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Keynote Paper

Applications, behaviour and design of high performance steel and composite structures

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ABSTRACT

Steel and composite structures have played a very important role for over a century. Initially, the unintended composite action was realised in the application of encasing steel sections in concrete for multistorey buildings at the end of the 19th century. Early in the 20th century proprietary products were developed that saw the widespread use of shear connection to develop composite flexural action between structural steel beams and concrete slabs. For the last fifty years intense standardization has seen American, Australasian, Chinese and European Standards developed to deal with member behaviour. This paper will focus on current research that deals with trying to further analyse and understand system behaviour for composite frame and overall building behaviour, with the advent of other new typologies such as composite walls seeing significant international interest. Looking to the future and with the need to address material efficiencies and coupled with life cycle costing, has seen the introduction of high strength and ultra-high strength steels, stainless steels and clad steels. Extensive research in these areas will also be highlighted in this paper. This paper will also try to posit the future for steel and composite structures, looking at what areas need to be addressed in terms of material advances, system behaviour and standardization beyond prescriptive based approaches and toward performance based design.

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