

Integrating weighing and vehicle management

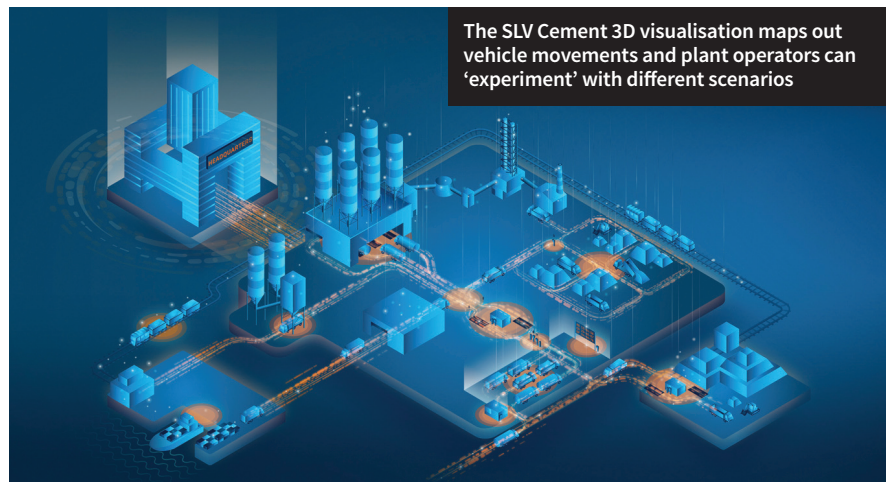
Weighing plays a crucial role in a wide range of cement plant processes. The key weighing sectors include weighbridges, silo filling and emptying, dosing, blending and bag filling. The majority of these processes involve a vehicle element, making raw material and finished product movements at modern plants diverse and complex. Weightron Bilanciai explains how its integrated weighing and vehicle management control system helps ensure efficient and safe operations, and improve overall cement plant productivity.

■ by **Nick Burley**, *Weightron Bilanciai, UK*

Ensuring the smooth running of a cement plant requires vehicular operations to be efficient, safe, securely-controlled and accountable through effective data collection. At any given time, vehicles are not only entering and leaving the plant but also travelling around the site from location to location. The various loading and unloading processes are extremely varied and, in the past, traffic management was seen as a quite separate part of the overall manufacturing process, typically resulting in bottlenecks at various parts of the plant.

There is now a proven cement-specific control system, engineered to integrate these critical weighing operations with effective and efficient site-wide traffic management. The Bilanciai Group's SLV Cement system streamlines, standardises and automates material flow, enabling ongoing operational improvement and optimisation of inbound and outbound processes. It provides personnel with tools for operational analysis and ensures the automatic delivery of detailed reports to the right users.

The modular and scalable Industry 4.0 software architecture optimises the use of advanced identification technologies and HMI devices in conjunction with the latest weighing technologies. Seamless online/offline ERP integration maps business flows into operational procedures and provides a vertical solution for cement companies. This enables a wide range of unmanned operations and the integration with automation and information systems to provide automated loading and unloading procedures. Comprehensive 3D graphics map out vehicle movements



The SLV Cement 3D visualisation maps out vehicle movements and plant operators can 'experiment' with different scenarios

and plant operators can 'experiment' with different scenarios to optimise productivity.

The control process starts from the time vehicles arrive to check in at the holding area of the plant. Automatic number plate cameras check authorised vehicles against the comprehensive database, which can be preprogrammed for a range of parameters including haulier, driver, product, vehicle, tare weight and plant area destination. Large message board screens then instruct vehicle drivers when they can proceed and to which destination within the plant.

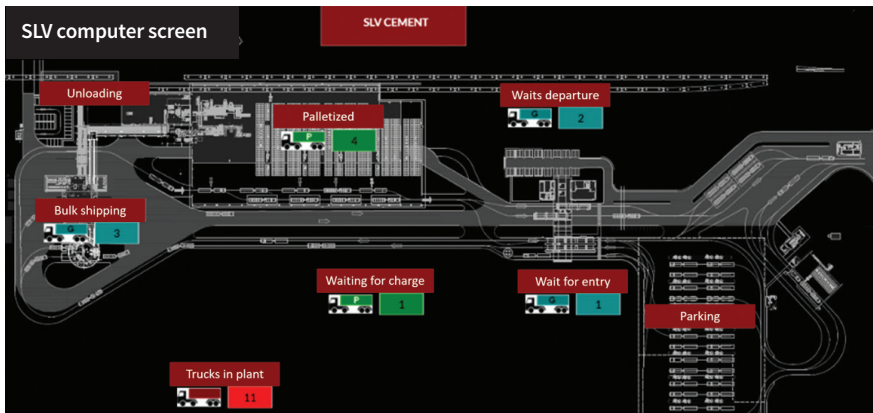
Weighbridges

A high share of vehicles entering and leaving cement works are required to be weighed on the weighbridges, which act as critical control points in and out of the plant. The weighing process can now be automated as part of the overall SLV control system. Typically ANPR cameras, traffic barriers and traffic lights control vehicle access, with sensors ensuring

correct vehicle positioning on the weighbridge.

Overhead cameras can check loads and provide additional security. Vehicular control for bypass lanes can also be configured to manage the entry and exit of unweighed vehicles, ensuring enhanced site-wide security and visibility.

Touch screen driver-operated terminals, alongside the weighbridge and accessible from the vehicle, provide drivers with clear and easy-to-understand instructions to guide them through the automated weighing process. (It should be noted that legal for trade weighbridges are classed as non-automatic weighing instruments and, as such, legally require such operator intervention during the weighing process.) A range of driver access cards for these terminals can be accommodated and dual-height terminals optimise access for different vehicle designs. If the vehicle is weighed twice, unloaded and loaded (known as double weighing), the system automatically recognises the vehicle



details when it returns to the weighbridge to be re-weighed. This automation improves the throughput of vehicles and weighing efficiency. Intercoms in the driver terminals can be used to deal with any questions drivers may have and manual controls in the gatehouse or control room can be used if any issues arise.

Silo filling and emptying

SLV optimises the complete silo filling and emptying processes, integrating with existing silo automation systems to reduce the average operation time. This can include unmanned or operator-assisted load operations, together with material and silo validation to avoid any logistical errors. Both weighing and level measurement technologies can be managed via the software. Traffic lights, ANPR cameras, traffic barriers and sensors can be controlled to manage vehicle entry and ensure correct positioning.

Blending, dosing and filling

The control of key raw material and finished products during various blending, dosing and filling processes throughout the plant can be included in the SLV system. This can include bagging lines, robot palletising and loading processes. Again, the ability to control vehicle movement at these key areas improves traceability and efficiency.

Remote trouble shooting and maintenance

In addition to these integrated operational improvements, maintenance of key weighing equipment such as weighbridges can now be monitored remotely using Cloud technology. This allows weighing engineers to log in and view a wide range of individual weighbridge operational parameters remotely in real time. For larger users, it is also possible to configure the system so that operations managers

have limited access to key data.

The system will immediately flag up any load cell or instrument malfunction via its comprehensive alarm functionality. Engineers can examine parameters, including alarm occurrences and frequency, load spikes and overloading as well as critical voltage values and temperature graphs.

This real-time vision allows rapid response to site and ensures that engineers know what the issue is before they arrive. It also ensures the correct spares are made available and, if required, availability of the weight calibration truck to ensure minimum downtime. Such detailed information can also help establish optimised service patterns for individual weighbridges.

Conclusion

Cement plants around the world are already benefitting from the implementation of the SLV system, including LafargeHolcim, Cementos Balboa, InterCement, Cimentos Europa and Cimpor.

Comprehensive computer simulation

models, developed in co-operation with the University of Minho, Portugal, can show details of plant KPIs before and after the implementation of the SLV system. These clearly highlight the significant operational improvements that can be gained.

These include:

- reduction in vehicle weighing time due to the driver-operated weighbridge systems
- much quicker parking management through automatic vehicle calling
- reduction in the number of human errors due to the automatic management of the dispatching processes
- increase in the safety, security and organisation within the plant
- increase in the number of dispatched vehicles and cement quantities, due to the improvement of the overall service.

By changing only the input data, computer modelling allows the simulation of several behaviours of the vehicles. This means that it is also possible to simulate the introduction of new rules for the lorry drivers. Such an example would be adding a schedule for one or more types of product or types of operations (loading/unloading) to a different time of the day (for instance, to a time shift with less number of lorries being dispatched) and see what happens to the processes.

SLV Cement is a 24/7 self-service solution and therefore, the plant will be able to dispatch cement at any hour of the day without extra human resources. With this simulation model, it is possible to experiment with different schedules to achieve the best performance of the processes before implementing it live on the site. ■



The 24/7 self-service solution enables plants to dispatch cement at any hour of the day