

Expertise is the Key

When you see a robotic total station standing beside a work site, gently moving from side to side and directing a complex piece of equipment such as the Vigliaroni's laser screed, you're inclined to think, "This looks so easy".

As in so many specialised fields, it's easy so long as you know how. The name of the game is to get this gear functioning in such a way that relatively unskilled people can operate it and get consistently good results, and you don't send a man on a boy's errand.

If you had a laser expert standing around the site all day to sort out problems, that would be defeating the purpose. V&G's operator Brian Hill is the first to admit that he stepped on to the laser screed after thirty years of operating concrete pumps. Generally, new equipment is not going to justify itself unless regular blokes like Brian can achieve consistently good results.

V&G Concrete Constructions are using Topcon's 3DMC LPS (3D Machine Control Local Positioning System) on the laser screed, and so, for that matter, is Graeme Salmon in preparing the subbase.

Two things can be said about that. Firstly, this Topcon laser equipment has a justifiable reputation for accurate performance, and is highly reliable.

But perhaps of more importance, Bob Bent's company Laserbeams in Melbourne has a great team of experienced people who know how to get such systems running smoothly, and support them in the field.

The fact is, the Somero laser screed didn't originally come set up with Topcon equipment. It is now, but that's because after others had failed, Ivan Vigliaroni approached Bob Bent to come up with the true 3D solution he was determined to have.

Laserbeams recognised that the control of the floating screed head, pivoting in the centre, was essentially little different in principle to controlling a motor grader blade—and they'd had years of experience in setting up full automatic control on graders, dozers, scoops and a variety of other earthmoving plant.

Of course, it wasn't just as simple as that. But Laserbeams rightly take some pride in the fact that—not having sighted one of these laser screed machines before—they found the solutions.

"Which goes to show," says Ivan Vigliaroni, "That talk's cheap, but when you outlay big money you need to be dealing with people who really know what they're doing."



Complex Concrete Surfaces Created by Mechanical Screed under Laser Control: Fast and Accurate

Just as the precision of road surfaces and compacted fill has been revolutionised in recent years, so the relentless search for greater efficiency and accuracy has been directed to the construction of concrete slabs.

The blokes doing the searching for efficiency, in this case, are Ivan and Nick Vigliaroni of V&G Concrete Constructions in Melbourne—although Melbourne is only a base, since their work takes them far and wide.

V&G are operating one of the few Somero laser screeds in the country. Advertising themselves with the motto "Faster, Flatter, Fewer" (faster production, flatter surfaces, fewer people needed) the American self-propelled Somero machines produce a superior quality finish.

Big Labour Saving

Principal benefits are the considerable speed at which they work, the accurate and well-compacted surfaces they produce, and the relief they provide from backbreaking labour. The labour issue is one of the most important, giving rise as it does in the concrete industry to so much absenteeism. It's physically tough work under time pressures, and anything that cuts down the grinding effort is bound to keep the team more motivated.

True 3D Operation — Creates Complex Shapes

The point of difference between V&G's operations and others using laser screeds is Ivan Vigliaroni's insistence upon obtaining a true 3D solution. Normally, the screed will work from a single or dual grade laser. That's good, up to a point, but is limited to flat or sloping surfaces, and single grade breaks. Ivan saw a need for offering his clients the accuracy of laser on complex designs involving multiple grade changes—a new and better approach.

Thanks to the technical skills of Bob Bent's Laserbeams organisation, this has been successfully accomplished. Guidance is now provided by a robotic total station, reading directly from a computer loaded with the engineers' plans for the job.

This is logical. Most contractors work off paper plans—the paper plans are produced on a computer, so why not work off the original digital plans?

Both Top and Underneath of Slab Created Using 3D Laser Control

V&G Concreting works closely with Graeme Salmon's Melbourne Laser Levelling, who produce the subbase. The combination of laser accuracy on both the prep work and the finished surface generates the further advantage of precise slab thickness, minimising wastage of concrete.

The job we watched was both complex and large—a good example of the capabilities of this equipment. At Melbourne's Appleton Dock, a new quarantine wash-down area was designed such that the central area sloped inwards to capture contaminated waste water, at each side protected by separate drainage systems for uncontaminated stormwater. The overall post-tensioned slab design of 1600 square metres was of some complexity, with multiple grade breaks.

The challenge was, without dividing the job up into segments, to work from one side to another of the slab in one continuous process, accommodating all the grade changes in the design. And to do it mechanically, with a minimum of manual work.

Our pictures make it pretty clear how the Somero system works. After strips of concrete are pumped into place, the boom-mounted head both compacts and screeds in one pass, as the telescopic boom withdraws towards the machine.



The Somero laser screed deploys a vibrating screed head on a telescopic boom, which draws inwards towards the operator under automatic laser control.

As the Somero completes each section, tracks are re-laid on top of the reo to reposition it for the next.



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 smooths the surface.



Note the multiple changes in grade that the laser screed is executing, without pause.

The laser screed moves along a set of aluminium tracks that sit on top of the reinforcing steel, and are progressively re-laid.



Concrete laser screed...

Although both ends can be laser controlled, the usual arrangement is that one end of the screed head takes its level by a small overlap of the previous pass, while the other end receives positioning data from a laser transmitter.

In the unique system set up by V&G and Laserbeams, the positional data comes direct from the computer design, via a robotic total station. We watched the laser screed smoothly produce one shape after another, running on a set of tracks that was progressively demounted and moved as each section of the job was completed. Surface accuracy is within two or three millimetres and is constantly checked, virtually eliminating re-work.

The production rate was dictated not by the laser screed, but by problems of keeping concrete trucks up to the job. At ten trucks an hour, the Somero was winning hands down and easily completed the slab in a day.

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In situations where floor designs specify a 'dry-shake applied' surface hardener, the laser screed's operation is matched in terms of speed and working method by a topping spreader, giving automatic concrete screeding and dry-shake application.

Faster, Cheaper, Superior Quality

"Once a team gets into the groove of operating this equipment, it's a winner," says Ivan Vigliaroni. "We need fewer people—probably half a dozen less on this job—and those on site are not being asked to break their backs. They finish up being less stressed, so the work progresses better. The added bonus is quality—the vibrating screed produces a more compact finish, far better than could be achieved manually."

The bottom line: a big investment, but much faster and more accurate results of a superior standard. Which equates to either more profit, or more competitive quotes, whichever way you prefer to look at it.

