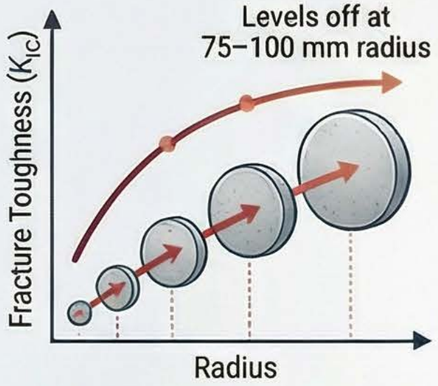
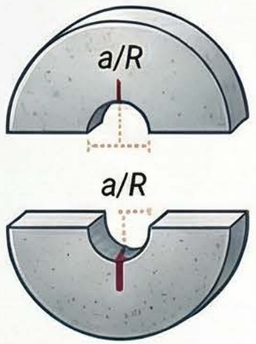
Engineering Resilience: Factors Affecting Fracture Toughness in Steel Fibre-Reinforced Concrete (SFRC)

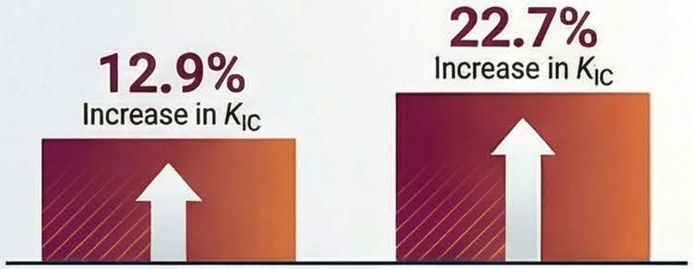
THE IMPACT OF SPECIMEN GEOMETRY

Toughness Increases with Specimen Radius



Crack Depth Boosts Measured Toughness

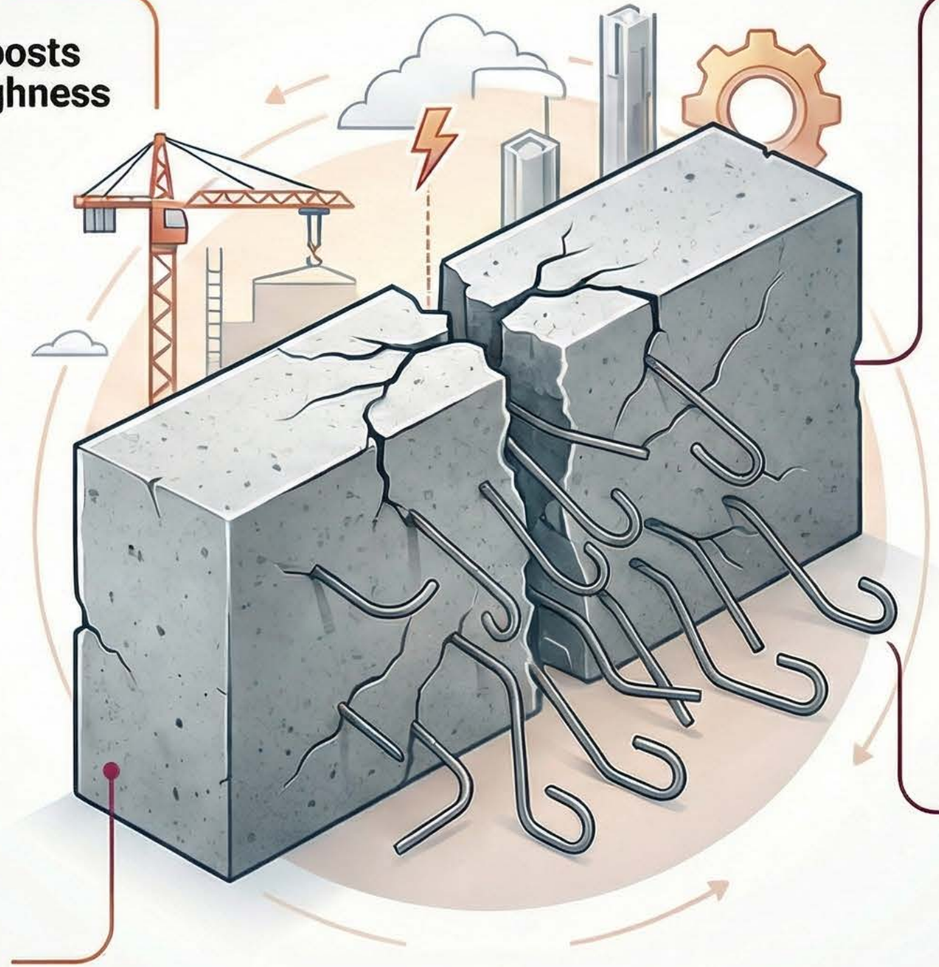




with 0.3 increase in a/R (0.2 to 0.5)

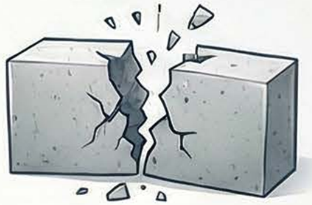
Geometry-Adjusted Models are Essential

Standard LEFM assumptions fail because SFRC's large fracture process zone requires size-effect law corrections.

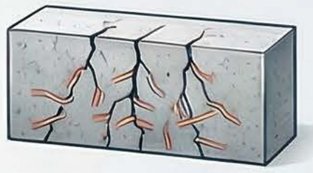


FIBRE-BRIDGING AND FAILURE MODES

The Transition from Brittle to Ductile



Plain Concrete
Sudden, explosive failure



SFRC
Steel fibres bridge microcracks, redistributing stress and preventing sudden failure

Shift in Failure Mechanisms

Shallow Cracks:
Ductile Fibre Pull-out

Deep Notches:
Brittle Fibre Rupture

Enhanced Energy Dissipation

2X

1% steal fibre reinforcement more **than doubles** fracture toughness compared to normal-strength concrete