Weighbridges are often seen as the unsung heroes of quarrying operations, expected to work remorselessly in the most arduous conditions. They act as vital control points for vehicles entering and leaving site and any bottlenecks at busy times can cause unnecessary delays, frustration and pollution. However, the integration of new technologies, combined with advances in engineering, is continuing to improve the operational flexibility of these crucial weighing systems, bringing increased security and efficiency and more effective use of weight data.

Driver-operated weighbridges are playing an increasingly important role in today’s quarrying industry, offering a number of operational advantages, especially in terms of vehicle throughput, extended working hours and improved data accuracy. Two well established technologies – automatic number plate recognition systems and electronic signature pads – are now bringing further benefits to these already efficient weighbridge systems.

**Automatic number plate recognition systems**

Automatic number plate recognition systems (ANPR) are an important asset to any driver-operated system and recent advances in camera technology are leading to the increased integration of this technology within weighbridge applications. ANPR systems can be used to operate traffic lights and control security barriers, thereby introducing a high level of site control and security by only allowing pre-registered vehicles to carry out weighing procedures in a highly efficient manner. They also remove the need for drivers to carry pre-programmed smart-cards or keys.

Number plate details can be programmed directly into the designated weight terminal without the need for a separate PC, while related information can include haulier details, product descriptions and vehicle tare weights. The use of stored tare weights removes the need for double weighing in many applications, thereby speeding-up collection or delivery procedures.

The latest systems include an integrated illuminator, high-resolution digital camera, digital analyser and on-board relays, all contained in a standard security housing. The on-board electronics continually adjust the exposure, gain and integrated on-board IR lighting to maximize the contrast and readability of the registration plate. Unlike CCTV/PC systems, the latest generation of cameras can read dirty plates and compensate for variations in plate reflectivity, strong headlamps and adverse weather conditions, making them well suited to quarrying applications.

**Electronic signature pads**

Until recently, electronic signature pads have primarily been used in the logistics and parcel delivery industry sectors. Now the technology has been developed to integrate with driver-operated weighing instrumentation. The electronic signatures act as a permanent record for each weighing and the signatures can be printed on paper receipts and also
Weighing Technology

Electronic signature pads have been developed to integrate with driver-operated weighing instrumentation displayed on a local or central PC. The specific weighing procedure determines where the pads are located and drivers may be required to sign the pad in order to gain entry to and/or exit from any particular weighbridge. The signing process gives added security and traceability to the weighing process, while triggering an output to control traffic lights or barriers. The robust pads are designed to be fully compatible with weighbridge software packages and can either be integrated into the driver-operated terminal or, for manned installations, located in the weighbridge office.

Wireless connectivity

Wireless (WiFi) technology is rapidly expanding in the commercial world and is now starting to be used to very good effect in weighbridge applications at quarries. In many applications weighbridges are located at some distance from the main offices and traditionally hard wiring was necessary to provide a suitable communications link. However, transportation anywhere in the world using standard shipping containers. On arrival at site, the half-width sections are simply removed from the container and bolted side by side to form the requisite standard-size deck module.

Most weighbridges operate on a drive-through basis, however, for installations in space-restricted locations it may be convenient for vehicles to enter and leave from one end of the weighbridge only. In such installations an integral back-box provides the requisite support and stop-end for the deck.

Another restriction for weighbridges may be the terrain where they have to be installed. There is now a proprietary technology available that allows weighbridges to be installed on sloping sites without any adverse effects on accuracy. The sloping weighbridge concept, which is suitable for gradients of up to 1 in 20, is designed for space-restricted installations or situations where it would be impractical or prohibitively expensive to carry out civil engineering works to establish a suitable level area. The weighbridge can be installed to accommodate the slope either from end to end, side to side across the width of the bridge, or a combination of both. The system uses special load-cell mounting assemblies in conjunction with the weighbridge design to ensure correct load introduction, while a non-slip surface prevents vehicles from slipping backwards.

Software developments

Important developments are continuing to expand in cost-effective weighbridge-management software, especially for multi-installation, multi-site applications. There is also a growing ability to collect data and manage weighbridge installations from a central location bringing obvious advantages, especially when users can configure and amend key operational aspects of the software themselves. For example, designated vehicle access for driver-operated systems can be updated or changed remotely, removing the need to visit individual sites. Connectivity can be via LAN, WAN, GSM GPRS or phone line, and added benefits may include usage activity log files, PC file back-up and the capability to view weigh displays from several weighbridges on a single PC screen at any one time.

Engineering improvements

Although significant advances are being made in weighbridge data collection and management, it must not be forgotten that accurate and reliable weighing is still totally dependent on sound engineering principles relating to weighbridge design, installation and ongoing maintenance. Despite their well-established pedigree, innovative improvements in weighbridge design and build are still continuing to emerge.

Modular designs, for example, allow for cost-effective

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Conclusion

Sound engineering practices combined with the integration of innovative technologies continue to increase weighbridge versatility, improving vehicle throughput and site security. In parallel, developments in user-configurable software and data management are bringing important advantages to quarry operators.