When standards stack up

An innovative pallet testing device can save the South African fresh fruit industry millions of Rands and spur the development of stronger, cheaper pallets.

**PALLETS IN THE PAST**

Pallets evolved from skids – flat wooden boards with two runners like a sleigh – that were used to move cargo from shore to ship. The skids were carried by hand and loaded onto ships using a winch.

The logistical requirements of the Second World War led to a bumpy ride. It must withstand cartons weighing more than a ton, forklifts flying in at different angles, being dragged across pack house floors and thrown around in moving trucks.

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**THE NEED FOR A TESTING DEVICE**

Prior to October 1997, Outspan regulated the South African citrus export industry and Unifruco the deciduous fruit sector. The two exporters’ packaging design departments coordinated the design and testing of fruit pallets.

Following deregulation, which allowed anyone to register as an export agent, no organisation fulfilled these functions. The design drawings of fruit pallets currently in circulation date back to the period of regulation and don’t specify the forces a functioning pallet must withstand.

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The device was designed with practicality in mind—it is compact, economical and easy to operate. Considering the amount of money it could save, it sells at an affordable R38 000. It is also cheap and easy to maintain. “The device only has two components you can’t buy at your local hardware store,” says Mr Bouwer. The device is operated manually and uses no electrics, software, hydraulics or pneumatics. No more than two people are required to operate the device, which is easy to calibrate and, therefore, suited for semi-skilled workers.

Gert Coetzee, an engineering manager from the fruit packaging company, Kromco Ltd, says he is happy that a prototype proved that Kromco’s self-made pallets are of exceptional quality. “Pack houses should test the quality of their pallets, because the 15% rubbish that enters the market gives South African fruit exporters a bad name.”

LOOKING TO THE FUTURE

Now that the functional requirements of pallets are known and can be tested, pack houses cannot blame manufacturers for broken pallets if those pallets have passed the tests. Pack houses and farmers can also demand that manufacturers test their pallets before they are sold.

The testing device is also breaking new ground in pallet design. There is a growing trend towards plastic pallets, which can be cheaper, lighter and pose fewer health risks than wooden pallets. In 2010, for example, Plesa had to recall several of its over-the-counter products that had been contaminated by a chemical applied to the wooden pallets.

Despite these advantages, expensive tests slow down the development of new plastic pallet designs. According to Mr Bouwer, his pallet testing device paves the way for optimal pallet designs, including plastic, which could increase the competitiveness of South African fruit exports.

In 2014, Mr Bouwer will deliver several presentations at seminars and industry association meetings, and train staff at manufacturing facilities, pack houses and logistics depots on how to use the pallet testing device. He will also train industry players on how to use, interpret and update the functional pallet specifications for the five major fruit groups.

THE DEVICE AT WORK

The pallet testing device, designed by Koos Bouwer, performs seven different tests to confirm that a pallet is up to standard. These tests are grouped into three categories.

LOAD-BEARING TESTS

- The bending stiffness test simulates the load a pallet carries while resting on a pallet rack in the cold store. If used for citrus, it must be able to resist 1 300kg without distorting by more than 20mm.
- The vertical pull test pulls the top part of the pallet upwards and the bottom part down to test the resistance of the pallet joints.
- Forklift bending test

IMPACT TESTS

- The impact tests mimic the force of a forklift hitting the pallet blades at 1.27m per second. This simulation is achieved by levers attached to a pendulum that slams into the stationary pallet. The height at which the fork hits the pallet is adjustable, which makes it possible to test different types of impacts.
- There are three impact tests:
  - Block impact test
  - Top-edge impact test
  - Shear impact test

DROP TEST

- The final test drops the pallet on one of its corners from a height of one meter.

1 A pallet designed to hold citrus must be able to resist 1 300kg without distorting by more than 20mm.
2 Exporting large quantities of quality fresh fruit would not be possible without pallets.
3-6 It is estimated that only 15% of South African fruit pallets are of a poor standard. But 15% of the three million fruit pallets exported each year is a significant number.

Citrus: Oranges, grapefruit, lemons and limes. Naartjies and mandarins are soft citrus.

Deciduous fruit: Table grapes, apples, pears, peaches, plums, kiwifruit, nectarines, persimmons and apricots.