Analysis of Stub Axles

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Three stub axles were tested. The OEM part from a HG Holden, an aftermarket part from Stubtech, and an aftermarket part from CRS. The parts are shown in Figure 1.

Figure 1. Left OEM stub (HG Holden); Middle: Stubtech; Right: CRS

The chemical composition of the materials corresponded to (OEM: 1345 Steel); (Stubtech 4340 steel) and (CRS: 1045 steel). Hardness was checked on all three parts on the spindle, 3-4 times each following normal procedures. The results are shown in Table 1.

Table 1. Hardness testing

Component	Test 1	Test 2	Test 3	Test 4	Average
OEM	15 HRC	14 HRC	14 HRC	20 HRC	**16 HRC**
Stubtech	27 HRC	28 HRC	28 HRC		**28HRC**
CRS	14 HRC	8 HRC	10 HRC		**11 HRC**

Note that the OEM part was tested at a different location to the other two axles due to a geometric restriction.

In general hardness broadly relates to a range of mechanical properties, including wear resistance.

Figure 2. Position of cut on spindle.

The spindles were cut as shown by the red line in Figure 2.. Each spindle was identified by engraving before sending to a NATA test laboratory (Bureau Veritas, Thebarton, SA) for independent tensile testing. Tensile testing was conducted according to procedures outlined in AS1391-2007.

The tensile results are shown on the following page. Note that:

UTS is the ultimate tensile strength;

0.2% proof stress is the yield stress;

Modulus of elasticity is the stiffness of the material;

Elongation is the engineering strain, or tensile ductility;

ROA is the reduction of area (another measure of ductility at the area of final fracture).

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CERTIFICATE OF ANALYSIS

15 October 2014

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CLIENT REF: PO: 19551
TEST DATE: 14 October 2014
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ATTENTION: Roger Lumley

REPORT NO: ***14-2759682-12***

TENSILE TESTING

TEST SPECIFICATION: AS 1391-2007 (circular specimen)
PRODUCT CODE: N/A
MELT NO: N/A
DESCRIPTION: Supplied steel stub axle spindles (x3)

Sample ID	UTS (MPa)	0.2% Proof Stress (MPa)	Modulus of elasticity (MPa)	Elongation (%)	R.O.A (%)
OEM	991	898	215945	10	35
S-Tech	947	836	209860	11	42
CRS	789	501	206850	11	12

TESTING OFFICER(s): Paul Hosking
Mechanical Testing Officer(s)

Paul Hosking
NATA Signatory
Material Services