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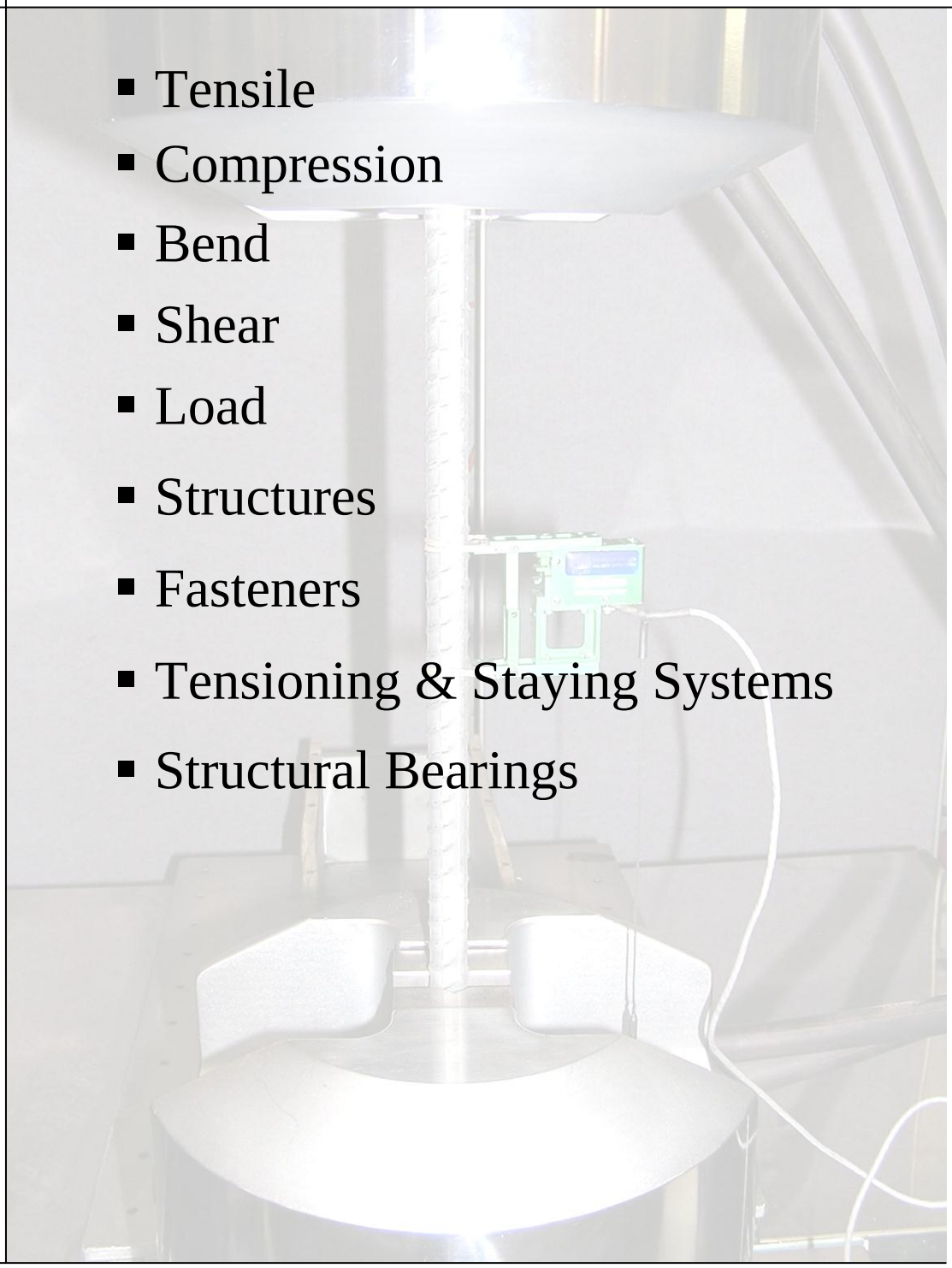
Mechanical Testing



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IN CONFIDENCE TO THE CLIENT
REPORT NO: MT-11/516

IMPACT TESTING OF PROTECTIVE HEADSAVER SOFT HELMETS

CLIENT: HEALTHSAVER PTY LTD
PO BOX 2395
MANSFIELD BC QLD 4122

DATE OF TEST: OCTOBER 18TH 2011- OCTOBER 19TH 2011

DATE OF REPORT: NOVEMBER 2ND 2011

TEST SYNOPSIS:

A protective soft helmet designed to reduce the magnitude of impact forces from accidental head collisions was delivered to the MTS laboratory for testing.

As advised by the client, the soft helmet (see Fig 1) is to be worn mainly by elderly people to provide extra head protection in the event of head collisions. The cushion is manufactured from a polyester and spandex foam composite and incorporates an adjustable rear section and chin strap for a comfortable fit. Upon arrival at the laboratory, the test item was examined and the following details recorded:

HeadSaver Soft Helmet

Height:	*110mm*
Breadth	*150mm*
Length	*210mm*
Wall Thickness (nom.):	*12mm*

At the request of the client, impact tests were to be conducted on *HeadSaver Soft Helmet* to determine the impact force reduction attributes.

FIG.1
HEADSAVER SOFT HELMET

TEST PROCEDURE:

A specially designed test rig was constructed to conduct impact drop tests at pre-determined drop heights. Three impact orientations namely frontal, lateral and posterior impacts were conducted (see Fig.2). The support frame was rigidly bolted to the laboratory test floor and the test sample was fitted as shown in Fig.2a. An accelerometer, mounted on a flat faced striker with a mass of 2.3kg, was released at a distance of 0.04m, 0.08m, 0.12m, 0.16m and 0.20m with respect to the contact surface. The striker mass was fitted with roller bearings, which allowed a smooth descent with minimal friction. A high speed data acquisition system was then used to record the impact forces autographically for the respective drop heights.

Note: A fibreglass head mannequin (3mm thickness) was used to provide support to the soft helmet during testing.

TEST DATA:

Test data curves for HeadSaver soft helmet at a drop height of 0.04m, 0.08m, 0.12m, 0.16m and 0.20m equivalent to impact energies of 0.92J, 1.84J, 2.76J, 3.68J and 4.6J are provided in Figures 4a to 4c.

Based on the recorded peak impact forces (for impact tests conducted with and without the HeadSaver soft helmet) and the corresponding impact energies, the energy absorbed (in per cent) vs impact energy for the posterior impact tests were calculated and are provided in Figure 3.

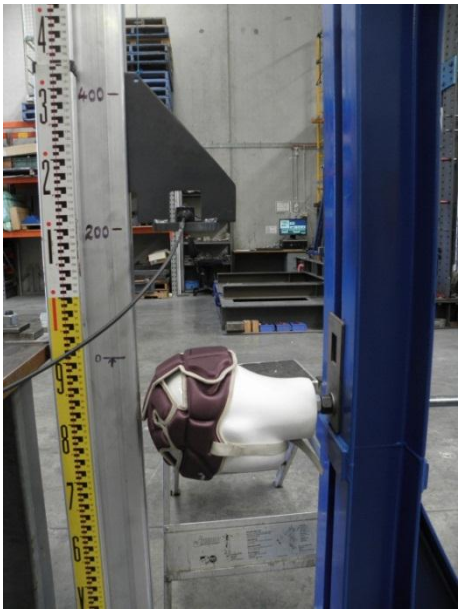

FIG.2A
HEADSAVER HELMET
IMPACT TEST SET-UP

TEST OBSERVATIONS:

As shown in Figures 4a-c, the peak impact forces were observed to be fairly uniform across the different impact orientations for the tested sample.

Frontal Impact Test

At a drop height of 0.12m, the peak impact force (g) recorded without the HeadSaver soft helmet was observed to be 10g (see Fig. 4a). On the other hand, a peak impact force of 4.7g was recorded with the HeadSaver soft helmet. Therefore, this represents a fifty-three per cent (53%) reduction in the peak impact force.

Lateral Impact Tests

For a similar drop height of 0.12m, a fifty-six per cent (56%) reduction in the peak impact force was observed for the tested sample.

Posterior Impact Tests

Posterior impact tests conducted for the HeadSaver soft helmet also resulted in a fifty per cent (50%) reduction in the peak force at a drop height of 0.12m.

COMMENTS:

For the range of impact tests described and conducted herein, lower peak impact forces were observed with the HeadSaver soft helmet when compared to impact tests conducted without the HeadSaver soft helmet.

FIG.2B
HEADSAVER HELMET
FRONTAL IMPACT TEST SET-UP

FIG.2C
HEADSAVER HELMET
LATERAL IMPACT TEST SET-UP

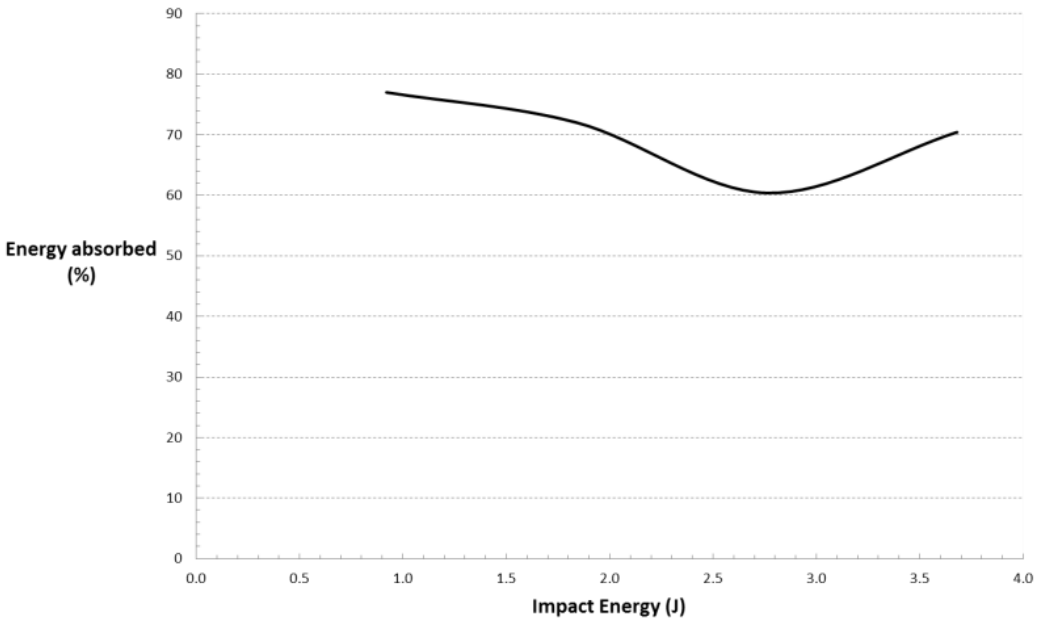

FIG.3
ENERGY ABSORBED (%) FOR POSTERIOR IMPACT TESTS

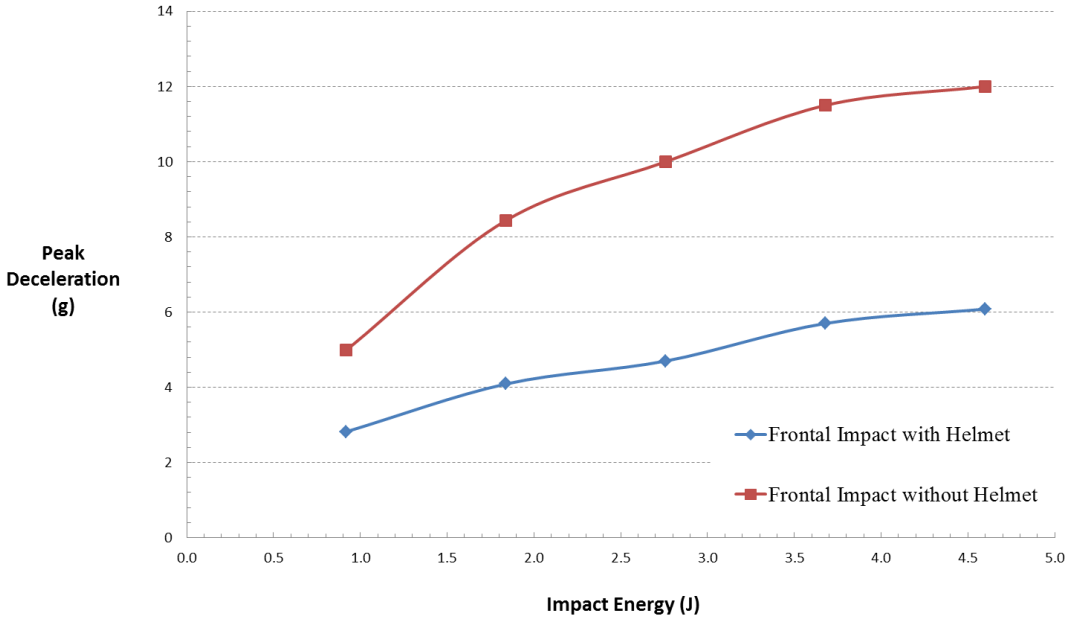

FIG.4A
FRONTAL IMPACT TESTS

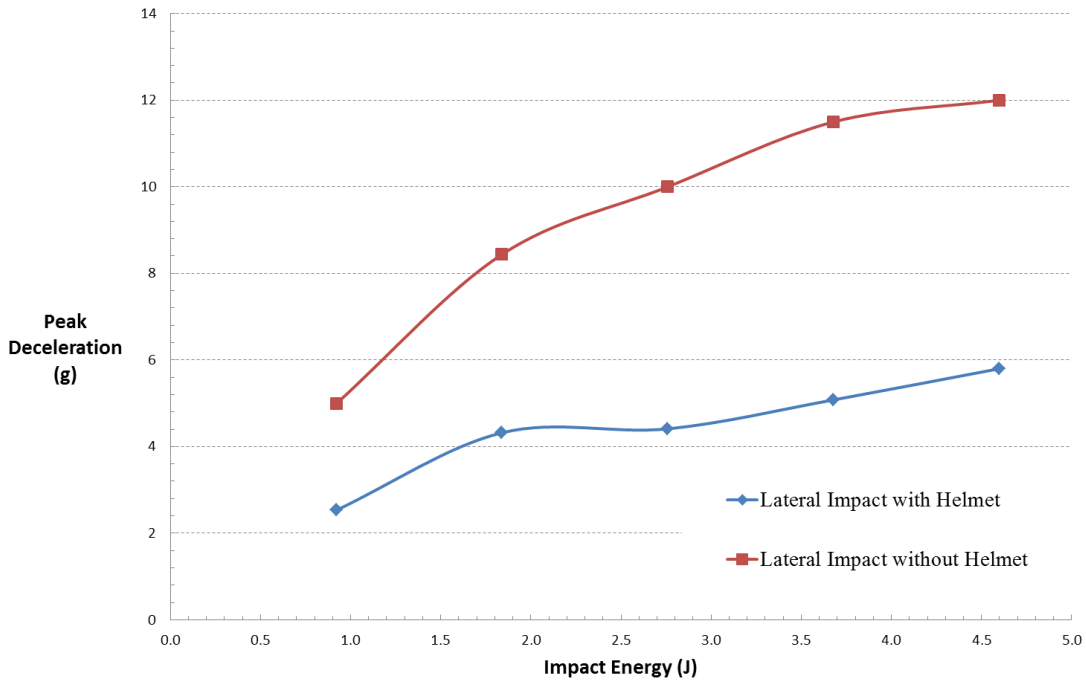

FIG.4B
LATERAL IMPACT TESTS

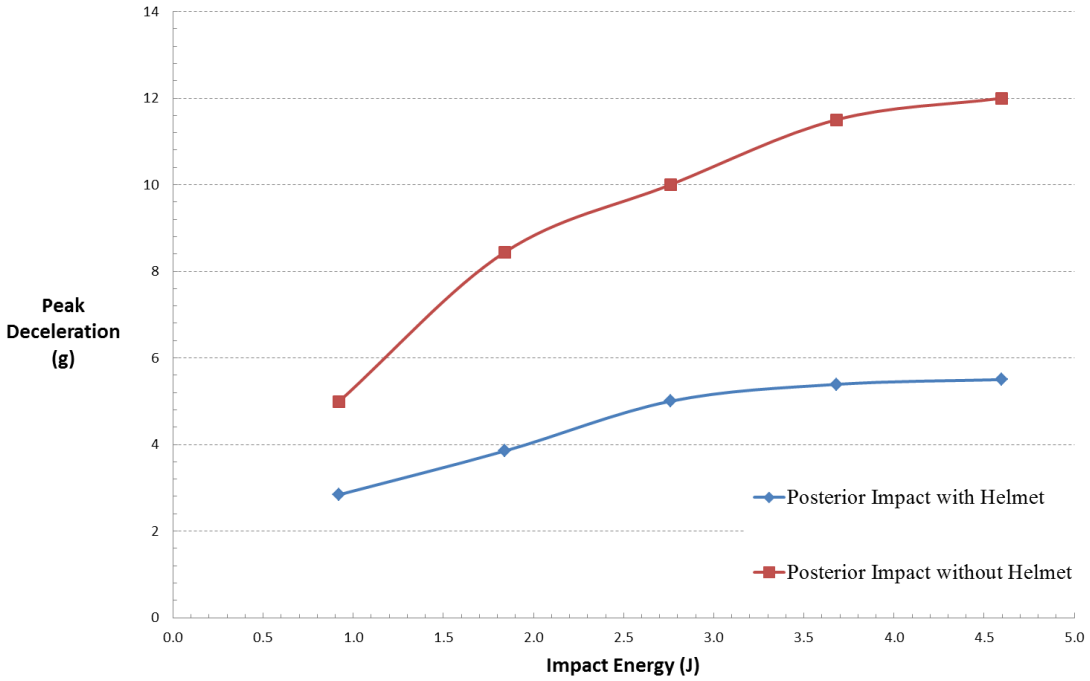

FIG.4C

POSTERIOR IMPACT TESTS

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7. The tests as reported herein are considered Experimental Type Tests and therefore do not validate or certify the products with any Australian or International standards that may apply.

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TEST ENGINEER
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