

KEEPING TRACK OF WHAT'S IN THE BACK

Command Alkon explains how a new direct contact, in-drum monitoring technology will help shrink the cement industry's environmental footprint by enabling the accurate, in-transit monitoring of concrete properties.

The decarbonisation of the cement and construction industry is essential to reach the goals set out in the 2015 Paris Agreement, which seeks to limit global warming to well below 2°C, and preferably to 1.5°C, compared to pre-industrial levels. This includes a goal to reach net zero global greenhouse gas emissions by 2050. With the cement industry being responsible for around 7% of the world's total CO₂ emissions, and substantial growth likely over the foreseeable future, addressing these emissions head-on is critical.



Many cement and building materials companies have launched their own plans to achieve net zero by 2050 and are implementing roadmaps to take steps toward this goal. According to the NGFS Net Zero 2050 scenario, US\$9.2 trillion per year will need to be spent to meet the targets outlined in the Paris Agreement – US\$7.2 trillion being spent on new construction.

Reducing initial embodied carbon (EC) is a crucial tool in fighting the climate crisis. For example, the US\$7.2 trillion being pumped into new building projects will play into the impact of construction on carbon emissions – because of this, each company's focus on EC emissions is key to their strategic approach. The World Green Building Council – comprised of more than 80 organisations, including Heidelberg Materials – has led an initiative for new buildings to reach 40% less embodied carbon emissions by 2030 and ultimately reach net zero by 2050.

Reducing and eliminating greenhouse gas emissions from the quarry to the cement mill, to the ready mix plant, and while in transit to the jobsite will play a huge role in achieving net zero emissions. To reduce carbon emissions in a significant and meaningful way, companies must invest in new innovations as well as look beyond their own operations by engaging their trading partners.

Tackling embodied carbon takes a team

Once the cement leaves the plant, the cement producer has traditionally had minimal say in which sustainable practices are infused in the next link of the supply chain. To achieve

decarbonisation, collaboration from production through to placement must occur to set out the vision, goals, actions, and milestones needed to drive the change. This is best accomplished through connected technologies and an engaged network of stakeholders.

More specifically, success can be defined through the accurate and timely sharing of data, allowing real-time visibility across materials to create greater trust among partners. Load Assurance (previously COMMANDassurance) gives this insight and assurance.

Insight and assurance across production, quality, and while in-transit

Scott Kelley is the Quality Control/Technical Services Manager for Heidelberg Materials' Southeast region of their Ready Mix division. Scott has spearheaded the implementation of Load Assurance in Alabama and Georgia – a ready mix operation that spans across 23 production plants and 120 trucks. Scott has been a cheerleader for the concrete telematics system before it was widely available to the market.

"Several years ago, I was having lunch with one of my Command Alkon friends," said Scott. "He told me he wanted to show me something and pulled out this probe with a sensor on it that he wanted to use inside of the drum of the truck to capture properties of the ready mix while in transit to the jobsite. I told this individual that if they were able to make it work, it would absolutely change the face of concrete and ready mix production."

Load Assurance uses direct contact, in-drum technology to measure concrete properties throughout the delivery process so that customers are not relying on a driver's perception of the materials. Sensor data – including slump, temperature, volume, water additions, water-to-cement ratio, drum rotation, and direction for each load – goes into the cloud and is readily available in real-time to all who need it. Soon, measuring air-content in real-time will be possible, giving complete visibility into critical concrete properties.

Reduce lost loads, increase tonnage, and reduce carbon footprint

The ability to trace concrete properties can reduce



The World Green Building Council – comprised of more than 80 organisations, including Heidelberg Materials – has led an initiative for new buildings to reach 40% less embodied carbon emissions by 2030 and ultimately reach net zero by 2050.

cement usage per yard through tighter water control, and therefore results in reduced standard deviations in compressive strength. Doing so can also reduce the energy costs associated with regulating fresh concrete temperatures by knowing the exact adjustment required to achieve the desired placement temperature. Accurate returning volume, as well as extra water and temperature data help to enable the efficient reuse of any returned materials. Best of all, dispatchers are presented with this data when making the next ticket for a truck with the ability to determine its reuse – ultimately eliminating material waste.

“The ability to reuse concrete or reduce cement usage is not only beneficial to a ready mix company, but also for a cement company because it extends tonnage out,” said Scott. “Our company is vertically integrated, so we have operations on both sides. Our ready mix division benefits through cost savings, and our cement division benefits through CO₂ savings.”

There is an ASTM standard for reusing concrete. One of the requirements indicates that

the producer must know how much concrete is in the trip before it can be sold to another customer. Historically, volume has been an estimation – and one that is not easy to make for a new, less-experienced driver. Having no consistent, measurable, and reliable data on volume, temperature, slump, and water additions deterred Heidelberg Materials from reusing concrete. Instead, the few extra yards would be discarded.

“Now with the visibility that Load Assurance provides, we are able to reuse those loads of concrete that would otherwise be washed out,” said Scott. “According to our data, we have reused over 3000 yards of concrete in less than a year. On average, there are 450 lb of cement in a yard of concrete. So, saving 3000 yd of concrete equates to saving over 1.3 million lb of cement – just in the span of 10 months.”

A double green win

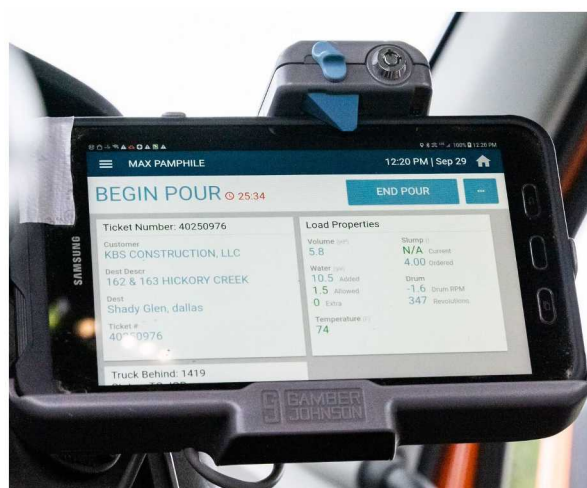
According to the Portland Cement Association, the manufacture of cement produces about 0.9 lb of CO₂ for every lb of cement. So, in saving over 1.3 million lb of cement, Heidelberg Materials was simultaneously able to save more than 1.2 million lb of CO₂.

“From a financial perspective, our ready mix operation has saved nearly US\$250 000 since we’ve started keeping track of the data,” said Scott. “Saving that amount in less than a year is significant.”

This sensor data transforms trucks into a virtual rolling lab, offering insights that help reduce out-of-specification issues. Once the driver leaves the plant, data is transmitted to their tablet via a probe – a durable and reliable sensor system installed in the drum. Having this information while in-transit to the jobsite reduces fuel usage through a reduction in truck mixing time, as well as reducing idling

time on the jobsite while quality control testing is performed.

“We’ve lost many loads of concrete over the years due to testing conducted by inexperienced workers at the jobsite,” said Scott. “Knowledge is power, and when you have an issue or a complaint, accurate data prevents misunderstandings and efficiently resolves problems. Having this data benefits our business, our suppliers’ businesses, our customers, and the environment.” ■



COMMANDassurance Tablet.



COMMANDassurance Display-Board.