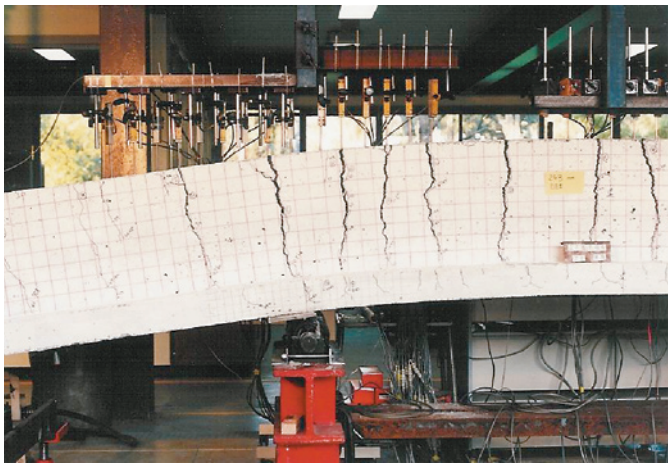
SRIA Research Program for Class L Reinforcing Mesh in Suspended Floors

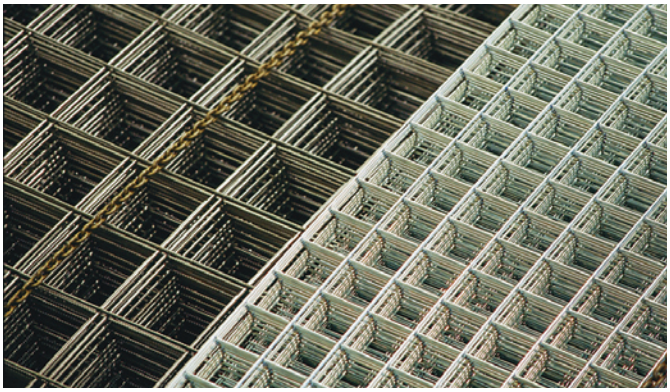
The SRIA has initiated an exciting research program, which will include **full-scale structural testing**, to ultimately improve the design rules in the present Concrete Structures Standard AS 3600:2001 for suspended concrete floors, with particular emphasis on the use of high-quality Class L mesh that conforms to the Steel Reinforcing Materials Standard AS/NZS 4671:2001. The behaviour of flexural members including beams and slabs under one-way or two-way action is being investigated.

Immediately prior to the adoption of AS/NZS 4671:2001, it was acceptable to manufacture high-strength wire that did not meet the minimum ductility requirements of AS/NZS 4671 with respect to both tensile-strength-to-yield-stress ratio and uniform strain. This is because cold-reduction increases the yield and tensile strength, but reduces ductility, and this process must be performed in a more controlled manner in order to consistently satisfy AS/NZS 4671. In this regard, **Class L mesh is a superior product** to cold-reduced reinforcing meshes of the past, with generally higher and more consistent ductility. The research being undertaken is looking to exploit the improved ductility of Class L reinforcing mesh.

Low ductility Class L mesh can be used as main reinforcement, either by itself, or usefully in combination with normal ductility Class N bars that provide more strength in peak moment regions, particularly over supports. **Another aspect of the research program** is to thoroughly investigate the interaction of these two common types of reinforcing steel, under both serviceability and ultimate strength conditions. Both types of reinforcing steel develop excellent bond with concrete, with the cold-worked wires of the mesh ribbed, and the hot-rolled bars deformed. The new information gained will also be examined with regard to any possible effects due to the differences in steel ductility, and possibly refining moment capacity calculations involving hybrid cross-sections, particularly if the reinforcing steels are at different heights within the tensile zone.



Tests and moment-curvature analysis already confirm that the Class L steel is sufficiently ductile to use simple-plastic rectangular stress block theory to calculate the moment capacity of beam and slab cross-sections.



Detailed analysis of the results of **recent Australian tests** on continuous one-way concrete slabs incorporating Class L mesh indicates that they will reliably form full-strength plastic hinge mechanisms if tested to destruction, provided they are designed in accordance with AS 3600:2001, which limits the amount of moment redistribution peak moment regions are likely to experience in practice. Another purpose of the SRIA testing is to independently confirm this important finding. Despite being designed for zero moment redistribution – ie, analysed elastically at the strength limit state, and the main reinforcing steel distributed according to the elastic bending moment distribution – the tests consistently illustrate that large amounts of moment redistribution can reliably occur at all stages of loading. This accounts for the development of full plastic hinge mechanisms.

Recently-published results of tests on two-way concrete slabs incorporating Class L mesh as the only type of main reinforcing steel have also confirmed that very significant tensile membrane action can occur, further enhancing the load-carrying capacity and factor of safety against collapse. An independent, **large-scale test** of this type will also be conducted by the SRIA to simulate the effect of in-plane restraint that naturally occurs in real structures.

The findings of the tests will be published as soon as they are available, and new **SRIA Technical Notes** will be prepared for the immediate benefit of practicing design engineers and builders wishing to further exploit the benefits of Class L reinforcing mesh that conforms to AS/NZS 4671:2001 in concrete floors designed in accordance with AS 3600:2001.

SRIA Technical Notes are available for free download from the web site: ***www.sria.com.au***

For further information on Class L reinforcing mesh or any other matter, contact SRIA on: (02) 9410 3224.