

Some recent results of the research on steel rebars

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1. Introduction

This work is intended to present a survey of some recent results of the research on steel rebars concerning both ductility and durability.

These researches have been sponsored by major Italian producers and more recently by the European Community via the ECSC Research Program. The intent is very clear: it is to give precise information to the steel producers, to the designers, to the building industry and finally to the standardization bodies both at the national and European level.

Major open problems, to the authors knowledge, concerning steel reinforcement recognized at the international level are listed in the following:

1. *Ductility, intended both as ultimate to yield stress ratio and deformation at ultimate load is too low in several reinforcing products available on the European production. A simple mathematical model, derived from extensive experimental tests, has been recently proposed in order to control ductility at the steel production mill and here briefly illustrated.*
2. *Energy dissipation during low cycle fatigue tests is to be increased, in order to meet the requirements and expectations of reinforced concrete structure designers especially in seismic areas, where the kinetic energy transferred to the structure by the grounds motion has to be dissipated in the so called “plastic hinge” essentially by the steel cage; low cycle fatigue tests results are presented together with the failure modalities and the major parameters influencing crack initiation.*
3. *Special attention is to be paid to the welding procedures inside the “plastic hinge”, where now welding is forbidden but significant improvements have to be expected if proper and industrially controlled welding procedures are studied and then standardized; some results on welding are presented and commented.*
4. *Reinforced concrete column prototypes are often adopted as benchmark to compare ductility of the “plastic hinge” under cyclic loadings; some results on this subject are presented and discussed.*
5. *Durability of steel reinforcement is a very well known issue of the reinforced concrete construction, but nevertheless still work is missing in order to have a reliable knowledge of the different protection behaviour under several environmental “loading” conditions. The present contribution aims to give some hints on some tests on going on galvanized and inox steel rebars at the University of Brescia and Politecnico of Milan.*