



20 June 2013

Our Ref: W13-003

Dooza Engineering  
c/o Gary Kairn  
Harness Racing Australia  
Level 1, 400 Epsom Road  
Flemington VIC 3031



Dear Gary,

**RE: DOOZA ENGINEERING WHEEL TESTING**

Human Impact Engineering has completed testing of the two sulky wheels supplied by Dooza Engineering (see picture).

Testing included the following according to the Australian Harness Racing **Sulky Wheel Approval Policy**:

- a static lateral strength test,
- a dynamic fatigue test,
- measurement of required dimensions, and
- a check of required markings.

One wheel (ID #W13-003A) was subjected to a static lateral load strength test on 19<sup>th</sup> June 2013. It met the approval criteria. The second wheel (ID #W13-003B) was subjected to a dynamic fatigue test on 19<sup>th</sup> June 2013. It met the approval criteria.

The approval criteria for wheels for use in harness racing in Australia is to have similar strength and fatigue properties to the steel rimmed and spoked traditional wheels currently used in and proven appropriate for Australian racing conditions. The approval criteria, based on the spoked steel wheels, are a lateral strength of at least 1000 N and a fatigue life of 40,000 cycles at a lateral load of at least 420 N.

Approved wheels must incorporate a tamper proof and externally visible display of date of manufacture, manufacturer, material, wheel model and a unique serial number (to be reported to Harness Racing Australia for approval). Currently the wheels meet this requirement.

Test conditions for the wheels and details of the wheels performance are provided in the attached report. Please do not hesitate to contact us if you require further information or wish to discuss the wheels.

Best regards,

**Tom Gibson** PhD CPEng  
Director

**Edgar Schilter**  
Test Engineer

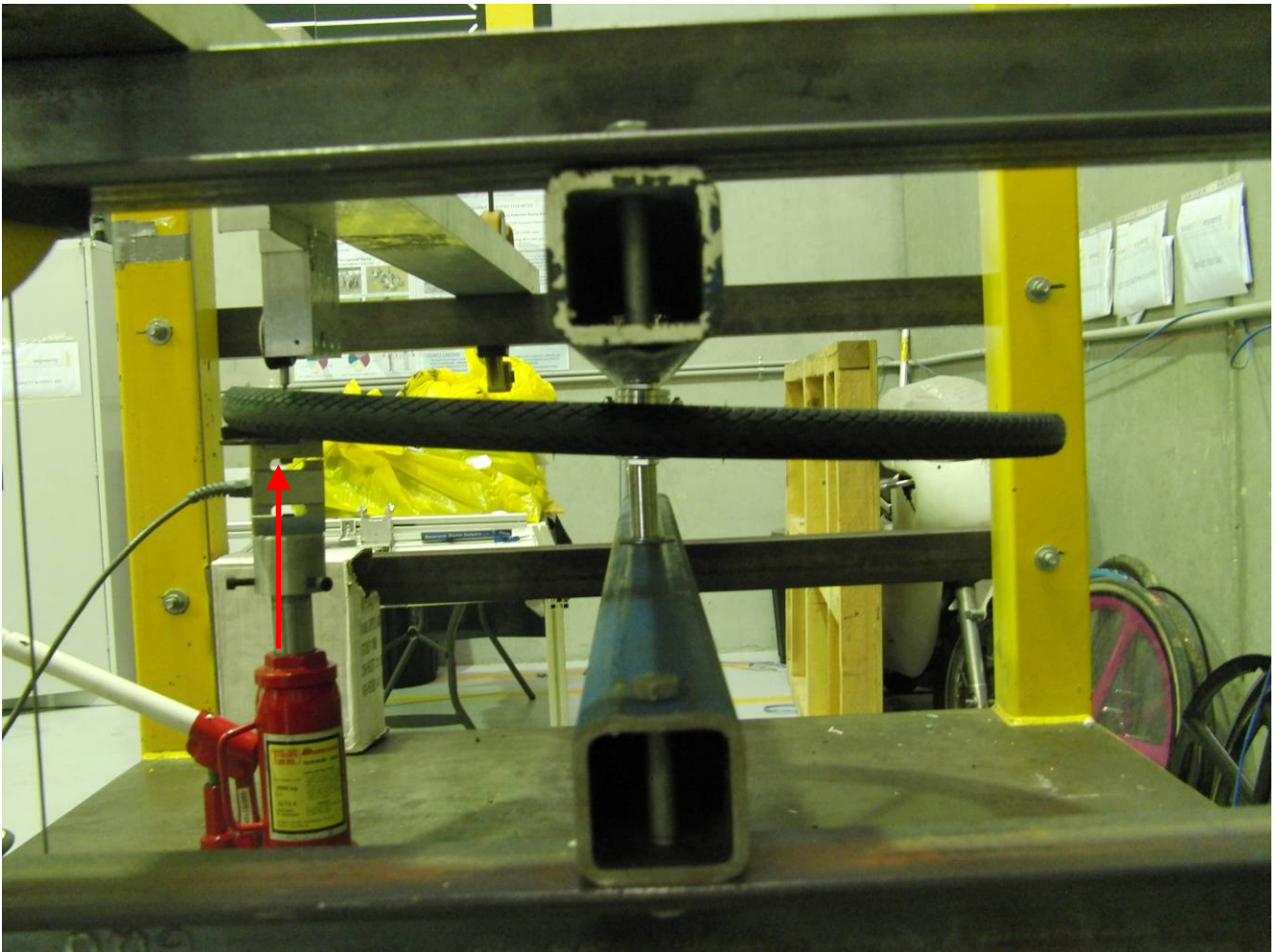
## **WHEEL TEST SUMMARY**

---

Wheel ID:	W13-003A
Wheel Model:	0103
Manufacturer:	Dooza
Date of manufacture:	05/2013
Serial No:	0103
Material:	Aluminium
Safety Disc:	Fitted
Wheel diameter:	704 mm
Tyre Width:	35
Wheel Weight:	5.0 kg

### **Test 1: Static lateral load test**

Test 1 determines the stiffness and the lateral strength of the wheel, Figure 1. With the wheel hub secured, the wheel rim was laterally loaded until a significant structural failure occurred. A load cell was used to measure the lateral load and a dial gauge was used to measure the corresponding lateral deflection of the wheel.



**Figure 1 Static lateral load test. Arrow depicts load application direction (see also Figure 2).**

In Test 1 the wheel (ID #W13-003A) reached a load of 3072 N at a deflection of 93 mm.

The wheel reached a load of 3072 N and there was no sign of structural failure. The high tensile steel threaded rod used to mount the wheel became increasingly deformed as the strength of the wheel was greater than the strength of the rod, see Figure 2. The testing was stopped at this point.

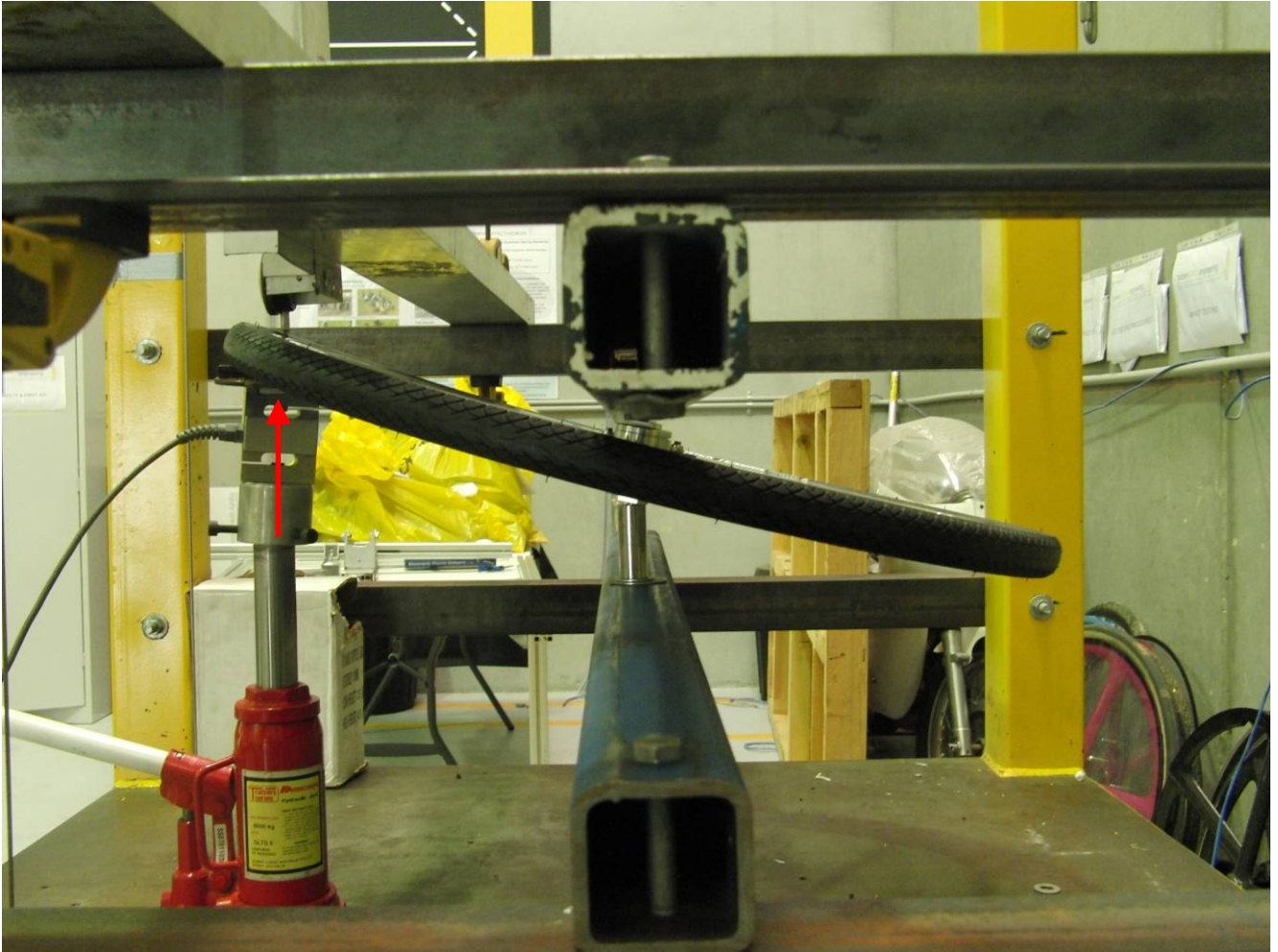


Figure 2 Deflection reached at maximum applied load in Test 1

Results

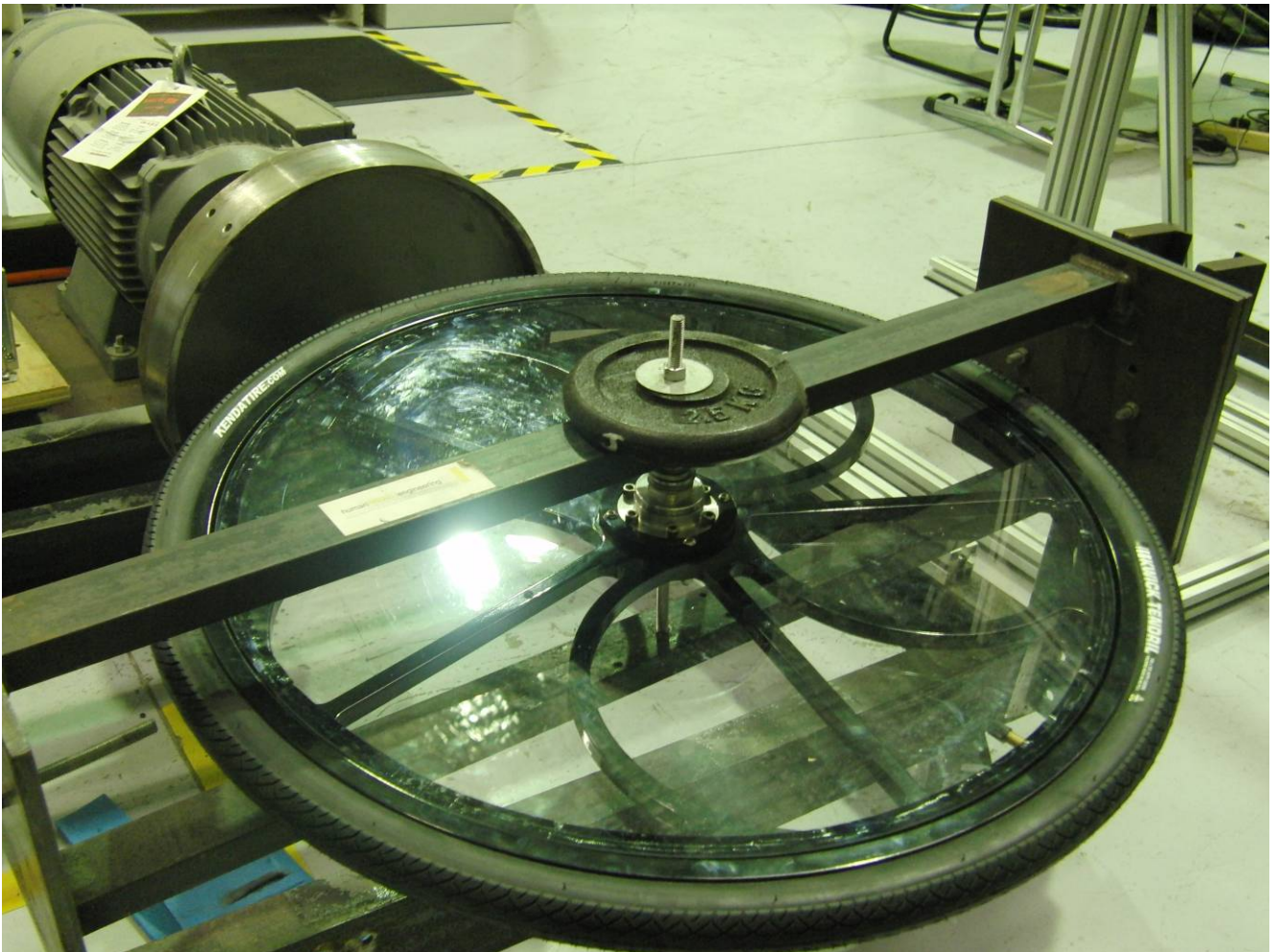
**Static Lateral Load Test Results**

Wheel ID	Test No.	Lateral strength (N)	Maximum deflection (mm)
W13-003A		3072	93

The wheel (ID #W13-003A) met the static lateral strength criteria of 1000N.

## **Test 2: Dynamic fatigue test**

The fatigue test determines the fatigue life of the wheel, Figure 3. With the wheel hub secured, a 430 N load was applied to the wheel rim. The wheel was rotated continuously at a speed of 473 rpm.



**Figure 3 Fatigue test**

The wheel (ID #W13-003B) performed 50160 cycles and there was no sign of failure. Testing was stopped at this point.

## **RESULTS**

### **Fatigue Test Results**

<b>Wheel Id.</b>	<b>Wheel Speed (rpm)</b>	<b>Dynamic Load (N)</b>	<b>Test Life (cycles)</b>
W13-003B	473	430	50160

The wheel met the fatigue test criteria of 40,000 cycles under a lateral load of at least 420N.

## **Test 3: Other Requirements**

### **Marking Requirements**

Approved wheels must incorporate a tamper proof and externally visible display of date of manufacture, manufacturer, material, wheel model and a unique serial number (to be reported to Harness Racing Australia for approval).



**Figure 4 Markings shown on the tested wheels with the manufacturer (CSW), wheel model (5D) date of manufacture (5/13), material (Alum) and serial number (0103).**

The wheels meet this requirement.

#### Size Requirements

Wheels and tyres must be approved by HRA. Approved wheels must have a diameter (including the tyre) in the range of 660mm to 715mm. Approved tyres must be no more than 50mm in width.

The wheels were fitted with a tyre. The wheel including the tyre was 704 mm in diameter. The width of the tyre was 35 mm.

The wheels meet this requirement.