

Scientists test blast-resistant concrete

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Engineers at the University of Liverpool have tested a new form of concrete designed to reduce the impact of bomb blasts in public areas.

The fibre-reinforced concrete was found to absorb a thousand times more energy than plain concrete and could therefore be used for bomb-proof litter bins and protection barriers. Although not yet used in the UK the concrete has been utilised in Australia in the design of slender footbridges and in the roofs of government buildings to strengthen them against mortar attack.

University Engineers working in partnership with the Centre for the Protection of National Infrastructure explored the limits of the concrete's capability through a range of tests for dynamic bending and "shear" or indirect stress. These culminated in a series of high explosion blast tests at RAF Spadeadam, in Cumbria, each representing a typical IRA car bomb.

The Ultra High Performance Fibre Reinforced Concrete (UHPFRC) resisted the high explosion blast without any disintegration from the back of the panels causing shrapnel. This is important in the use of protection barriers designed to shield people from bomb blasts.

Professor Steve Millard said: "Many of London's tourist landmarks are surrounded by concrete to protect against terrorist attacks. However, the material does not absorb sufficient energy to prevent the creation of shrapnel which is one of the most lethal consequences of a bomb blast. UHPFRC is different because needle-thin steel fibres are added into the

concrete mix instead of steel reinforcing bars to increase its tensile strength.

"We carried out a number of high explosion tests; gradually reducing the distance to the explosive charge to examine the concrete's bending strength and capacity to absorb energy. Our results showed the new UHPFRC material had an enhanced tension and compression strength of 500% greater than conventional concrete. This makes UHPFRC a suitable material for use in anti-terrorism applications."

Source: University of Liverpool

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