

STEEL EARTH (Steel-based applications in earthquake-prone areas)

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Coordinator:	University of Pisa
Position of Ferriere Nord:	Partner
Other partners:	RIVA Acciaio S.p.A. (Italy); University of Camerino (Italy); Rheinisch-Westfälische Technische Hochschule Aachen (Germany); University of Thessaly (Greece); Shelter SA (Greece); Technical Research Centre of Finland VTT (Finland); C.E.R.I. University of Rome (Italy); Politecnico University of Timisoara (Romania); Coordinamento Sismico Regione Toscana (Italy)

The STEEL EARTH project was aimed at disseminating the results obtained from some previous research activities carried out at the European level (PRECASTEEL, STEELRETRO, OPUS), which developed practical tools and technical documents for engineers, companies and certification institutions on structural issues in earthquake-prone areas associated with both new constructions and refurbishments.

PRECASTEEL: The objective of this European research was to define standardised solutions using steel and steel-concrete composites for one floor industrial buildings and commercial buildings in earthquake-prone areas. Some innovative solutions were also proposed, including the replacement of steel bracing by reinforced concrete cross walls made of double lattice girder plates, which were both dissipative and isolated by means of suitably positioned dissipators.

Finally, a (free) engineering software application was designed, including a calculation tool that can perform a cost benefit analysis of various modular solutions made of steel or steel-concrete composites.

STEEL RETRO: Recovery and refurbishing of existing masonry and reinforced concrete building with steel solutions, including some innovative solutions based on the use of dissipative systems.

OPUS: Analysis of some issues related to the harmonisation of structural engineering with standards (European codes such as EN 10025, EN 210210 e EN 10219) in order to optimise the ductile behaviour of steel structures and overcome current contradictions.

In particular, Ferriere Nord aimed at disseminating an innovative concept developed during two previous European research projects, PRECIOUS (2003-2007) and PRECASTEEL (2007-2010): use of prefabricated lattice girder elements (such as plates for decks and double plates for cross walls) also in metal frameworks, whose floors are generally made of zigzag sheets with casting in situ, whereas bracing is made of steel sections.

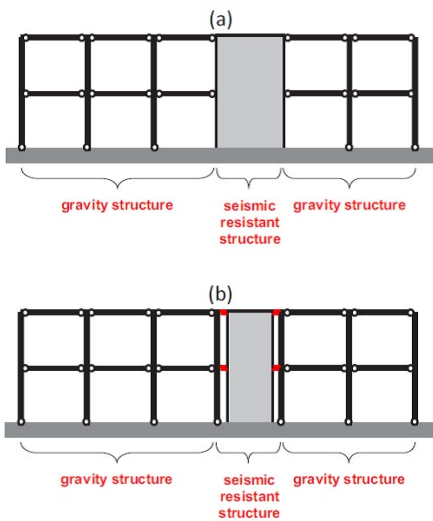


The growing attention devoted to seismic actions not only in Italy (new classification of earthquake-prone areas in 2005), but also all over Europe, is encouraging engineers to find above-ground lightweight and flexible solutions to improve performance in the event of an earthquake. Therefore, engineers usually prefer steel or wood framed structures instead of reinforced concrete ones, especially for industrial buildings, commercial buildings and tall residential buildings.

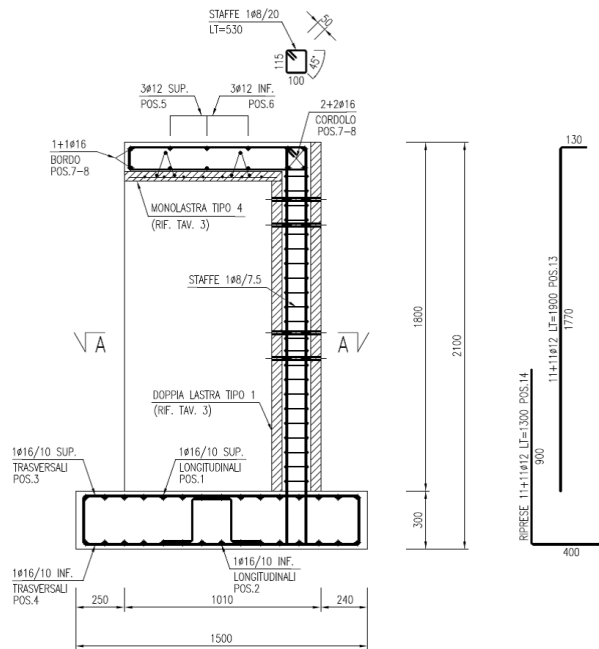
These research activities proved that, in some cases, composite steel-concrete structures with reinforced concrete prefabricated elements, even though they are not yet largely used, can be technically and economically advantageous.

Explore:

Results and suggestions for designers about the use of lattice girders slabs and double slabs in steel commercial and industrial constructions.



Module with metal braces and RC walls



Box element with lattice panels and double-wall lattice