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ENSURING PRECISE FLOOR LEVELS WITH CONCRETE LASER SCREEDS

The quality of floors in distribution centres, warehouses and production facilities can be the 'make or break' factor for the life of the facility. This is according to Peter Norton, managing director of CLF Concrete Laser Flooring, whose company, Norton Construction Products, joined forces with CLF in 2006 to provide clients with quality industrial flooring.

One of the systems he brought into CLF was the Somero laser screed, a machine that has fast gained a reputation for its ability to produce concrete floors with a high quality finish and levels, in amazingly short time periods.

Norton says that while any type of concrete can be laid and levelled using the Somero, CLF has worked closely with the technical experts at leading cement and aggregate supplier AfriSam to develop a mix which is particularly suited to laser concrete flooring. This mix is known generically as the CLF Surface Bed Mix.

"It is important for us as flooring solutions providers to have a concrete supplier who has the capacity, both in terms of product availability as well as prompt response to delivery needs, to ensure we meet our deadlines and are not left with a half-finished job. Because of the speed at which the Somero lays and levels floors,

we need an uninterrupted supply of concrete. It therefore makes sense to call on the expertise that AfriSam, as a reputable supplier, has."

AfriSam has been supplying CLF with a surface bed mix that is developed to ensure optimum productivity, meeting CLF's specification and individual requirements and enabling them to produce quality finished floors.

"Through careful planning and commitment to each pour, AfriSam is able to ensure consistency of the product workability and continuity of supply. AfriSam and CLF have produced many high quality floors together over the years and have been successful in co-ordinating continuous pours during the night and over weekends to meet customer demands and tight construction programmes," Graham Hannah, multi products key accounts manager at AfriSam, says.

Three recently completed projects bear testament to the close relationship the two companies have forged in an effort to provide customers with superior-finish flooring. "A total of 95 000 m^2 of concrete was laid on the interior floor of the Unilever central distribution centre (CDC) in Boksburg and we are currently finishing 60 000 m^2 of concrete flooring for the truck hardstands and parking areas," Norton says. "Quality control was of the utmost importance and by using the CLF Surface Bed Mix along with the Somero, we met all customer defined specifications."

The Ferrero Rocher production facility and CDC in Vereeniging was designed in Europe and follows stringent construction specifications as laid down by the parent

company. "The 8 000 m^2 facility required approximately 1 300 m^3 of concrete which was poured on two different levels. The second pour was required to be 20 mm lower than the adjacent floor levels to allow for the laying of hygienic floor tiles thereon. It was a very complex job and required clever coordination of people, machinery and concrete," Norton explains. The finished result, which was achieved in only four days, is an attractive durable floor with fewer joints than normal.

"The Heineken Brewery contract called for 8 000 m^3 of concrete for the 40 000 m^2 of hardstand and roads. We reinforced the concrete mix with Norfibre steel fibres which were added into the concrete mixer truck and dispersed simultaneously with the concrete. This will provide the customer with the required concrete "toughness" for the demanding road use," Norton says.

"Timing is everything with flooring," Norton says. "The site must have sufficient access and the material suppliers must be able and ready to deliver concrete at a sufficient rate and on time to ensure a full day's work. Any shortfall will delay the programme, increasing the cost and adding to the number of joints.

"Factors such as ground conditions and sub-base material, the general build programme, including when the building envelope will be closed, access and health and safety issues, will all influence the end result," he adds.

Norton explains that until the 1990's floors were laid in separate individual strips, with each day's strip of concrete covering about 500 m^2. With a joint separating

each strip, most floors had a large number of joints, which are weak points, running across the surface.

Generally, the warehouse floor is hardly noticed until something goes wrong. When cracks appear, joints deteriorate or when very-narrow-aisle (VNA) handling equipment runs unevenly, the cause can nearly always be traced back to well before the project work started.

Different types of buildings, such as distribution centres, production facilities and warehouses, need different types of floor and factors such as the type of handling equipment used, racking height, aisle width, the warehouse layout, point and dynamic loading factors, and whether it is an ambient or temperature controlled environment all affect the final result.

The Somero laser screed is a self-propelled four wheel drive, four wheel steer unit with a telescopic boom, on the end which is equipped with a 3.5 metre screed head (2.7 metres for smaller units). This head consists of a plough and auger to cut the concrete to level and a vibrating beam for compaction. On each end of the screed head are two laser receivers that, coupled with a laser transmitter, provide a constant reference to datum.

The machine's automatic laser control system ensures an accurate level finish through the use of electro-hydraulic controls. The laser receivers receive a signal from a transmitter multiple times per second providing automatic control of finished floor levels. The signal from these receivers, via a control box, is used to automatically adjust hydraulic cylinders.

Concrete is discharged in strips from a concrete readymix vehicle to match the size of the machine approximately 25 mm higher than final grade. The laser screed moves into position and the telescopic boom is extended over the discharged concrete.

The screeding/compacting head is then lowered to the grade established by the laser-level transmitter. Retraction of the boom causes the screed head to be drawn across the fresh concrete which is levelled and compacted in a single pass to a constant and precise level, maintaining the screeding level of the whole head assembly.

The screed head itself consists of three parts: the plough, the auger, and the vibrator. The plough disperses the concrete evenly; the auger removes the excess material to finished grade and the vibrator smoothes the surface.

In situations where floor design specifies a dry-shake applied surface hardener the laser screed’s method of operation is matched in terms of speed and working

method by the topping spreader, resulting in automatic concrete screeding and dry-shake application.

Going compact

The physical size and weight of a laser screed machine, along with economies of scale, make it impractical for many small projects. The standard machine is also inappropriate for larger sites consisting of several smaller units, upper decks, heavily reinforced slabs and those having delicate membranes on the sub-base. The Somero S-9210 CopperHead provides a solution to this.

The CopperHead laser screed works by using the same basic laser control system as the 'big' laser screeds. While some of the electronic components are different, the key principle remains the same. However, the CopperHead differs from other laser screeds on three points – floating versus fixed stabilisers; in the mud versus outside of the mud; and electric actuators versus hydraulic cylinders.

Instead of working from a fixed base of stabilisers, a fixed boom, and reaching 'down' to the concrete, the CopperHead vibrating plate actually 'floats' on the surface of the concrete. In order to hold grade over the uneven sub-grade that represents the placement area, the wheels are designed to move separately from the screed head. The pivot attachment isolates the movements of the lower and upper frame; the laser control system allows the plough to continually cut the

concrete to grade even with variations in sub-grade; the vibrator plate rests on and is actually stabilised by the concrete (that is, it 'floats' on grade).

The plough on the CopperHead is moved up and down by a set of electric linear actuators. These actuators are much lighter than hydraulic cylinders and minimise the complexity of the screed head.

The CopperHead is easy and efficient to use and works best with one man operating the machine and two rakers along each side to ensure that the concrete is not lower than grade before it is screeded.

"It's important for our clients to have level and durable floors, especially where the quality of surface finish could negatively impact on production," Norton says. "We therefore make use of the UK Concrete Society Technical Report (TR34) specifications of FM2 Special category (free movement floor) to determine the degree of levelness provided by our machines."

The specification assumes the use of standard forklift or reach trucks in wide aisles, with storage on pallet racks or block stacked up to 13 metres in height. While hand screeding methodologies require more labour intensive and time consuming input to attain such a standard, laser screeding achieves FM2 with ease and speed. Secondary finishing techniques coupled with specialist ride on power trowel equipment is however necessary to complete the job.

Norton points out that in order to ensure reliable and continuous job completion, the company owns five Somero machines in various configurations. "This means that we will always have a backup machine ready to take over from the primary machine should the need arise."

CAPTION FOR AFRISAM 01: AfriSam has been supplying CLF with a surface bed mix that is developed to ensure they produce quality finished floors.

CAPTION FOR AFRISAM 02: CLF's Somero laser screed machine produces concrete floors with a high quality finish in amazingly short time periods.

CAPTION FOR AFRISAM 03: The Somero laser screed is a self-propelled four wheel drive, four wheel steer unit with a telescopic boom.

CAPTION FOR AFRISAM 04: The Somero laser screed's automatic laser control system ensures an accurate level finish.

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