The industrial steel storage racks are a complex system of equipment of great importance for the modern logistic industry, nowadays also used in retail areas open to the public.

Designed mainly to support heavy vertical loads, the industrial racks are generally very light steel structures, flexible, sensible to the horizontal actions and for this reason apparently vulnerable when challenged by earthquake shakes.

Systematic studies on the behaviour of the steel storage racks challenged by seismic actions started in the USA in the early 80s (Chen, Scholl and Blume, Blume and Associates), promoted by the Rack Manufacturers Institute, the association of the rack manufacturers in the USA. These studies provided basic information to the RMI specifications that for a long time has been the only official document explicitly addressing to the topic of the design of pallet racks in seismic zone, now an official ANSI Norm since 2008.

The FEM Section X started in year 2000 studies on this argument using an “European” approach with the goal of developing a specific Norm; the FEM Section X—Racking and Shelving work Group, nowadays ERF (European Racking Federation), joins the European National Association of rack manufacturers; among them, the ACAI-CISI (now UNICSAL), the Association of the Italian manufacturers, has always played a proactive role promoting this project.

The starting points of this project have been the RMI standard and the Eurocode 8; during its development, several researches were carried out, mainly coordinated by the former Structural Engineering Department (DIS) of the Politecnico di Milano; starting from the observation and analysis of the dynamic behaviour of storage racks tested on a shaking table, the researches continued with experimental and numerical studies for the characterization of the components and of the structural systems; and finally, the development of advanced design methods explicitly considers phenomena typical of the racking systems such as the interaction between the structure and the supported loads.

The results of these researches are nowadays implemented in the standards and in the Norms developed by the European industry and used in the design practice.
that have been progressively extended worldwide and that are also attracting the interest of RMI.

In this book, the results of the first research on Seisracks are presented; the Seisracks was coordinated by ACAI in the role of research partner under the responsibility of Prof. Carlo Andrea Castiglioni of the Politecnico di Milano. This research was promoted by the European Industry of racks and shelving and was funded by the European Community: therefore, this is the result of a synergy between university and industry producing fundamental results of scientific and technical knowledge that are the basis of the first European guidelines for the design of storage racks in seismic areas, the FEM 10.2.08 issued in 2010, and of the first Italian Norm issued by UNI in 2009, the UNI/TS 11379.

These Norms are currently the specific reference for the design of steel storage racks in seismic zones based on the European approach, but they will be soon replaced by the new Norm EN16681, recently endorsed by the CEN Technical Committee TC-344, that is the evolution of the previous guidelines; this Norm is based, in addition to the results presented in this book, on the finding of the recent research project Seisracks2, also coordinated by Prof. Castiglioni, representing the continuation and completion of the first Seisracks.

The fundamental technical and scientific contents presented in this book are an evidence of a fruitful synergy between university and industry that has produced very important knowledge for a relevant branch of the logistic industry, in which the Politecnico di Milano and the Italian racking industry plaid and plays today a fundamental role.

Ing. Stefano Sesana  
Convenor  
CEN TC 344—WG5 “Seismic Design”  
SCL Ingegneria Strutturale