

Mechanical Testing

- Tensile
- Compression
- Bend
- Shear
- Load
- Structures
- Fasteners
- Tensioning & Staying Systems
- Structural Bearings



IN CONFIDENCE TO THE CLIENT

REPORT NO: MT-07/157-D

LOAD TESTING OF TYPE "3" ADJUSTABLE FORMWORK PROPS

CLIENT: **ARUJ ANAND**
BSL AUSTRALIA PTY LTD
10 JANE STREET
BLACKTOWN NSW 2148

DATE OF TESTING: MAY 10TH – MAY 13TH 2007

DATE OF REPORT: MAY 21ST 2007

TEST SYNOPSIS:

A consignment of telescopic, adjustable formwork props used to support concrete formwork was delivered to the Melbourne Testing Services laboratory (See Fig.1). The six TYPE "3" props were identical in construction and consisted of two telescopic steel tubes with a nominal 150mm square x 8mm thick steel plate welded at one end of each tube. A threaded adjusting nut was located at the top of the outer tube and a profiled shear pin was also fitted.

Upon arrival at the laboratory the props were inspected and the following markings and identification details were recorded:

- *Formwork Prop:* "No 3-2.59m-3.96m"
- *Base Plate:* "C-06-B"
- *Tube Markings:* "Welspun"
- *Nut Markings:* "0804"
- *Closed Length:* 2590mm (With Shear Pin Inserted)
- *Extended Length:* 3960mm

TEST REQUIREMENTS:

At the request of the client, load testing was to be carried-out on the props to determine the ultimate compressive load-carrying capacity and working load limit. Sample evaluation testing was to be conducted at full extension as well as fully closed. An approved test procedure conforming to the requirements of AS 3610-1995 FORMWORK FOR CONCRETE was adopted and three repeat tests were required for each extension.



FIG.1.
FORMWORK PROPS



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TEST SPECIMEN PREPARATION AND SET-UP:

Prior to testing, one of the six props was disassembled and measurements were taken of the inner and outer tube diameter, tube length, hole sizes and other appropriate dimensions were also recorded. The props were then marked with a unique test number and eccentricity offsets were marked onto both bearer plates. Machined wedge platens manufactured in accordance with AS 3610 Supplement 2 were then fitted to the test frame to provide out of plane and eccentric loading conditions as specified in AS 3610-1995.

The props were then preset to their nominated extension before being fitted into the testing rig. An electronic load cell and displacement transducer was then fitted to the test assembly.

TEST PROCEDURE:

Testing was carried-out throughout the day of May 11th 2007 in an enclosed environment and at an ambient temperature of 21°C. A compressive load was applied to the props and was continued until the peak load had been achieved and permanent deformation was visibly evident. Once the applied load had dropped away from its peak or excessive distortion of the prop components was evident, the test was terminated. Throughout testing, computer data records were taken of the applied load and the corresponding lateral deflection.

TEST OBSERVATIONS AND COMMENTS:

TEST PROPS FULLY EXTENDED

Failure of the fully extended 3960mm props occurred by excessive bending of the inner tube (see Fig. 2). Inspection of the inner and outer tubes, base-plates and shear pin did not reveal any visible sign of failure in any of the three props.

TEST PROPS FULLY CLOSED

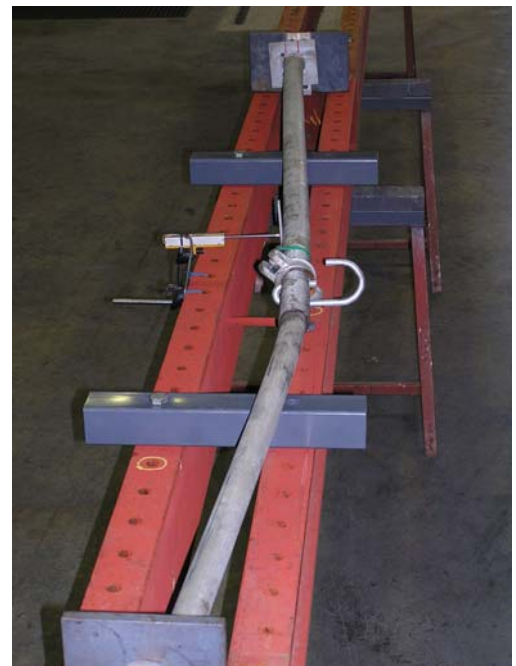
In each case, failure of the fully closed props occurred by excessive bending of the inner tube with some deformation of the shear pin occurring in all props.

TEST DATA:

Load vs lateral deflection data curves for fully closed and fully extended props are provided in Appendix A. Test data and calculated load limits are provided in Table.1.

TEST CERTIFICATION:

In accordance with AS 3610, Appendix A3, testing was carried-out using an AS 3610-1995 approved test procedure by a test engineer at the premises of Melbourne Testing Services.



**FIG.2. FAILURE MODE
FULLY EXTENDED TEST PROPS**

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STRENGTH LIMIT STATE CALCULATIONS (ϕR_u):

In accordance with AS 3610-1995, the value for ϕR_u has been derived from the following equation.

$$\phi R_u = \frac{\bar{x}}{k_s}$$

2590mm Extension $\phi R_u = \frac{82.9}{1.6} = 51.8 \text{ kN (5.3 Tonnes)}$

3960mm Extension $\phi R_u = \frac{32.3}{1.6} = 20.2 \text{ kN (2.1 Tonnes)}$

WORKING LOAD LIMIT CALCULATIONS (Wll):

In accordance with AS 3610-1995, the value for Wll has been derived from the following equation.

$$Wll = \frac{\bar{x}}{1.5k_s k_{d1}}$$

2590mm Extension $Wll = \frac{82.9}{1.5 \times 1.6 \times 1.0} = 34.5 \text{ kN (3.5 Tonnes)}$

3960mm Extension $Wll = \frac{32.3}{1.5 \times 1.6 \times 1.0} = 13.4 \text{ kN (1.4 Tonnes)}$

Test Number	Prop Extension (mm)	Outer Tube Diam & Wall Thick (mm)	Inner Tube Diam & Wall Thick (mm)	Maximum Test Load (kN)	Strength Limit State (ϕR_u) (kN)	Working Load Limit (Wll) (kN)
MT-07/157-D						
#1	3960	60.5, 4.5	48.0, 4.0	38.9	20.2	13.4
#2	3960	60.5, 4.5	48.0, 4.0	27.1		
#3	3960	60.5, 4.5	48.0, 4.0	30.8		
#4	2590	60.5, 4.5	48.0, 4.0	72.4	51.8	34.5
#5	2590	60.5, 4.5	48.0, 4.0	85.4		
#6	2590	60.5, 4.5	48.0, 4.0	90.9		

TABLE 1 FORMWORK PROP TEST DATA

Notes:

- Melbourne Testing Services Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Melbourne Testing Services Pty Ltd be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines and lost production arising from this report.
- This report only indicates compliance of the formwork props in their state at the time of testing. It should not be taken as a statement that all similar formwork props or components of formwork props in all states of repair, would also be found to comply.
- It remains the responsibility of the client to ensure that the test formwork props and components of the test formwork props as reported herein are representative of the entire production batch.
- This report only covers the structural integrity of the formwork props specific to the requirements of AS 3610-1995 Appendix A3.
- Melbourne Testing Services shall take no responsibility for the procurement and authenticity of the formwork props as described herein.
- Melbourne Testing Services shall take no responsibility for the installation procedures used for the formwork props described herein.



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APPENDIX A

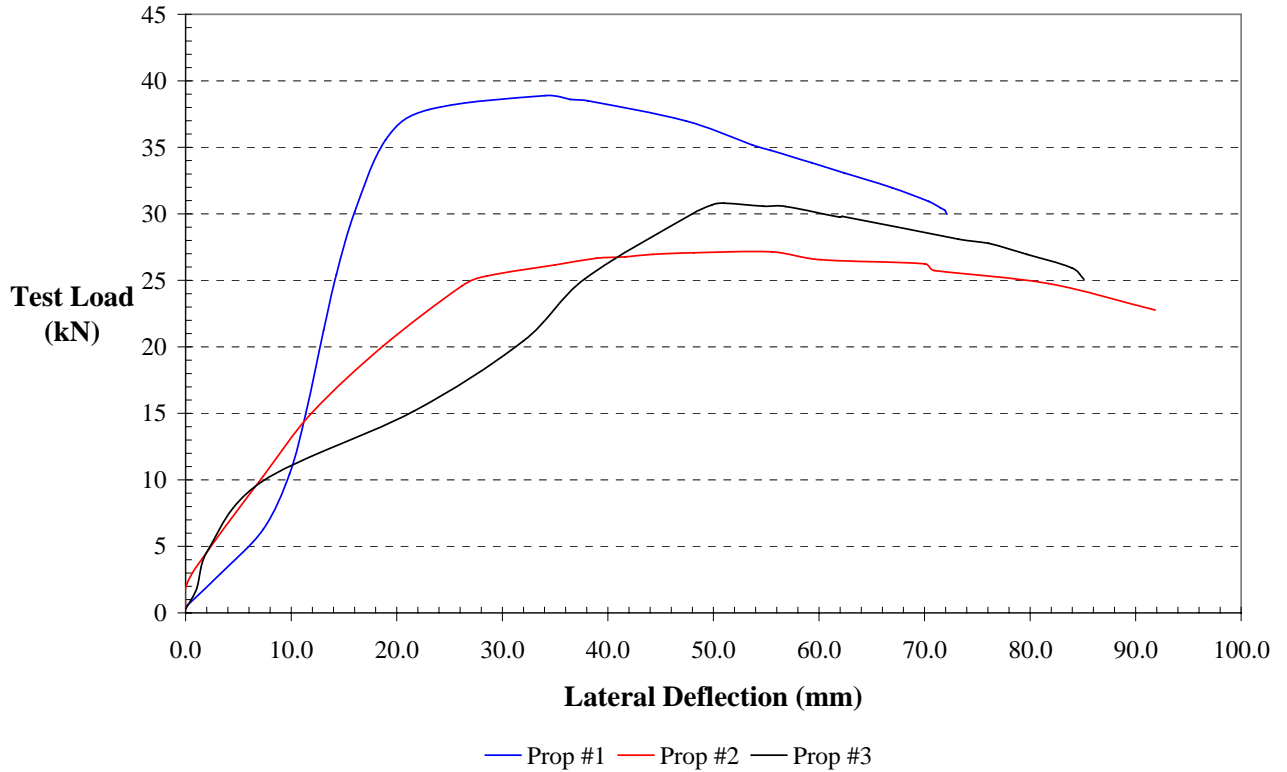


FIG. A1. TEST CURVES FROM FULLY EXTENDED PROP TESTING

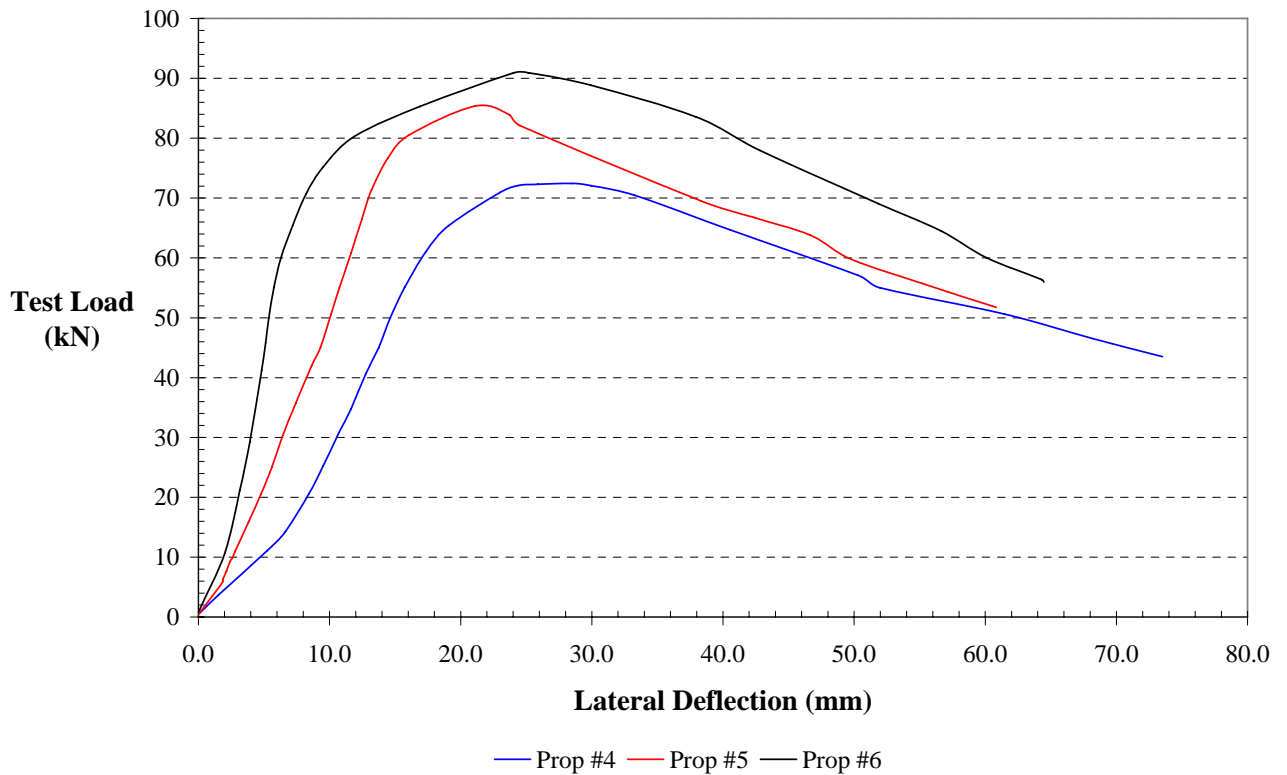


FIG. A2. TEST CURVES FROM FULLY CLOSED PROP TESTING