

Award-winning paper in 2014

Papers published in *Magazine of Concrete Research* are eligible for awards from the Institution of Civil Engineers. Papers from any of the ICE journals can be nominated for several awards. In addition, each journal has awards dedicated to their specific subject area.

On Friday 9 October 2015, ICE President David Balmforth presented an award to the following paper published in *Magazine of Concrete Research* in 2014. The editorial panel nominated their best papers and an awards committee chaired by Quentin Leiper allocated the awards.

MCR Award

The MCR Award, presented for the best paper on concrete published in *Magazine of Concrete Research* in any one year, was awarded to Metelli and Plizzari (2014).

Abstract

Steel-to-concrete bond is a basic aspect of the behaviour of reinforced concrete structures both at serviceability and ultimate states. When bond rules were originally developed, experimental results were mainly obtained on normal-strength concrete and a minimum relative rib area (bond index) was required by building codes to ensure good bond properties. The arrival into the market of high-performance concrete and newer structural needs may require different bond indexes. In the present paper, the experimental results of pull-out tests on short anchorages are presented. Several pull-out tests on ribbed bars, embedded in cubes of normal- and high-strength concrete with a concrete cover of 4.5 times the bar diameter, were carried out in order to better understand the influence of the relative rib area and bar diameter on the local bond behaviour, as well as on the splitting crack width generated by the wedging action of ribs. A total of 96 tests were performed on machined bars of three different diameters (12, 16 and 20 mm) with a bond index ranging from 0.040 to 0.105. The results of 55 pull-out tests on commercial hot-rolled ribbed bars of four different diameters (12, 20, 40 and 50 mm) are also presented to confirm that the bond response also depends on bar diameter (size effect). Experimental results provide information concerning the influence of the relative rib area on bond strength and on the bursting force due to the rib's wedge action. As the minimum measured bond strength of rebars was always markedly greater than the minimum bond strength required by building codes even when low bond indexes were adopted, the test results point out the possibility of reducing the minimum value of the relative rib area required by Eurocode 2 without limiting the safety coefficient of bond. The reduction also allows a higher structural ductility that can be achieved due to a greater strain penetration of the rebars from concrete cracks.



Giovanni Metelli and Professor Giovanni Plizzari, winners of the MCR Award, with ICE President David Balmforth

REFERENCE

Metelli G and Plizzari GA (2014) Influence of the relative rib area on bond behaviour. *Magazine of Concrete Research* 66(6): 277–294, <http://dx.doi.org/10.1680/jmacr.13.00198>.