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From high strength and high performance concrete to high performance RC bending elements. (English) [\[Zbl 1412.74014\]](#)

de Wilde, W. P. (ed.) et al., High performance structures and materials IV (HPSM 2008). 4th international conference on high performance structures and materials, 13–15 May, 2008, The Algarve, Portugal. WIT Transactions on the Built Environment 97. Southampton: WIT Press. 73-82 (2008).

Summary: Many achievements in recent studies in the field of RC structures are related to high performance phenomenon. This phenomenon can have structural, technological or economical aspects, but it is not always emphasized. Moreover, each structure's improvement cannot be defined as high performance – it can be just upgrading some of its definite properties. Hence, a problem of a strong definition of high performance structural element arises. This paper deals with definition, related to the structural aspect only taking into account that a concept of high performance RC structure is mainly related to bending elements. Considering concrete behavior in these elements, it is important to achieve high performance properties separately for tensile and compressed zones of a bending section. For this reason it is logical to use different concrete classes, i.e. high and normal strength concretes in the compressed and tensile zones, respectively. It is necessary to provide suitable section ductility in the compressed zone and necessary cracking resistance in the tensile zone. A high strength concrete with elastic-plastic properties should be used in the bending element section compressed zone in order to withstand both static and dynamic loads. With this aim fibered concrete is used and the fiber quantity should be calculated according to the required ductility. Using pre-stressed reinforcement in the tensile section zone allows for improvement of the cracking resistance and reduces the bending elements' deflections. Thus, a two-layer RC beam represents an effective bending element having fibered high strength concrete in its section compressed zone and pre-stressed normal strength concrete in the tensile zone. Such a beam can be defined as a high performance bending element, because, on one hand, the concrete compression properties are maximally used for a given ductility level, and, on the other hand, the section's design stiffness requirements are provided by pre-stressing the tensile zone.

For the entire collection see [\[Zbl 1138.74003\]](#).

MSC:

[74E30](#) Composite and mixture properties

[74K10](#) Rods (beams, columns, shafts, arches, rings, etc.)

Keywords:

[high performance bending element](#); [high strength concrete](#); [high performance concrete](#); [steel fibers](#); [ductility](#); [pre-stressed elements](#)

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