

Leading Edge, supported by the Society for Engineering in Agriculture and the Australian Centre for Precision Agriculture, provides a local and worldwide window on engineering and PA research.

## 'Seek the sweet spot'

By Gary Alcorn

Harvester operators will get optimum performance from their machines by finding and maintaining the elusive 'sweet spot' according to internationally recognised agricultural engineer, Dr Graeme Quick.

"The 'sweet spot' is when the harvester is operating at peak efficiency, neither under or overloaded. Today's electronic monitoring systems are helping more operators spend longer in the 'sweet spot', saving fuel and getting more processed product per hectare," he said.

His 40-year plus career in farm machinery research and development most recently included nearly seven years in the US as leader of the Power and Machinery Engineering section and adjunct professor at Iowa State University.



The McCormick-Case gold medal from ASAE.

Part of his coursework there included teaching about cotton and sugarcane harvesting design principles to engineering and mechanisation students and to industry personnel.

In 1995 he was the first Australian to be made a Fellow of the American Society of Agricultural Engineers (ASAE).

That followed a seven-year stint working in Asian countries as the Head of the Agricultural Engineering Division of the International Rice Research Institute. During that time he promulgated indigenous manufacture and training in farm machinery in many developing countries from North Korea to Egypt.

Last year he became the first Aussie to receive ASAE's highest award — the CH McCormick-JI Case gold medal for 'exceptional and meritorious engineering achievement in Agriculture'.

ASAE's citation states in part, "...Dr Quick is recognised for his distinguished career as an exceptionally dynamic researcher, inventor, engineering administrator, author and scholar. His professional engineering achievements have taken him to more than 30 countries, 21 in Asia, over the past 40 years..."

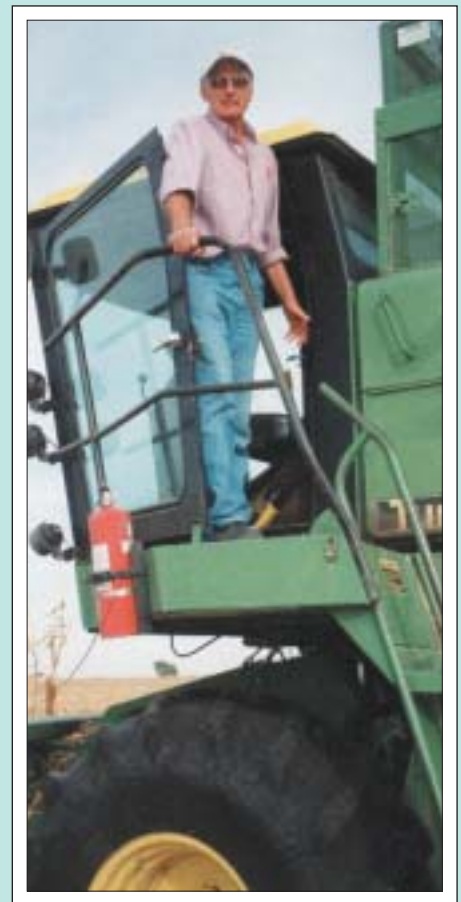
Today, after completing his contracts in the US, he is back in Australia conducting his Engineering for Agriculture consultancy.

"I believe my research into finding the 'sweet spot', which is just filtering out now, has been my most useful contribution to harvesting technology. I am releasing technical papers and reports on work conducted with various companies on this subject.

"The general principles in this work apply to all crops — including cotton, sugar and grains — although most of my work has been with rice, maize, soybeans and other cereals," he said.

Has harvesting technology reached a peak performance threshold?

Not yet, according to Graeme who



Graeme Quick has operated and monitored harvester performance in many countries.

believes inventors and engineers keep finding new ways to push the envelope of innovation and find ways around 'constraints'.

"I think anybody who believes we have reached the limit is likely to be proven wrong by events. I'm beginning to wonder if there is any limit."

"Obviously the biggest change in harvesting is more towards improved operator comfort and taking over some of the management of many of the signals coming in to harvester operators.

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"Taking care of those tasks electronically — that's the biggest change that's taken place lately. However, all that is in the direction of higher costs," he said.

Does that mean that operators have to be better trained these days?

Not necessarily, says Graeme, it might even mean they need less training in some cases.

"Even so I think a responsible manager and owner would be a bit wary about letting a novice take over a large harvester without much training."

Have we reached the limit of harvesting efficiency?

"The field efficiencies of harvesters I'm dealing with are now going well above 85 per cent, certainly a lot better than they were. But there is one major constraint, especially with grain — and that is with the biggest machines — getting the crop away from the harvesters.

"That's an interesting bottleneck both now and into the future. For instance with rice you can take off 40 tonnes per hour or more but you might find the receiving elevator leg at the depot might be only say

80 tonnes per hour, so two harvesters would load it.

"As trucks back up at the elevator you have no way to get the material into the depot as fast as the combine can harvest unless you have a stack of wagons and put a mother bin in the paddock, which makes for a lot more expense and delays.

"So the logistics of getting the crop away from these bigger harvesters is turning into quite an interesting challenge — there are Class 9 combines on the market already," he said.

He sees one possible solution as attaching a large trailer bin or buggy to the harvester — for example an articulated combine — to carry product and unload to fill a semi in one pass at roadside.

Today Graeme is concentrating on writing more books — one is titled *Farm Machinery Olympics* — and doing some hush-hush industry research. His *Australian Tractors* book is highly regarded by readers as the standard reference in the subject while *The Grain Harvesters* published by ASAE has sold 40,000 copies worldwide.

He also holds 15 design patents, including the Kwik-Cut cutterbar and bolt-on

knife sections which have been adopted worldwide.

"Bolted-on sections have saved a lot of skinned knuckles," he said.

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## Australian Society for Engineering in Agriculture

The society contributes to the development of a strong engineering involvement in agriculture to aid economic growth and environmental sustainability for the entire Australian community.

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