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Launch of a new interface: measurement, evaluation and characterization of vibration

It's widely agreed that the performance of the concrete, particularly in terms of mechanical resistance and sustainability, comes from the quality of the vibration during the manufacture of the fresh concrete. Quality vibration ensures a concrete with uniform composition and guarantees a global homogeneity of the material overall. The current challenge in manufacturing concrete products is reducing the manufacturing cycle time while improving the quality of the product, enhancing the sustainability of the materials and assuring consistency of production. Controlling vibration and its effects on product quality and speed of production are critical in the concrete industry today.

Quadra is expert in vibrating systems and mechanical innovations. The vibrating features designed by Quadra are patented and provide innovative manufacturing conditions that allow the perfect control of the dimensional parameters of the finished products (height, weight, density and resistance) and constant production cycle speeds.

Continuing with its policy of continual investment, Quadra has just launched the development of a new interface designed for the measurement and the optimization of its vibrating press. Data is acquired during each production cycle and measurements are interpreted and presented on an interface enabling the manufacturer to look in detail at the vibration characteristics of their machine. Thanks to the data acquisition and interpretation of the vibrating measurements, this interface enables the manufacturer to examine the vibration behaviour of the components. The objective is to determine the optimal operating conditions of the machine required to manufacture in high and consistent quality, within an efficient cycle time and minimizing the demands on the machine.

Description of the Quadra Prefit interface

The interface tracks the vibrating press and its vibration behaviour. Quadra Prefit records and analyses all the data in real time, producing immediate and pertinent results that are ergonomically and synthetically displayed on the interface.

The measurements are recorded with accelerometers located strategically in the vibrating press (mould, vibrating table, tamper head, air bags). Laser cells are used to record the rotational speed of the vibrating motors. The information recorded by the accelerometers and laser cells is combined

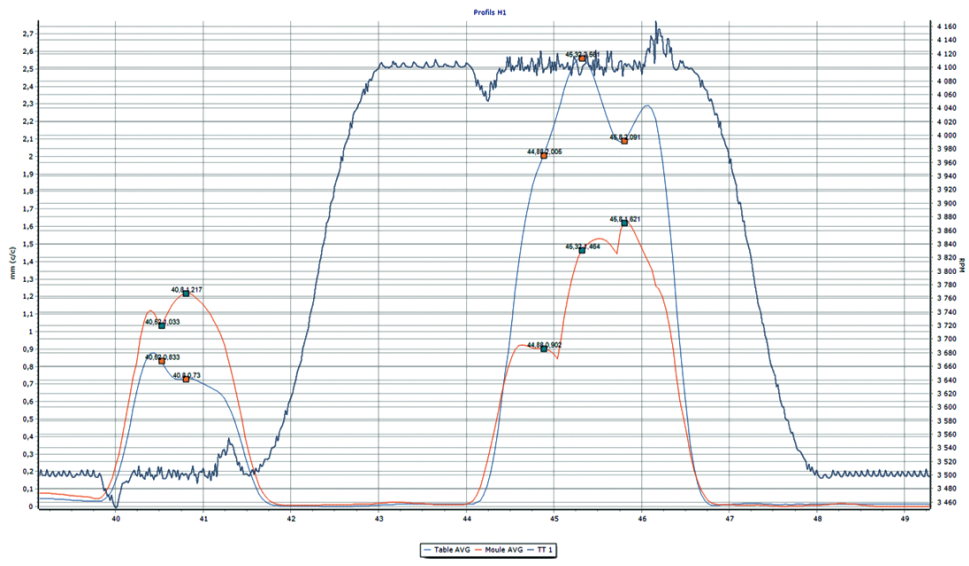


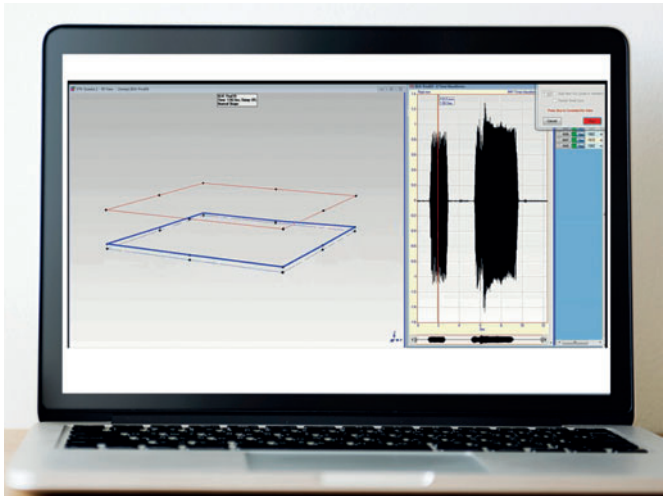
Illustration of the vibration cycle displayed via the interface: graphic display of the pre-vibration & final vibration cycle

to provide a global view of the vibration in the machine while operating. Those measurements are retrieved, processed and sent to the interface.

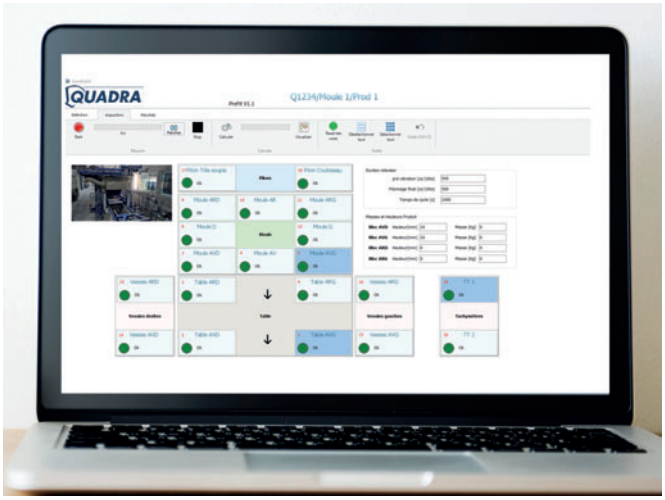
The interface takes into account all aspects of production:

- vibrating press: geometry of the equipment, type of machine, type of pallet, location of the motors, the air bags etc.

Devices: accelerometers & laser cells



Preview of the mould and the vibrating table's motion



Preview of the cells and their location in the machine

- mould: type of product manufactured, height of the products, weight of the mould etc.
- production in progress: detailed recipe (speed of rotation of the motors, vibration times etc.)

All the production data reach the interface and are saved and recorded for each product. The interface assesses and processes the data, creating an accurate and relevant report on the display. The results are available in real time in order to view and analyse them cycle by cycle.

This new tool enables the manufacturer to determine the specific adjustments needed to the settings of the vibrating press in order to establish the most effective operating conditions.

The first tests were carried out on a vibrating press based in Quadra's factory, then additional vibration measurements were also completed in some customer's plant on their Quadra machines during actual production.

With a well-known concrete mix, the interface enables the manufacturer to follow and watch in real time the impacts of the adjustments to the vibration settings in order to define the optimum parameters. With a changed concrete mix, the interface enables the manufacturer to follow in real time the effects of the recipe's settings on the vibratory behaviour of the machine. Indeed, in some cases the mix design can cause changes during the pre-vibration, which can negatively impact the final vibration. With some adjustments using data gathered by the Prefit interface, the vibration settings can be modified to improve the quality of the vibration performance based on the mix, ultimately guaranteeing efficient vibratory behaviour and the highest quality products.

Conclusion

A strong understanding of the equipment's behaviour due to vibration is becoming essential. Optimization of these settings must be a compromise between speed, efficiency and low demand of the equipment. Indeed, apart from the performance of the equipment within one cycle time, the requirements regarding the sustainability of the components and the consistency of the production are growing. In order to achieve this optimal balance, it requires a high-quality design, as well as customized and in-depth settings, monitored for continuous optimization.

This tool is unique in the block making machine industry. It enables the producer to adjust the manufacturing and vibration parameters in order to provide the best possible operating conditions. It enables Quadra to assist its customers in maximizing the value of their machine and also provides a detailed evaluation if improvements are needed for the production of a particular product. ■

FURTHER INFORMATION

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