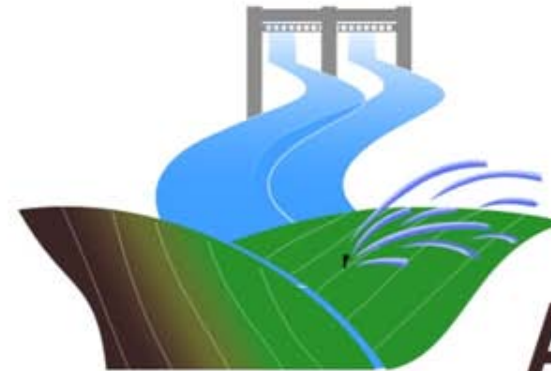


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Land Leveling – Technology & Benefits

Owen Williams, Leica



**Asian
Irrigation Forum**

11-12 April 2012 • Asian Development Bank, Manila, Philippines

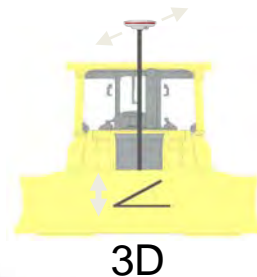
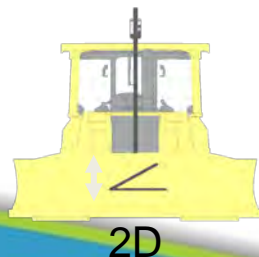
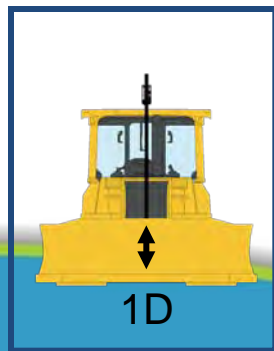
Agenda

- Grading Solutions
- Machine Control Market Drivers
- Powerblade
- Systems Utilised in the Region.
- Land Leveling, How does it Work?
- Statistics
- Success Story

What is Leica PowerBlade?

§ An automatic Grade control system that simplifies fine-grading and agricultural land-levelling & grade preparation

- Automatic hydraulic control for smooth, consistent surfaces
- Priced & featured for developing markets & distributors



Why Laser Land Leveling?

Market Drivers:

- Reduces the amount of water required for land preparation
- Improves crop establishment
- Decreases the time to complete tasks
- Results in better crop stands
- Reduces weed problems
- Results in uniform crop maturity
- Overall increasing yields and profitability for the farmer

Systems Utilised

Research by Joseph F. Rickmann



1. Draft animals and 2-wheel tractors using harrows and leveling boards.

These leveling techniques require total in field water coverage and require 7 to 8 days for a 2-wheeled tractor and 12 days per ha using draft animals



2. Four-wheel tractor using rear mounted tractor blades or drag buckets.

In wet fields a rear-mounted tractor blade is best and in dry fields a hydraulically operated drag bucket is superior. Work rates depend on the tractor size and the amount of soil to be moved. It will take approximately 8 hours to level 1 ha with a rear mounted tractor blade. This reduced to about 4 hours when using a drag bucket.



3. Four-wheel tractor with a laser controlled bucket.

The use of laser controlled equipment results in a much more level field. Accuracy was improved by 50% and the time required was halved.

Conventional Method Of Leveling with Tractor



Problem with Conventional leveling



Water logging In A wheat Field



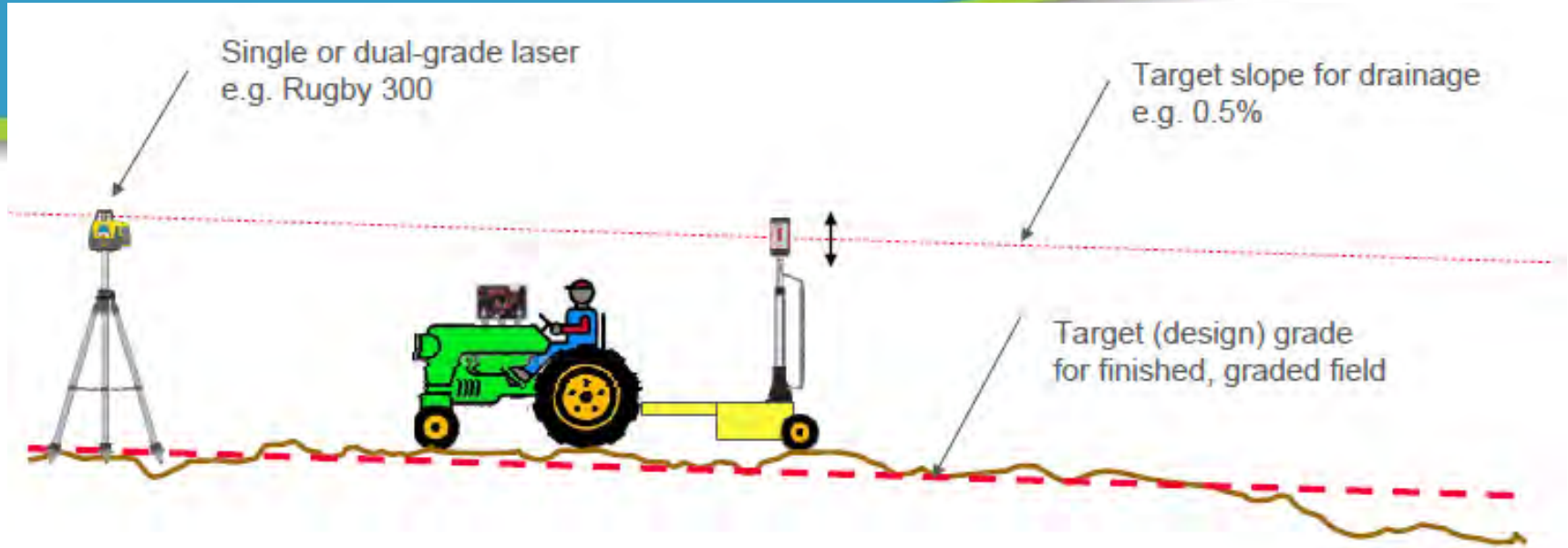
Non-uniform Crop Stand In Undulated Field

Problem with Conventional leveling



Uneven Distribution of Irrigation Water Under Traditional Land Leveling

What is Laser Land Leveling, How does it work?



Laser Land Leveling



Laser Land Leveled Field Prepared For Rice Transplanting

Laser Land Leveling



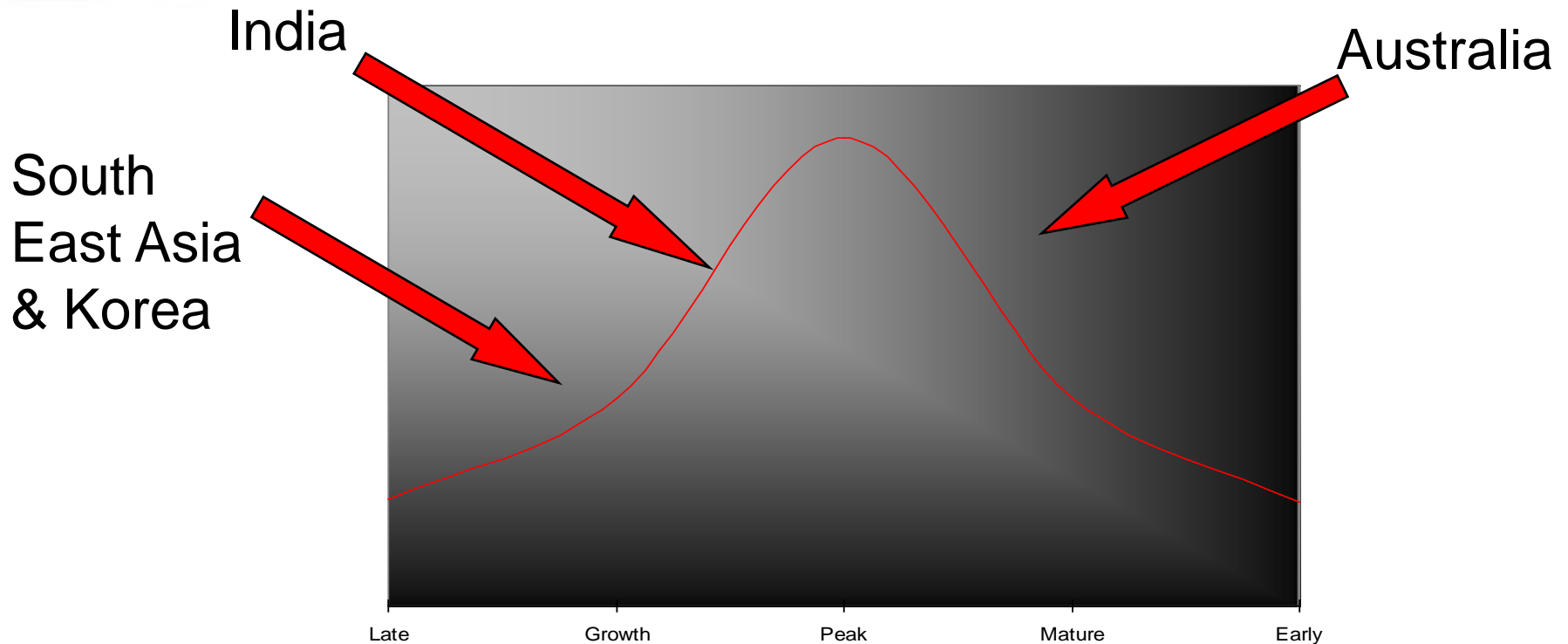
Direct Seeded Rice In a Laser- Leveled Field

Laser Land Leveling



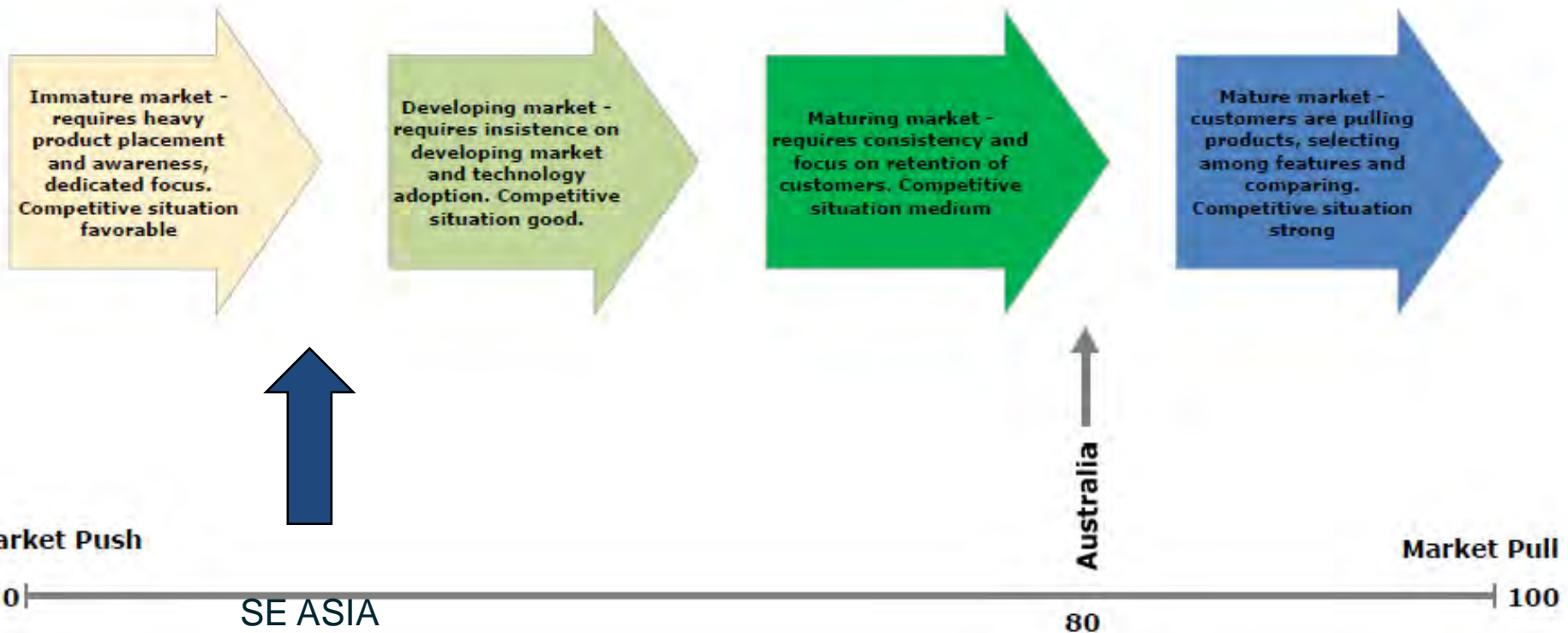
Wheat on Furrow Irrigated bed System (FIRBS) in Precisely Leveled Field

Adoption Rate in our Region...



Market Audit...

Market Readiness



Costs of Land Leveling

- Cost of leveling one hectare of land using tractors is between \$40 and \$50
- Cost varies with volume of soil to be moved & soil type; Studies over many sites show actual cost ranges from \$3-\$5/10mm of soil moved/hectare
- Contractors charge between \$30 and \$100 per hectare
- Based on 530 Kilograms of additional yield/ha, \$53/ha additional revenue
- There is a significant time saving when utilising Laser Control Systems 0.5 days/ha compared to 12 days with animal & leveling board

	Animal + leveling board	2-wheel tractor + harrows	4-wheel tractor + blade
Purchase price (\$)	500	1000	12,000
Time (days)	12	7	0.5
	Operating cost \$/ha		
Labor	15	9	2.5
Fuel & oil		22	32.5
Repairs		5	7.5
Pumping costs	6	6	
	Fixed Cost \$/ha		
Depreciation or Replacement cost	12	4	7.5
Total Cost (\$ ha)	33	46	50

Cost Benefits of Land Leveling



	Additional Cost (\$ ha)							
Leveling	50	0	0	0	0	0	0	0
Ploughing	15	0	0	0	0	0	0	0
Fertilizer	13	6	0	0	0	0	0	0
	Benefit (\$ ha)							
Grain yield	53	53	53	53	53	53	53	53
Reduction in weeding	8	8	8	8	8	8	8	8
Cumulative cash flow	-17	38	99	160	221	282	343	404

Yields & Water Saving

Yield and irrigation water saving for Laser leveled and traditionally leveled plots for rice crop under replicated experiments at PAU, Ludhiana

Sr. No.	Leveled (t/ha)	Unleveled (t/ha)	% age increase in yield	% Saving in Irrigation time/water
Site 1	8.78 ±0.33	7.73 ±0.21	13.60	26.15
Site 2	8.30 ±0.46	7.53 ±0.39	10.30	—
Site 3	7.60 ±0.21	7.00 ±0.25	8.57	25.00
Mean			10.82	25.57

Information Supplied by Elcome Technologies

Statistics - Other Regions

Research by Joseph F. Rickmann



Crop Yield

In Cambodia crop yield was increased by 24% or 530 kilograms per hectare.

For every 10mm in surface variation, there was a yield loss of 260 kg of grain.



Seeding Practices

Land leveling improved the reliability of direct seeding which:

Reduced labor requirements by 30 person days.



Weed Control

Improved water coverage from land leveling reduced weeds by up to 40%.

Weeding time was reduced from 21 to 5 labor-days/ha.



Farm Operation

Land leveling facilitated the use of larger fields which:

Increases field sizes from 0.1 ha to 0.5 ha and increases the farming area by between 5% and 7%.

Reshaping fields reduced operating times by 10% to 15%.



Efficiency of Water Use

The average variability in Asian rice fields is 160mm. This means:

An extra 100mm of water must be stored in the field to give complete water coverage.

Water in the higher fields can be used in the lower fields for land preparation, plant establishment, and irrigation.

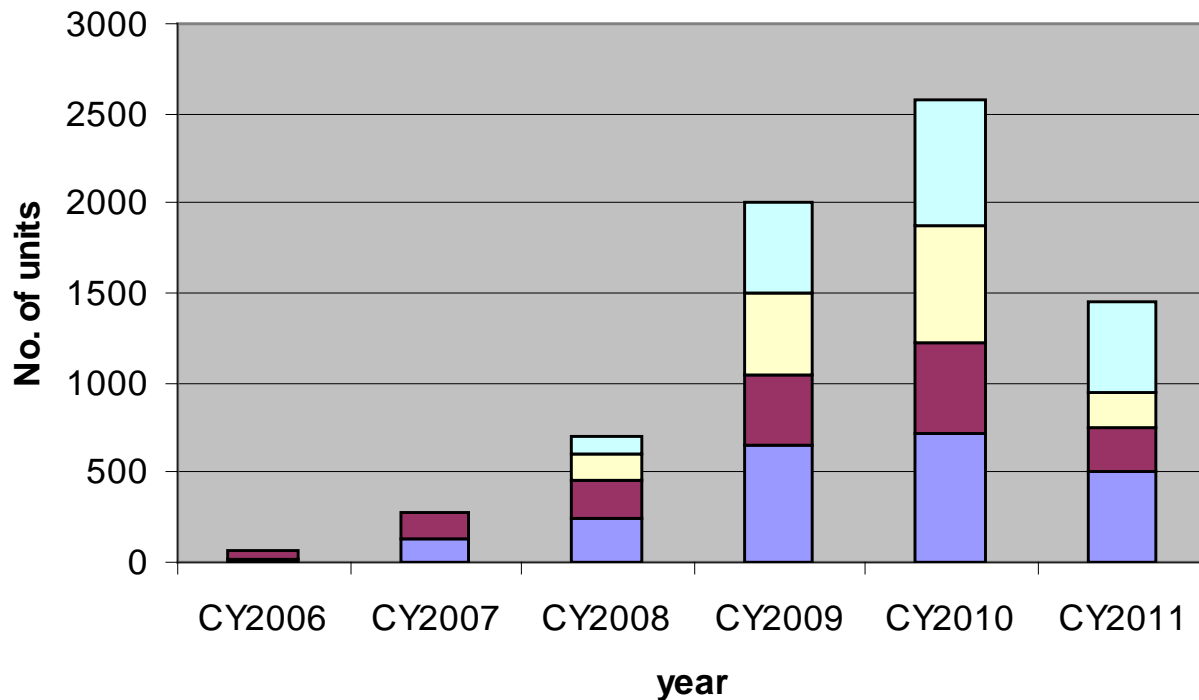


Powerblade Technology - A success story



Market Size - India

- Between 1500-2000 laser land leveler market in CY2011 (US\$ 6-8 million)
- CY2011 market was almost lower by 40% compared to 2010. Weather conditions and market nearing saturation contributing factors in the Punjab region.



Growth in India

- **Government bodies now realise the technology as real boost to AG economy. Subsidy has been a key driver in India at 40-50%.**
- **Through a good support network and local product knowledge, sales have increased.**
- **Cooperatives have been set up to utilise the technology. Farmers work together in local communities, and also hire out the technology to other areas.**

THANK YOU
ANY QUESTIONS?

- when it has to be **right**

Leica
Geosystems

