

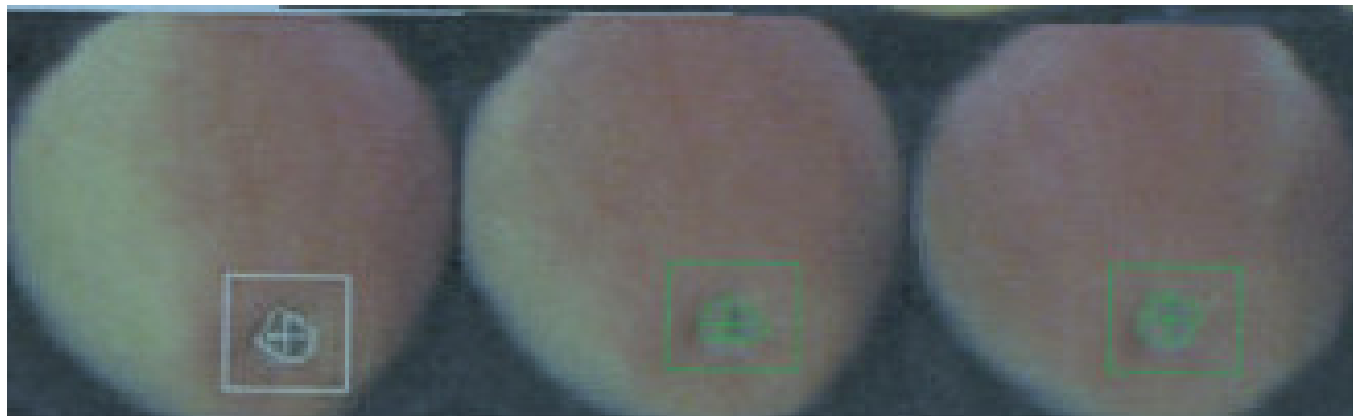
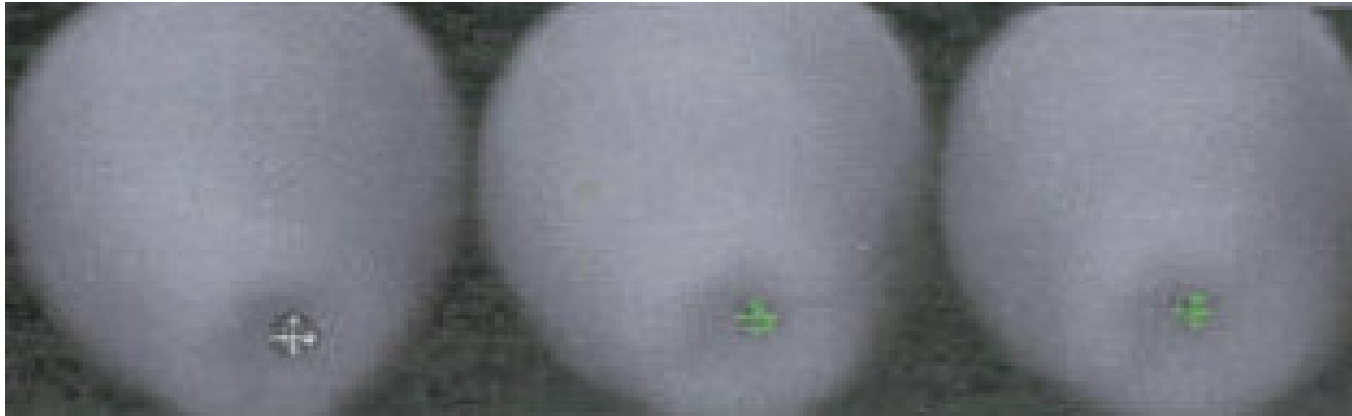
New Advances in Packing

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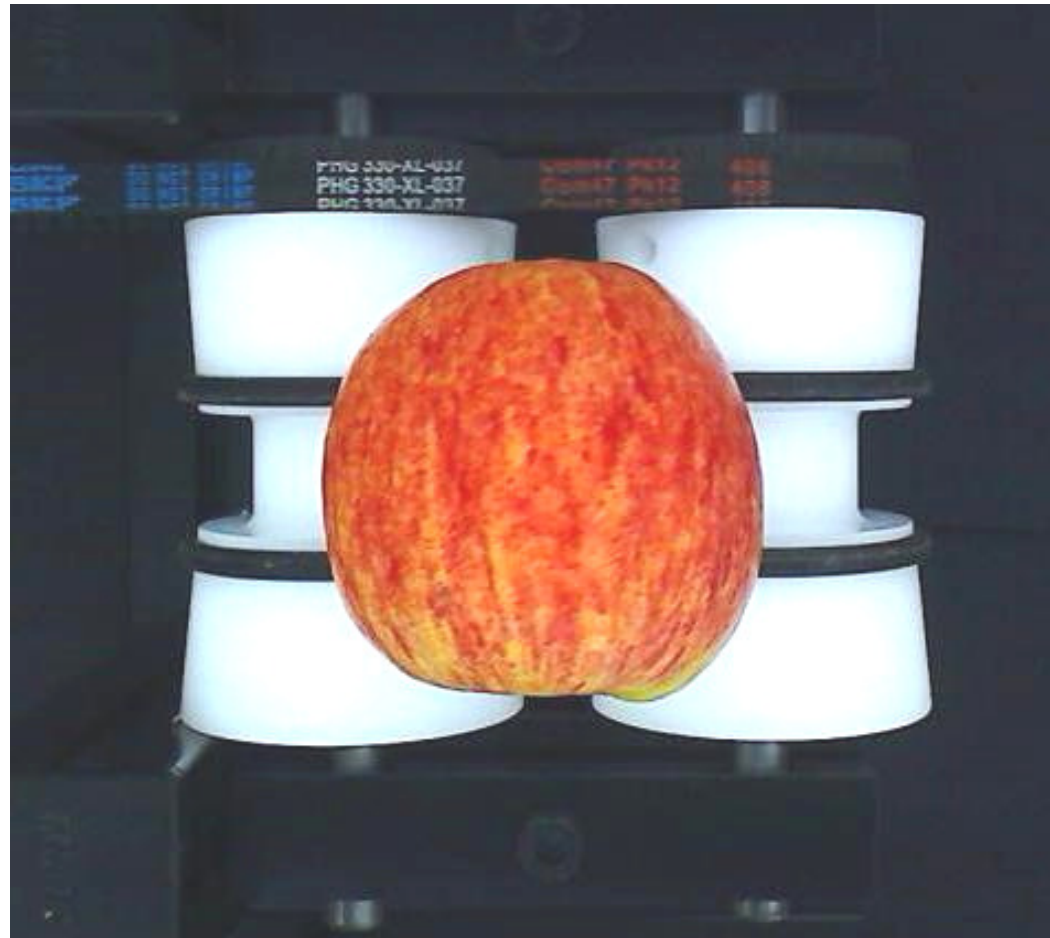
The problems with packing fruit

- Lotta labour
- Lotta damage to fruit from vigorous movement and bumps (25% bruised?)
- Grading for damage/blemishes/colour is not as good as we need
- Labelling runs at 90% efficiency
- Bagging - a four letter word
- There is a review in the paper in the proceedings

In the trenches of Inspection



Eyeball Inspection – is very hard



Inspection

- Operates with infrared images because they come out black and white
- IR cannot see beneath the skin – it gives no extra information over visual colours – in fact, less.
- Programs discriminate purely area of a blotch
- Cannot inspect within the naughty areas
 - No mold at calyx or stem
 - No stem damage
- Cannot inspect forensically i.e. “Here’s a tiny little puncture but we know it’s going to go bad later”

- Singulation

- If you drop a fruit from 50mm, it hits the ground at 1m/s. Depending how soft it is, it suffers 150 to 200g's. ie a 100g fruit suffers a force of about 17.5 kgs!
- When the chain is moving at 600 rods per minute, this means a linear speed of about one metre per second. Engaging a stationery fruit cleanly in a pocket is equivalent to dropping the fruit from a height of 50mm.

- Labelling
 - Fruit could be at any orientation
 - Fruit may have a thin layer of water
 - 90% efficiency is not very good

- Dropping the fruit at the Drop
 - Padding works well
 - At high rod numbers, the last fruit is sometimes not out of the way and you have one fruit falling onto another. The fruit might follow each other 100 milliseconds apart. But the first fruit will have decelerated in 100 milliseconds = a twofer.
 - You might get more whoopass out of going lippetylop but you will also get twofers.

- Packing out
 - Lotta unskilled, rough and indifferent labour, particularly on 3rd shift
 - There are no commercial packing systems
 - Well, that's not strictly true

Two new things

1. A novel fruit handling scheme
2. An automated packing cell

A novel Concept

- Don't do ten fruit per second, do one fruit per second.
- All fruit operations are then slow and much easier and much more gentle.
- Take the time to do a better job of inspection/grading.
- Retain the fruit in its puck until it is lifted by robot into a tray.
- Orient the fruit before you apply the label.
- But . . . You have to design for the same number of fruit packed per hour per square metre as existing systems

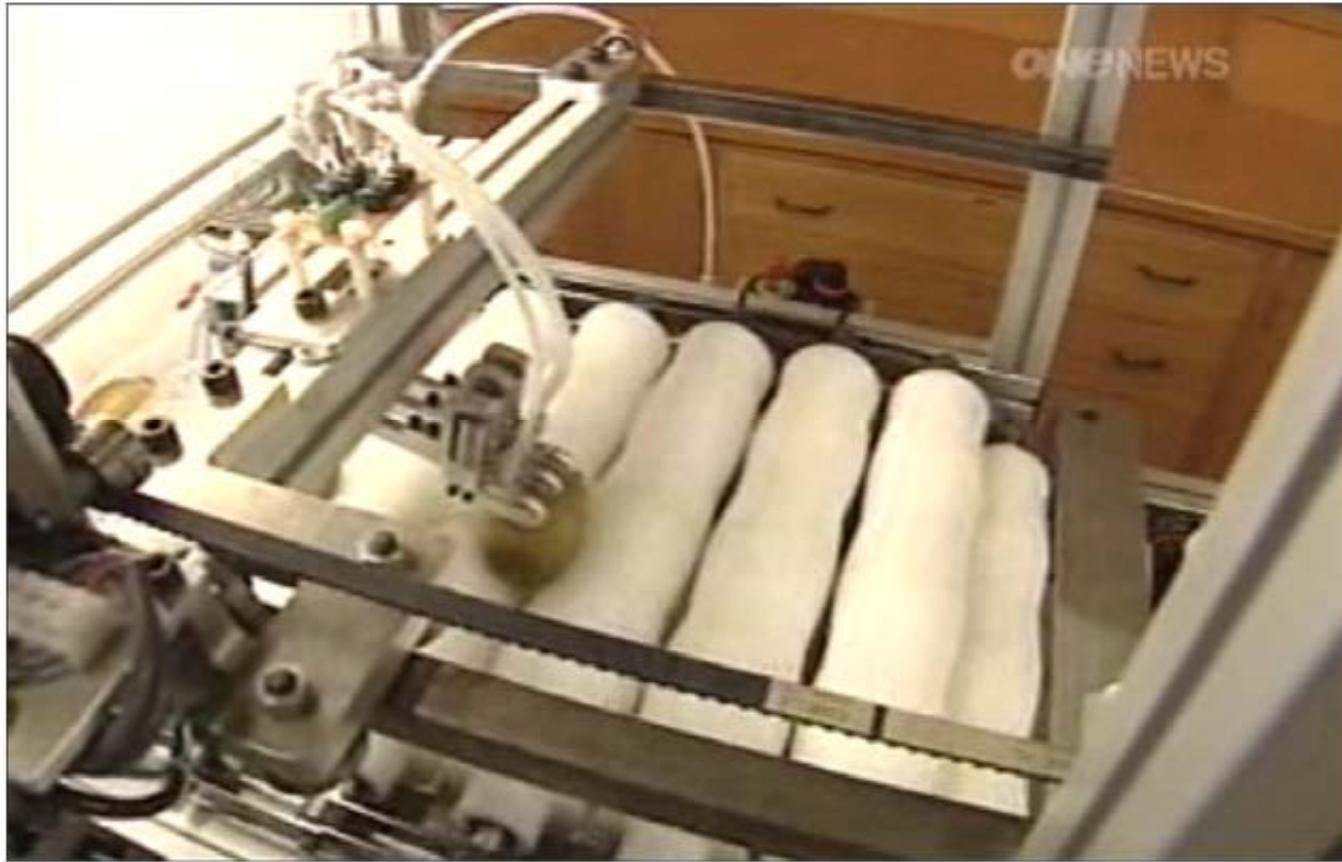
Fruit in one of four grooves



Fruit moving to pack



Soft spot measurement



Robotic packing and tray management



Bottom Line

- If you pack slowly, the fruit has a better time and it saves a lot of money.
- You have to automate in order to be able to afford to pack slowly.

And now for a packing station . . .



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