Spectrum

Wood fibres replace asbestos in cement sheeting

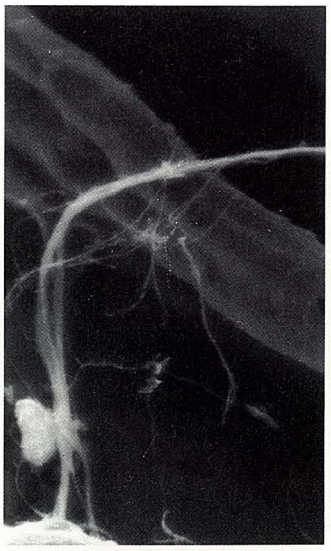
About 50 million square metres of flat and corrugated asbestos–cement sheeting are used in Australia each year.

Some 10% of houses constructed in Australia use asbestos–cement outer walls, while in Queensland the figure exceeds 20%. The product accounts for nearly half the asbestos used in this country.

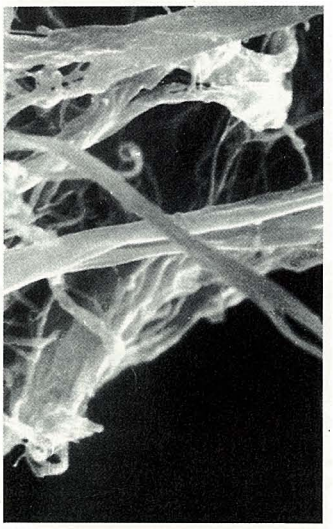
Asbestos is well suited to cement reinforcement because it resists the alkalinity of the cement and its fibres are very strong.

Unfortunately, airborne asbestos dust is now known to be a significant occupational health hazard, and standards regulating exposure in mining and manufacture have been made increasingly strict around the world. While the asbestos in asbestos–cement sheet is bound into the bulk of the material, fibres may escape into the air during cutting and working.

Although asbestos–cement consists mainly of finely divided asbestos fibre and Portland cement, some cellulose (wood) fibre may also be incorporated. The amount of asbestos ranges from about 8% by weight for flat or corrugated sheet to 20–30% for fire-resistant boards.



The coarse fibres are wood; the much finer one is asbestos. Fine fibres bond better to cement, giving higher strength to the cement sheet.



'Beating' wood fibres gives fine fibrils that increase bonding and product strength.

Dr Bob Coutts and his research team at the CSIRO Division of Chemical Technology have been collaborating with James Hardie & Co. Pty Ltd in investigating cement-sheet reinforcement. This has resulted in significant advances in cement-sheet manufacture, making possible the total replacement of asbestos by cellulose fibres.

James Hardie & Co. Pty Ltd is now marketing asbestos-free fibre–cement board after converting a number of its board-making plants.

The replacement of asbestos with cellulose fibres is not straightforward. Unlike asbestos fibres, which are self-dispersing and have a great ability to adhere to cement, wood fibres normally lack the necessary adhesion. The investigators found that the adhesion problem could be overcome by a process known from paper-making, called beating.

Beating increases the surface area of the fibres by breaking them open. Normally cyclindrical and hollow, fibres when beaten have exposed fibrils and microfibrils, which increases their capacity to bond with cement.

Health aspects aside, the supply of asbestos is diminishing and its cost is rising. Wood fibre has the distinct advantage of being a renewable resource.

Research is continuing at the Division to increase even further the bonding strength between wood fibres and cement by using special compounds.

Refined wood fibre-cement products. R.S.P. Coutts and V. Ridikas. *Proceedings, 35th Appita General Conference, Rotorua, 1981.*