



Chris Seymour, Managing Director of Automated Positioning Systems (APS)

When you say to people that south-east Queensland is becoming the epicentre of the world in GPS machine control, they appear surprised or sceptical.

Why? Kingsford Smith and Charlie Ulm were at the forefront of an earlier technological revolution seventy-six years ago. Aussies were world leaders then, and nothing has changed.

When it comes to innovation in machine guidance, you have to hand it to Mike Forrest, Chris Seymour and now David Hall of APS.

It's only a few months ago that we were reporting the opinion of Ray O'Connor, President of Topcon USA, that Chris and Mike are leading the world with new systems to exploit GPS in mining. Just as the rest of the industry was contemplating its answer to APS's great leap forward into telemetry between machine and master, the Brisbane-based pioneers have moved another huge step ahead by plugging 3D display and logistic efficiency into the GPS equation.

The Significance of 3D

Currently, the cab display offered by all major GPS suppliers is in 2D—Topcon, Trimble, Leica etc. That is, it's like looking at conventional paper

Chris, Mike and David Go to the Top of the Class, with 81%

drawings, toggling between plan and cross section.

Until you see it, it's hard to grasp the improvement of 3D from an operator's perspective—he has a superior overview of the machine with all topographical and design features in their appropriate places. The chief benefit is that he grasps the scope of the job much more clearly, and quickly.

As David Hall points out, "The designer has spent many hours on his design, and understands it. The operator is expected to step into the cab and instantly acquire an equal grasp. Human nature doesn't work that way, but the 3D display bridges the gap."

Logistic Efficiency

The other glittering jewel that David Hall brings to the APS shopfront is something we'll call Logistic Efficiency. It might sound airy-fairy now, but just as we

APS merges with David Hall's firm Machine Guidance Technology, and takes the next great leap forward in GPS

observed four years ago that GPS was set to become the great leap forward in productivity, we are certain that you'll look back on this as the second great leap forward. Just as it happened with GPS, we reckon contractors will have to focus on this to stay in the race.

'Logistics' is an unfortunate word that's misused today—you see it on the side of trucks when people simply mean 'Jack's Road Freight'. But in the case of David Hall's concept, *logistic efficiency* is appropriate. Logistics, as we all know, simply means moving stuff from here to there.

Planning Cut and Fill

To get our heads around David's ExactaTrak concept, which frankly is brilliant, let's consider the case of using a dozer to knock the top off a hill and distribute the material into a couple of holes, depressions, call them what you will.

With a suitable digital model, GPS will save you re-work—no excessive cutting, and you know when the required level of fill is achieved.

But what about planning this job? Where to start cutting and where to start filling with the shortest haul route? How to work out the optimum push for the dozer, whether it's in first or second gear, at what angle, how far to back up?

When you consider it, there are a thousand and one variables involved in such a job, and it follows that there has to be a best way to do it, and a worst way. Well, possibly not a worst way, because taking the material to Timbuktu would come into that, but I guess you'd acknowledge that it must theoretically be possible, on any given job, to work out how to achieve the final result with the minimum input of fuel and machine time. This is the path that David's been going down.

These days, with civil projects, in almost all cases the job is just eyeballed. There's a bit of software around, but we haven't struck anyone who consistently uses it or has much success with it.

APS, through its merger with David Hall, will be offering the solution to this 'logistic efficiency' conundrum to the mining industry. In due course it'll be refined and filter down to the civil construction industry, no doubt through the Topcon dealer network.

How it Works

Way down the track, you can visualise an on-board computer re-calculating on the fly every time a

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The Great Leap Forward by APS

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dozer completes a push, and actually instructing him which direction to push, at what angle, in which gear—or more likely he'll sit there and overview the machine while it does it all automatically.

That's a long way off. Meantime, given a topographical model, David's software cuts a project up into many segments, each of which is 'cut and fill neutral'. That is, for that defined area, there's no import or export of material involved in achieving the final design.

Within each segment, the operator will be presented on his 3D screen, not with a finished design, but with perhaps half a dozen intermediate steps or layers that appear one at a time. He digs to one, then the next appears and he digs to that. Eventually, with appropriate warning, he arrives at the final design level.

Encourages Aggressive Dozing

The two benefits of this approach are these: Firstly, the operator doesn't need to pussyfoot around. He can dig very aggressively to the maximum capability of the machine, knowing that if he inadvertently goes through the intermediate design level he's working to, it doesn't really matter.

This addresses David Hall's belief that the greatest inefficiency in dozer operations is that they spend too much of their time trimming, and wasting fuel, and far too little time working to capacity and optimising fuel consumption per cubic metre moved.

Promotes Efficiency

The second benefit flows from the intermediate layers being skewed to encourage work in a certain direction that's been pre-calculated to give the greatest efficiency. This reflects David's other assertion that there is a very great difference between one

dozer operator and another, in terms of their approach to a job and their expertise in executing it (not to mention their skill handling the machine, which is not exactly the same thing).

All this preparatory design takes place in the office, and files are uplifted by telemetry into working machines.

Chris Seymour of APS describes this as 'seamless execution'—designs are reviewed and revised as the work progresses. He has another phrase, 'engineered earthmoving'—each of

This new technology allows a dozer to spend much more time digging aggressively, to its maximum capacity

them captures the essence of the concept, which is to address all the variables and come up with the best way to tackle the job.

How valid is this approach? We think that thoughtful contractors will immediately grasp its value. Some won't, like a top mining executive who held the view that "a dozer operator knows how to tackle these jobs without being told how." It was to satisfy this Captain of Industry that the trial was set up, demonstrating by a remarkable 81% just how wrong he was.

Addresses Declining Population of Skilled Operators

There's another issue. Good operators aren't becoming more plentiful—rather the opposite. Just as GPS/LPS machine control has been forced upon contractors as a vital means of turning a poor operator into



Mike Forrest, co-founder of APS and MD of ABC Lasers

Opportunity Knocks?

The publicly available data shows that there's a considerable amount of earthmoving work to be done in the restitution of open cut mines.

We're waiting on NSW figures, but in Queensland, where large scale open cut coal mining has been going for forty years, the industry has disturbed almost 400 square kilometres.

Of this total, only 79 square kilometres has so far been reclaimed. The remaining 321 square kilometres represents only 0.02% of the state's area, but it still adds up to a lot of land and a lot of dirt-moving to restore the original configuration of the land.

Mining companies are carrying liabilities in their balance sheets that relate to their obligations under various mining Acts to reclaim what they've dug up, but have been slow to move forward with the work.

Premier Peter Beattie recently announced a number of initiatives to reduce the backlog, so the Queensland Government clearly has the industry in its sights. One issue to be settled is that of standards for reclaimed land—what is and is not acceptable as a discharge of the mining companies' obligations.

Any invention that dramatically reduces the cost of reclamation, such as David Hall's, should have a bright future. □

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APS Moves Another Stride Forward...

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an adequate one, so, we believe, David's 'logistic efficiency' will become another indispensable tool in the fullness of time.

This is Hands-On Stuff

Many have met David Hall or heard of him, but those who haven't will be astounded to learn that this concept is the brainchild of a dozer operator of considerable experience, who emerged from the cab and pursued a vision. It's not the work of a boffin in the office with a few untested theories.

David takes up the role of Chief Technical Officer in the new business resulting from the merger of his Machine Guidance Technology Pty. Ltd. with APS. He'll be at the pointy end of research and product development. The trading name will remain Automated Positioning Systems (APS) with Chris Seymour as Managing Director.

Pre-merger APS needs no introduction, as the preferred supplier of GPS systems to Thiess Queensland mines, and the pioneer of productivity management systems at Yallourn for Thiess Roche Linfox. Not to mention their deep involvement at Century Zinc Mine, Milmerran, Drayton, Coppabella and Collinsville in Australia, and several U.S. mines from Alaska down into Montana.

Incoming chairman of APS is Ken Dredge, who has been chairman of Tarong Energy for five years and has known Mike and Chris for some time. Previously executive director of Mount Isa Mines, Ken not only has the commercial background but also the technical expertise to back his confidence in the strength of the merger. 



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Practical Applications


The only reason we bring this technology to your attention is that a multitude of practical applications occurs to us.

A road maintenance manager, for instance, identifying tasks for his mobile gangs and having a foolproof way of ensuring that they take the shortest route in getting from job to job. Your mobile service units, travelling to breakdowns or machines on site. The range of potential tasks is extensive.

New Model Coming

Garmin (not that we're particularly promoting their products) tells us that a new model will soon supersede the StreetPilot III, to be known as the 2610. It's touted to be far more user-friendly, which is saying something.

As new urban areas are developed and new roads are built, you can keep your data current—updated charts are available.

The maps, incidentally, are surprisingly detailed. We asked whether other charts—such as those created by councils for asset management—can be utilised. Unfortunately, at the present time, the answer is no. 

Next Stage of Sydney's Westlink M7

You may have wondered, as we did, why Sydney's Westlink M7 will, upon completion, connect the Hume Highway to the M2, but doesn't fill in the missing gap up to the Newcastle Freeway (F3) at Wahroonga, totally bypassing Sydney.

The NSW RTA tell us that given the length and complexity of such an undertaking, the Commonwealth initially funded the investigation of the Western Sydney Orbital (now WM7) from F5/M5 only as far as the M2 at West Baulkham Hills.

A separate investigation has been underway for several years now on the Sydney Orbital (SO) to F3 link (to allow motorists to avoid using the section of Pennant Hills Road north of M2).

Broad options were presented to the community in mid-2003.

The westernmost option/corridor (denoted corridor C) connects the WM7 at Dean Park to the F3 north of the Hawkesbury River. Corridor B connects WM7 at Dean Park to F3 south of Hawkesbury River. Corridor A connects the M2 with the F3 at Wahroonga. There are four options for corridor A—the costs of these four options are generally in the range \$1.5 billion to \$2 billion.

An enormous amount of work has been carried out, looking at the cost/benefit and environmental impacts of such a link, says RTA. These investigations are at present continuing. 