

TWP

**Timber and Wood Products
Research Centre**

**FURNITURE TESTING AT
CAPRICORNIA INSTITUTE**

Position Paper

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**M.H.Murray
C.G.McDowall
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Executive Summary

The dual needs of Quality in manufacturing and of increased export earnings have begun to impact upon the furniture industry in Australia. In order to compete successfully with imports and to improve the export position, local producers must at least match the structural as well as aesthetic qualities of competitor products. The latter have access to large sophisticated testing facilities in Europe and North America, and meet exacting international Standards of performance. In response to these pressures, the Timber & Wood Products Research Centre at Capricornia Institute in Rockhampton has taken the lead in setting up a structural testing facility for all types of furniture. The Centre's proven and internationally recognised reputation in R & D, together with the School of Engineering's expertise in Quality management and with its sophisticated Computer Aided Engineering Centre, enable the offering of a unique and timely service to Australian industry.

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POSITION PAPER

Why Test Furniture?

Office, contract and domestic furniture are subject to many sources and forms of loading throughout the life of an article. Design of furniture has almost always been more concerned with artistic or utilitarian aspects than with structural loading effects, yet pieces of furniture are without doubt as much a stressed structure as any component in a building.

Failure of a piece of furniture can be costly in terms of loss of the manufacturer's reputation, loss of business, and even the possibility of litigation where injury is sustained by the user. A recent example of such consequences was where the base of an office chair suddenly collapsed, causing the occupant of the chair to narrowly miss being flung out of an open window on the 10th storey of a city building.

In recognition of the need to see furniture as structural items requiring engineering input, there are large well established furniture testing laboratories in both Europe and the United States. These laboratories provide for manufacturers an extensive range of tests of their products in terms of structural evaluation of the strength, stiffness, stability, fatigue and operation of an item of furniture. There are substantial European, British and American Standards to which these laboratories work when assessing performance. Some export oriented manufacturers in Australia have recognised the need to meet their competitors' standards, and have sent some of their products to these overseas testing facilities.

There have been other positive moves recently within Australia. One example is the appointment of Dr. Barbara Ozarska as a 1988 Gottstein Fellow (Research Fellow in Timber Engineering, University of Melbourne). She considered the optimum use of timber in furniture manufacture, particularly within the areas of structural analysis of whole items and of their joints, testing of material properties, and design and testing of connections. This process is again well established in Europe and in North America, but has not been developed in Australia.

Realising the need for Australia to export to survive, the Australian Government is emphasising the need for Quality in manufacturing. The Queensland Government will require all suppliers by 1990 to have in place a Quality control system as a precondition to accepting tenders. Quality assurance in manufacturing means product testing as well as in-plant process controls. Performance testing of furniture is at present a poorly perceived option, but will rapidly become an economic necessity.

Furniture Testing at Capricornia Institute

Since 1987 a furniture testing facility has been progressively set up at Capricornia Institute under the auspices of the widely known Timber and Wood Products Research Centre (TWP), and within the Department of Civil Engineering. Several commercial contracts have been or are being undertaken, comprising evaluation of a range of furniture fixing devices for office desks, operational tests on kitchen door hinges and drawer runners, and on fatigue of drawer supports in bedroom cabinets. It must be stated that despite the obvious association with timber in the Research Centre, it has been realised from the beginning that all forms of furniture (irrespective of material used) must be able to be tested in this facility, and such has been the course adopted.

Testing is in accordance with the appropriate British Standards, as these are widely recognised, are extensive and comprehensive in scope, and cover strength and stability testing for almost all types of domestic, office and contract furniture. Relevant Australian Standards do not exist. Contact has also been made with European testing authorities and their Standards would be made available on request.

All forms of structural testing are possible on complete items of furniture or on any component. Certification consists of a pass/fail assessment of performance together with necessary comments on why and how an item failed to meet the associated performance requirement.

Other Services at Capricornia Institute

The School of Engineering at Capricornia in 1987 installed a \$1million Computer Aided Engineering Centre, comprising eight Apollo minicomputers with a wide range of powerful software to assist in analysis and design. The suites of programs available enable determination of the stresses in, and deflections of, any component within a piece of furniture, and hence identification of points of weakness. This facility is best used prior to commencement of manufacture at the conceptual design stage, to help avoid costly changes and retooling due to unforeseen structural weaknesses in the furniture.

The Dean of Engineering at the Institute has extensive and widely appreciated experience in matters of Quality in production. He has been the main driving force in the setting up of an active local branch of the Australian Organisation of Quality Control, and has attracted state wide interest in Quality courses in the School of Engineering.

It is believed through the convergence in the School of the three regimes of expertise in :

- Quality management,
- Sophisticated Computer Aided Engineering Centre run by a full time manager,
- TWP Research Centre with a deserved international standing in applied timber research, development and consulting,

