed bars in concrete with nominal compressive strengths ranging from 5000 to 16,000 psi (34 to 110 MPa) developed bar stresses at anchorage failure ranging from 55 to 148 ksi (370 to 1020 MPa). A limited number of tests were also performed on hooked bars to determine if the relationship developed in previous tests is appropriate for the largest-size bars. New descriptive equations are developed to represent the anchorage strength for bars as large as No. 18. These new equations are compared with the test results in the current study and available in the literature; and they are shown to accurately account for concrete compressive strength, confining reinforcement, and bar spacing.

This research was sponsored in partnership with the ACI Foundation, Concrete Reinforcing Steel Institute (CRSI) Foundation, and Precast/Prestressed Concrete Institute and in collaboration with BarSplice Products Inc., Headed Reinforcement Corporation, nVENT LENTON, Commercial Metals Company, and Nucor Corporation.

—Charles Pankow Foundation, **www.pankowfoundation.org**

Designing for Lower Carbon Concrete in Data Center Constructions

by the Gensler Research Institute

This pamphlet from the Gensler Research Institute summarizes data and opinions from internal and external sources, including reports, articles, and interviews. The document's key findings include:

- Global spending on data centers is expected to grow from 32 billion USD in 2022 to 49 billion USD by 2030;
- To minimize the embodied carbon in these facilities, project teams should:
  - Design data centers as holistic systems "through a lens of carbon reduction…to consider… where reduced material use is possible";
  - Select concrete mixtures with Environmental Product Declarations (EPDs) verifying lower carbon contents;
  - Set generalized carbon goals early, allowing local contractors to innovate with the supply chains in their region, including the option of shifting embodied carbon goals within a project's systems to meet a general project target without sacrificing the quality of the design; and
  - Strive for collaboration among the owner, designers, suppliers, and contractors to ensure their project hits embodied carbon targets.

—Gensler Research Institute, **www.gensler.com/gri/lower-carbon-concrete-in-data-center-construction**

Product Showcase

Digital Tools

Green Cement Technology Tracker

The Leadership Group for Industry Transition (LeadIT) and the Global Cement and Concrete Association (GCCA) have launched a tracker to help monitor worldwide decarbonization efforts in the cement industry. The Green Cement Technology Tracker currently includes carbon capture and storage (CCS) and carbon capture, utilization and storage (CCUS), accounting for 36% of planned reduction levers that leading manufacturers have committed to in the GCCA 2050 Roadmap for Net Zero Carbon Concrete. Future steps to enhance the tracker include expanding its scope to cover more technologies that reduce emissions from cement manufacturing. Preliminary data from the Green Cement Technology Tracker reveals that initiatives for carbon capture technologies are underway worldwide. Full-scale operational carbon capture plants are expected to come on stream in the coming years. Post-combustion capture technology is currently the most common investment.

—LeadIT, **www.industrytransition.org/green-cement-technology-tracker**

Vectorworks

Global design and building information modeling (BIM) software provider Vectorworks, Inc., has obtained IFC4 Reference View 1.2 Import Certification (Architectural Reference Exchange) from buildingSMART International (bSI), the industry body driving the digital transformation of the built asset industry through the creation and adoption of open, international standards and solutions for infrastructure and buildings. The Software Certification Program provides validation that Vectorworks' IFC4 import has been quality-tested against bSI's benchmarks, ensuring that users are consistently sharing the highest-quality Industry Foundation Classes (IFC) models with other BIM software products and instilling confidence in the accuracy and credibility of their work.

Supporting IFC4 import and export since 2018, Vectorworks was the first architectural software developer to achieve IFC4 Export Certification in 2019. Now paired with the import certification, it fully meets international standards for openBIM.

—Vectorworks, **www.vectorworks.net/en-US/architect/bim**

FLIR ONE Edge Pro

FLIR ONE® Edge Pro wirelessly connects to a smart device to allow inspection of targets that are out of reach—or it can be clipped onto a phone or tablet for one-handed operation. Combining VividIR™ and FLIR MSX® (Multi-Spectral Dynamic Imaging), crisp thermal images can be taken from any angle. Improved battery time and ruggedness make the camera usable in many industrial environments. The wireless connection allows the same camera to be used with both Android and iOS devices, so users can easily share their devices with colleagues. All thermal images and videos are saved directly to the mobile device, making them easily accessible for further use. Subscribers to the FLIR Ignite™ solution can opt to automatically upload files to cloud storage for editing, organizing, storing, and sharing images for a more efficient workflow.

—Teledyne FLIR LLC, **www.flir.com/browse/professional-tools/mobile-accessories**

DEWALT Suite of Construction Technology Solutions

The suite of DEWALT® construction technology solutions includes features that provide real-time data and insights, automate routine tasks, and facilitate smooth collaboration through each phase of construction, from design to fabrication shops, and on the jobsite. MSUITE® is a cloud-based suite of management software to connect BIM, Fab, and field construction teams for off-site and modular construction. MSUITE helps contractors track, manage, and share data throughout the entire life cycle of a construction project with easy-to-use, scalable, and industry-focused software that provides real-time status updates and progress tracking and estimating information right on the fabrication shop floor.

TOOL CONNECT™ Site Manager is a cloud-based platform allowing contractors to manage their tools and equipment from DEWALT and other brands from anywhere using a smartphone or tablet. Tool Connect enables users to locate tools, check their inventory levels, and monitor their usage and performance, helping to reduce downtime and prevent loss.

The No. 20 Toyota Camry TRD for Joe Gibbs Racing sported a DEWALT Construction Technology paint scheme during the June 4, 2023, NASCAR Cup Series race at World Wide Technology Raceway.

—DEWALT, **www.dewalt.com/Construction-Technology**