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1. GENERAL INFORMATION

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Prof. Eng. Carlo A. Castiglioni
1.1 Presentation, Skills, People

Presentation

Fincon is an international engineering company based in Milan, Italy. The company takes its power from the wide experience of its founders in the field of civil, geotechnical and structural engineering research, development and design.

Thanks to their excellent academic background and field experience, Fincon’s engineers can develop highly efficient solutions to complex problems.

Our structural experts are pushing forward international engineering and design practice, being actively involved in the preparation and revisions of design standards (such as Eurocodes, Turkish and Italian Seismic codes). In the field of geotechnical engineering, we develop significant solutions for several practical issues.

Fincon utilizes CAD and Finite Element tools for advanced structural analysis and design, as well as developing tools for specific topics.

We believe that by reassessing traditional approaches in view of the latest technologies and know-how, the best up-to-date solutions can be found, which will meet clients’ economic and engineering requirements.

Therefore, we apply our knowledge to improve the performance and economy of seismic design of residential and industrial buildings and infrastructures, structural retrofitting, design of industrial racking systems and warehouses.
**Skills**

**Civil, Structural and Geotechnical Engineering**

- Preliminary, definitive, and executive design, construction management and static testing of civil engineering works
- Site surveying and technical controls
- Structural analysis and design
- Geotechnical engineering, direct foundations and soil improvement design, special foundations and piles design, soil retaining structures, stability analyses, groundwater issues
- Seismic analysis and design
- Seismic base isolation systems
- Structural health monitoring and retrofitting of existing structures and infrastructures
- Seismic vulnerability analysis of existing buildings
- Structural analysis and design of industrial racking systems, automated warehouses, seismic retrofitting of existing racking systems and warehouses

**Research and Development**

- Research project development and management in the framework of R&D projects cofounded by European Commission (Horizon 2020, EU-RFCS, etc.)
- Software development for FEM one-dimensional and two-dimensional geotechnical problems
- Scientific consultancy in international research and development projects
- Testing and numerical analysis of structures
- Development of new construction methods and guides
- Product development for racking systems in collaboration with rack manufacturers
Quality Assurance and Control

- Consultancy for Quality Assurance & Quality Control in the field of construction materials and structural products
- Validation of projects

Fincon merges strong academic skills of its founders with their practical engineering experience and therefore provides cost-effective and innovative solutions by means of advanced analysis tools for the complex engineering problems of its clients. We are eager to discover opportunities for new design methods, develop ground-breaking products and find alternatives to traditional systems improving their economy, efficiency and practicality.

People

Carlo Andrea CASTIGLIONI

PhD in Civil and Environmental Engineering. Full Professor of Structural Design at Politecnico di Milano.
Author or co-author of more than 190 technical papers on topics such as stability of structural members, fatigue and fracture, seismic behaviour of structures, structural damage and strength deterioration.
Active since 1983 as designer and consultant in the field of structural engineering. Member of the structural engineering Commission of UNI (Italian Standard Organization). Coordinator of the W.G. 4 (steel and composite steelconcrete structures) of the drafting panel of the Italian Building Code (NTC). Vice President of the Interuniversity Consortium SAFER (Safety, Reliability, Risk Assessment).
Angelo Silvio RABUFFETTI

Civil engineer, specialist in geotechnical and foundation analysis and design, had been involved in a noticeable number of projects ranging from residential buildings to shore and submerged structures, buried special facilities such as underground plants and parking structures. Former design manager in special foundations' primary Company (ICOS Spa), then technical director in Studio Terrain, he wrote several engineering handbooks about geotechnical design and practice and leads e-learning courses for chartered engineers and geologists. He covers a major role in development of F.E.M. algorithms applied to soil mechanics stability problems (slope stability analysis).

He acts as consultant in forensic engineering, registered as safety coordinator as for Italian Legislative Decree 81/08, and fire professional in the Fire Board and Civil Defense Department, technical manager for project audits pursuant to ISO 17020 for the independent third party certification body DNV-GL (Det Norske Veritas - Germanisher Lloyd).

Julia-Nerantzia TZORTZI (GEORGI)

Associate Professor at the Department of Architecture, Built Environment and Construction Engineering of Politecnico di Milano and Associate Professor at the Department of Architecture, Land and Environmental Sciences of Neapolis University of Pafos. She also established the Master of Landscape Architecture at Neapolis University as Director of the Master and as Head of the Department. From 1997 to 2000 Julia was Head of the Environmental Department of EGNATIA ODOS S.A. Design/Construction Company which developed Egnatia Odos, the transnational Road from Adriatic Sea throughout Greece up to the borders with Turkey.

Julia has served for 15 years as Executive Professional in Forestry Engineer and Landscape Architect at the Ministry of Environment, Urban Planning and Energy – Climate Change of Greece.

During the years 2000-2004 she offered her expertise as General Project Manager and Head of Environmental Department for the Athens 2004 Olympic
Games. She designed and supervised the construction of significant landscape projects (urban and periurban parks, greenways, venues) of ATHENS 2004 Olympic Games.

Julia – Nerantzia Tzortzi / Georgi is Vice President of the Greek Association of Landscape Architects-PHALA, Board Member of Le:Notre Institute, Member of Landscape Institute (UK), member of IFLA, where she is active in the IFLA WGs: “UIA / IFLA Working Group Indigenous Ecosystem Corridors and Nodes” and “Cultural Landscapes”.

**Alessio BACCI**

Building Engineer, firstly graduated at Pisa University and afterwards at Polythecnic of Milan for MSC Degree with the experimental thesis “Linear-Elastic Analysis of prestressed slabs”.

His professional career started in London at “Arrigoni Architects”, focusing on construction details and environmental aspects of the firm and dealing with “Canal & River Trust”.

As he came back to Italy, the career at FINCON began, getting involved in the several projects carried out by FINCON as structural designer and works supervision assistant. He is experienced in new construction of steel and reinforced concrete structures and in structural strengthening projects with FRC and FRP materials.

His main responsibilities include finite elements models definition and development of detailed design projects.

He is qualified as health and safety manager in design and works execution phases in construction sites, in accordance with D.Lgs. 81/2008. He is BIM Autodesk Certified Professional for Revit Structures.
**Staff**

Staff includes additional 2 engineers, CAD drawing and plotting draftsman and a secretary.

**External cooperation**

For specific topics Fincon Consulting Italia refers to high-profile resources and skills provided by:

- Works supervision and Health & Safety Management: Eng. Roberto Barbieri – Bertonazzi Associati
- Fire Engineering Design & Prevention: Studio Luraschi
2. RECENT WORKS

2.1 Structural and geotechnical engineering, static testing

**Client: CAP Holding S.p.A.**
Static testing and proof engineering of an underground concrete large tank included in the hydraulic maintenance of “ex-fontanile Cagnola” basin in Arese (MI). The tank has a ribbed foundation slab and its deck is composed by precast prestressed beams (work in progress).
Client: SMV Costruzioni S.R.L.
Construction - level detailed design of structures for the new Luxottica Showroom in Milan, Via Tortona. Building and structural refurbishment of an existing industrial warehouse. Our effort covered the whole design process, including geotechnical design (micropiled foundations and retaining walls), structural strengthening (concrete columns round-reinforced with hollow thin-walled steel profile), steel connections design, new roof steel beams and fire engineering design.
**Client: CAP Holding S.p.A.**
Definitive and executive design of a new concrete reservoir inside the water treatment plant “Depuratore Consortile” in Robecco S/N (MI). Due to the groundwater level at -0.30 m from ground level, a dewatering system coupled with steel sheet piles and wellpoint plant was designed.
Client: Azienda ospedaliera di Desio
Definitive and executive design on behalf of firm 1.618 Engineers & Architects SRL, of two concrete 10-stories lift and staircases for fire safety & prevention at the Desio Hospital (MB).
Client: Adda Energi SRL – Breno (Bs)
Technical and administrative acceptance testing of the concrete dam for the hydroelectric Power Plant “Impianto DMV Sant’Anna” on the Adda river in Fara Gera d’Adda, Bergamo.
Confidential private technical evaluation relevant to the Polcevera bridge collapsed 2018.08.14
**Client: InterIKEA**

Static testing of non-structural elements in the shopping centre Tiare di Villesse (GO)
Client: Regione Lombardia - MM Metropolitana Milanese Spa
Proof engineering, technical review, testing and supervision of works, including complete revision of Contractor’s claims, for the construction of a new underground main road connecting via De Gasperi to via Gattamelata in Milan.

- Tunnel Gattamelata - Milan (Italy)
Client: Joint Venture EPTISA Servicios de Ingegneria S.L.–AMBIENTE S.C.
Structural assessment, included life cycle extension and seismic vulnerability check, in the feasibility project of the environmental adaptation of KOSOVO B Thermal Power Plant in Pristina – EuropeAid Project 136613/DH/SER/XK.
- KOSOVO B Thermal Power Plant
Client: FranceAgriMer – Commissariat général exposition Milano 2015
Static testing of “Palazzo Francia” structures, french pavilion at EXPO milano 2015.
**Client: InterIKEA S.R.L.**

Static testing and proof engineering, including complete revision of statical calculations, regarding the complex of structures for the new “El Nos” Shopping Center in Roncadelle (BS)
Client: Immobiliare Montanino SRL - Milano

Structural design and works supervision on site for a multi-floor underground car park and conservative rehabilitation of two existing buildings in Milan, Via Ascanio Sforza (excavation with top-down method, jet grouting, brick-wall strengthening).
Client: Libera Università IULM – Milano


Fig. 6 _A) Tipico accelerogramma di progetto applicato (al suolo)  _B) verifica della compatibilità con lo spettro elastico di normativa (in elevazione)

Fig. 19 – Distorsione della passarella a quota 16.45: Max spostamenti in direzione X

Fig. 20 – Max spostamenti in direzione Y in fase asincrona
Client: AUSL Piacenza
Seismic vulnerability assessment and technical-economic feasibility analysis for structural refurbishment of the Bobbio Hospital building, Piacenza.
Client: Bureau Veritas Italia SpA – ENI SpA
Seismic vulnerability check (level 1) of existing Pier ENI for oil-tankers mooring in Gaeta (LT). The Pier is 208 m long and it is supported by four main piled islands, with retaining walls at Pier root.
Client: Condominio Via Corridoni 7, Milano

Design of the structures for static and seismic strengthening of the building in via Corridoni 7, Milano

Numerical model of the building in via Corridoni 7, Milano

CONSOLIDAMENTO DI FONDAZIONE MEDIANTE JET GROUTING

Foundation improvement with jet grouting
Client: ILVA SPA, Taranto

Steel structural design of for the extension of longitudinal tube welding warehouse Progetto “TUL 2”

Extension of Warehouse TUL2 ILVA in Taranto: Structural details and assembly

Extension of Warehouse TUL2 ILVA in Taranto: Numerical modeling of the structures
Client: S. Giovanni Battista Cathedral Parish and Impresa Gaiani, Monza

Design of structures and supervision of structural works of the diaphragm walls and micropiles supporting the excavation works, as well as of design of the structures for the “Gaiani” section of the underground Museum of the Monza Cathedral. Supervision to the structural health monitoring, strengthening, and to the construction of a new completely buried elevator connecting the ground floor level of the Cathedral to the underground exposition room at elevation -11.0 m.

Structural modelling of the floor slab

Some phases of the excavation works

Design of the bulkheads
Client: Hotel Britannia Excelsior – Cadenabbia (Como)

Special on-shore structures for the realization of a new floating swimming pool on the Lake of Como, piled wharfs, piers and related steelworks, docking facilities and cautionary works relevant to the public navigation service. Structural and geotechnical design and site engineering and supervision of works.
Client: Ministero dei Trasporti – Gestione Governativa Navigazione Laghi Italiani

Structural Maintenance and refurbishment of Isola Comacina mooring. Design and Works supervision of specific foundation issues and mooring structures
Client: Condominium Via Volturno 46, Milano:

Structural refurbishment and redevelopment of the roof area for residential use in the building of Via Volturno 46, Milano

Condominio Via Volturno 46, Milano. Construction details and transversal section of the intervention of structural refurbishment of the roof
Client: Fratelli la Bufala, Milano:
Structural design for renovation and extension of the restaurant “Fratelli la Bufala” Galleria San Carlo n.6 Milano

Client: Boehler Uddeholm S.P.A, Milano
Structural design of the strengthening works for the warehouse (designed by Fincon, constructed in 1995) to add a new overhead crane of 300 KN capacity

Structural design of the strengthening works for the warehouse Boehler Uddeholm Italia di via Palizzi in Milano: Construction details, stages of assembly and structural modeling
Client: CAP Holding SPA

Project management of structural works of the 1st and 2nd phase for the denitrification section at the water-treatment plant of Bresso / Niguarda (Milan)

Structures for the installation of electromechanical equipments in the grit removal and oils / fats treatment sections at the water-treatment plant of Bresso / Niguarda. Piled foundations, revision of initial structural project.

Client: S.Paolo Hospital, Milano

Preliminary design of the evacuation pedestrian walkway and of 2 emergency staircases.

Numerical model of the pedestrian emergency walkway at S. Paolo Hospital in Milano
Client: Bertonazzi Associates, Piacenza

Design of the steel structures and the r.c. foundations supporting the cooling towers for the enhancement of the cooling of the HVAC system of the Santa Maria Nuova hospital in Reggio Emilia

Numerical model of the structures supporting the cooling towers at ASMN Hospital in Reggio Emilia

Client: SIRAM – GESTA

Design of the steel structures supporting the soundproofing barriers for the enhancement of the HWAC services of building S9, in the Santa Maria Nuova Hospital in Reggio Emilia
Client: Global Works SRL - Lodi

Structural Design of the diaphragm walls and tieback system for the construction of a large multi-storey underground car park in Milan in Viale Arethusa
2.1 Industrial Facilities

2.1.1 Racking Systems

- Structural verification and seismic modelling of the industrial racking systems of LIDL Italia S.r.l warehouse, in via Caduti del Lavoro 5, Massa Lombarda (RA)

- Structural design of seismic upgrade of industrial racking systems of LIDL Italia S.r.l warehouse in via Caduti del Lavoro 5, Massa Lombarda (RA)

- Structural verification and seismic modelling of the industrial racking systems of LIDL Italia s.r.l. warehouse in Pontedera, Provincia di Pisa

- Project validation for Lidl warehouse in Anagni Magazzino Lidl Anagni – Via Cangiano 2

Preliminary design of the warehouse Aysan Raf in Turkey for MARCEGAGLIA Buildtech Srl

Project validation of automatic warehouses for Temesist Depo Raf Sistemleri, Turkey

Implementation of Fullscale pushover tests for the evaluation of seismic response of industrial pallet racking systems for ACAI-CISI

![Different stages of a push over test on a real scale industrial pallet racking system](image-url)
Numerical models of warehouse systems
2.2.2 Structures for Industrial Plants

**Client: Gi.Di.A.**

Design of Steel SKIDs for ISG-Filter Skid, Panipat, India

**Client: Gi.Di.A.**

Design of Steel SKIDs for ISG-Filter Skid, Bathinda, India

**Client: Gi.Di.A.**

Design of Steel SKIDs for the Ruwais Oil Plant, Abu Dhabi Emirate.

**Client: Gi.Di.A.**

Design of Pipe Racks for the Urea production plant of Togliattirot (Russia).

**Client: DG Impianti - SINI – GAZPROM Invest LLC**

Design of the Steel Structures for the regeneration Gas heaters Piping Support, service platform, Inlet-Outlet filtration piping support for the CS "Kazatchiya“ Russia Gas Treatment Plant

Steel Structure for the service platform - CS “Kazatchiya”, Russia Gas Treatment Plant
**Client: DG Impianti - SINI**

Checks of the connections of the steel structures for the 100/500 and 400 building units of the new Sulphur Recovery Unit RZ2 of the ENI plant in Gela

Beam-to-Column connection model for the new Sulphur Recovery Unit of the ENI plant in Gela

**Other clients:**

Pipe stress analysis and support design for the following plants:

- **Escravos, NIGERIA**
  Client: Snamprogetti

- **Arak, IRAQ**
  Client: DG Impianti

- **Thisvi, GRECIA**
  Client: DG Impianti

- **ENNPI, EGITTO**
  Client: DG Impianti

- **Shah Gas, IRAN**
  Client: DG Impianti

- **Nuclear Power Plant of Mochuce, SLOVAKIA**
  Client: DG Impianti

Pipe stress analysis, ARAk, IRAQ
2.3 Consulting for Residential and Commercial Real Estates

Client: Immobiliare Passarella di Elio Fiorucci, Milano:
Consulting about the structural stability of the building in Galleria Passarella 1 in Milano following a major refurbishment

Client: Condominio Santa Giulia 2, Milano
Technical due diligence about the general deterioration of the building complex

Client: Condominio via San Nicolao 10, Milano
Consulting about the structural stability of the building and assessment of the damages caused by refurbishment in the adjacent building

Client: Condominio via Ciovasso 7, Milano
Consulting about the structural stability of the building and assessment of the damages caused by excavations and construction works in the nearby area

Client: Condominio piazza Repubblica 6, Milano
Consulting about the deterioration and static stability of the ramp for access to car parking
Client: InterIKEA

Technical consulting on water infiltration into the emergency evacuation tunnels in an important commercial mall in Italy.

Flooded tunnel– View toward the exit stairs

Flooded tunnel– View toward the mall access

Flooded tunnel– View toward the exit stairs

Flooded tunnel– View toward the mall access – Evident the water spilling

Flooded tunnel– failure of the floor slab due to idrostatic pressure
2.4 Research & Development

Client: Consorzio Pisa Ricerche (CPR)

EU-RFCS Project: ADBLAST Advanced design methods for blast loaded steel structures

Progetto EU-RFCS: STEELWAR (Advanced Structural Solutions for Automated Steel Rack Supported Warehouses)

Esempi di magazzini autoportanti per la logistica
Coordinator of Research Projects:


Prototype and numerical model of a I beam - to - tubular column joint by laser cutting techniques

Laser-cutting samples
**FASTCOLD – RFS-PR-13063 – Fatigue Strength of Cold Formed Structural Steel Details – (EC Open Call RFCS-RTD-2013)**

<table>
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<th>Fatigue details</th>
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<th>Detail n.</th>
<th>Detail ref. in FEM 10.2.10</th>
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<td></td>
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<td>Local bending of upper flange</td>
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<td>C</td>
<td></td>
</tr>
<tr>
<td>Tension</td>
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<td>-</td>
<td></td>
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<tr>
<td>Tension</td>
<td>4</td>
<td>-</td>
<td></td>
</tr>
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<td>Bending in vertical plane</td>
<td>5</td>
<td>D4</td>
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<tr>
<td>Thickness = 3 mm Normal Slots</td>
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<td>D4</td>
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<tr>
<td>Thickness = 2 mm Round Slots</td>
<td>Bending in vertical plane</td>
<td>7</td>
<td>D4</td>
</tr>
</tbody>
</table>

Real scale samples

Specific samples
2.5 Software Development: FEA-Slope

Project: Advanced two-dimensional Finite Element analysis for slope stability and earth works stability
2.6 Project Validation And QA/QC Activities

**Client: Eurolink**

Member of the independent team for the validation of the intermediate design project of the Messina Narrows Bridge

[Cross Section of the Deck – Intermediate Design Project – Messina Narrows Bridge]

**Client: CMC, Bari:**

Validation of the design of mechanical platforms according to ANSI/SIA A92.5-20 and UNI EN ISO 17020

**Client: Qualitalia Servizi**

Inspection, project validation and seismic certification of the racking systems for the LIDL Italia warehouses in seismic areas.