

Leica Geosystems Now in High Gear

GradeStar Version 5.0 delivers excellent features

A few months ago we reported on the opening by the Prime Minister of Leica Geosystems' new global research and development centre at Dutton Park in Brisbane.

The promise that this facility would rapidly stimulate machine control solutions is already being realised, as is the major expansion that Leica foreshadowed. There are a lot more new faces to be seen every time we visit. Leica is shifting into high gear.

Re-Birth of GradeStar

In the rapidly developing GNSS machine automation scene (Global Navigation Satellite Systems) a certain amount of leapfrogging takes place. Leica Geosystems has certainly leapfrogged into a very competitive position with the release a few weeks ago of GradeStar Version 5.0, containing some highly advanced and desirable features.

The GradeStar GPS product has been in the Leica range for several years, but any similarity between its predecessors and the new Version 5.0, now being delivered Australia-wide through distributors CR Kennedy, is purely in name only.

But before we talk about those features, let's get back to some basics.

An Effective 2D System Comes First

For any 3D GNSS product to deliver up to its promise, the machine control basics have to be in place. This is particularly the case with motor grader systems. For dozers, guidance by indicate-only lighting systems has always been an option, and still is, requiring no change to the machine's built-in hydraulics. But with graders, there have for many years been 2D products available to provide such features as simple blade cross-slope control, or perhaps cross-slope enhanced by sonic trackers or laser transmitters. All such options involve the fitting of electric over hydraulic valve banks.

In such systems, hydraulic controls need to be responsive and desirably should be capable of easy calibration to provide the 'feel' that individual operators are comfortable with. The set-up to meet the operator's preferences should be quick and simple, and re-setting should be equally straightforward when something happens, such as a hydraulic pump failure or a burst hose—no-one can avoid that.

In the past, this usually hasn't been the case. Some of the older 2D motor grader systems from competing suppliers have been, frankly, absolute brutes and prima donnas. Tuning for best performance has been a problem that installers have had to grapple with, and machine operators have had to suffer.

MC-1200 Delivers Superior Performance

Leica's MC-1200 is a newly developed and highly refined 2D system, having its origins in the early Moba system from Europe and Sonicmaster from the U.S. that form part of Leica Geosystems product legacy. The best features of both have been brought together.

Enhancements include CAN-bus technology, capacity to control four rather than the usual three hydraulic channels (more about that in a future article), and absolute simplicity in calibration. It's child's play for MC-1200 to 'memorise' individual operator settings, and re-set them.

For routine daily jobs a sophisticated platform such as MC-1200 is a boon to the operators we've spoken to, and is rarely switched off. But while it's such a useful workaday tool, the more important role is that it lays the foundations for maximum productivity out of the GNSS product, GradeStar. GradeStar is the add-on that supplies 3D capability when the need arises.

New Features of GradeStar

Past versions of GradeStar have moved from a DOS operating system through Windows NT to arrive, in

Version 5, at Windows XP embedded, as it's known. This is a very stable platform trimmed to the basic essentials that performs well and has the considerable advantage of being inexpensive. The operating system and data now reside on a small flash card instead of a 1.8GB card, and this cheaper media reduces the cost of the overall system whilst also making it easier for the dealer to provide quick backup software solutions for the customer.



Each version is licensed to only one computer system and if it has to be moved for support or operational reasons, these new cards make the process quicker and less expensive.

The cost of backup flash cards becomes relatively insignificant in the broad scheme of things, and that's a big plus if any glitches arise out in the field.

Resolving the Ambiguity of Mast Tilt

Initially available for dozers, graders, and supervisors' vehicles, one of the principal features continued in Version 5 is its capacity to compensate on the fly for mast tilt.

The mast attached to the machine's blade, on top of which the GPS antenna or total station prism sits,



moves through quite an arc when the angle of attack of the blade is altered. Compared to its vertical orientation when the machine requires maximum power for roughing out, it may be rolled forward by say 30% for final trim.

Simple geometry tells us that travelling through this arc will change the position of the antenna, relative to the cutting edge of the blade. An error is introduced in the vertical plane, which can be as much as 20 or 30mm above the design surface.

The same factor comes into play when the mast leans sideways to accommodate the cross-fall of a road's surface, and is further complicated when the machine is travelling up or down a slope. The blade can in fact be cutting far more or far less material than it's supposed to be, because the

offset geometry has altered—normally it will leave the finished surface low rather than high, requiring a lot of re-work.

With other products the question arises as to whether the system knows exactly where the antenna is, in relation to the design model. Uniquely, GradeStar V.5 resolves this ambiguity by constant reference to a dual slope sensor installed on the mast.

Rather than the operator having to get out of the machine and re-set the mast when he rolls the blade, he gets on with the job, knowing that whatever angle he may choose for the blade, the result will always be correct.

Measurements taken in static tests demonstrate clearly that this compensation is always accurate.

Automatic Side-Shift

Good motor grader drivers will appreciate the ability with GradeStar V.5 to steer to a nominated line or offset, outside a road design. For instance, in cutting beyond the lip of channel to accommodate the construction of the kerb and installation of ag pipe behind it.

If the design calls for a horizontal cut of 600mm (say) from the toe to the back of kerb and a further 800mm offset to accommodate the kerb laying machine, the blade can be run out, and under automatic control GradeStar will hold the grade at 0% to execute this horizontal offset.

Consider how much re-work that feature eliminates! 