



Fratelli Pesenti Master School

Polytechnic of Milan

MAIN ACTIVITIES

Aims and Mission

“From the Spring of Tech-Scientific and Cultural Tradition towards Innovation”

Traditions

1. Cultural Background

Italy is a Country with excellences in Architecture, either Historical and Modern, as well as in the field of Structural Mechanic and Engineering design. The education in Engineering and Architecture in Polytechnic of Milan University is deeply characterized by these heritages. The F.lli Pesenti Master School was founded at the Polytechnic in 1927 to spread and develop this heritage, as source of innovation.

2. Economical Background

Milan is the second-largest city in Italy and the capital of Lombardy. Its urban area is the 5th largest in Europe. Milan is the main industrial, commercial and financial centre of Italy and a leading global city.

3. Geographical Background

The central location of Italy in the Mediterranean area and its variable climate and its seismic activity, give actual challenges to Engineers and Architects.



School History

1927 - Historical date for the University of Engineering (R. Politecnico) Milano



New building at
P.zza Leonardo da Vinci



On. Antonio Pesenti



Gr. Uff. ing. Cesare Pesenti

Institute of the Foundation FRATELLI PESENTI for the insert of the :
“Specialized School for the Reinforced Concrete Constructions”
Near the ***“Institute of Bridges and Great Special Structures”***



The Foundation of *F.lli Pesenti* was signed in the presence of the Director of the Polytechnic:

prof. Fantoli and in the presence of the family representatives **Gr. Uff. ing. Cesare Pesenti** and **l’On. Antonio Pesenti**.

In February of 1928 started the first Academic Year.

During the opening ceremony, **prof. ing. Jorini**, (first Director) presented the main program of this Institution:

“ (...) Beside aiming at the creation of high-levels scientific culture, necessary for future engineers, we must provide them with proper technical, artistic, economic conditions, so that they can become capable of immediate practical use of this techniques”



prof. ing. F. A. Jorini



Sen. prof. ing. Gaudenzio Fantoli –
Director of the Polytechnic

School History

1931 - the publications of the volumes: "ATTI RICERCHE STUDI" starts

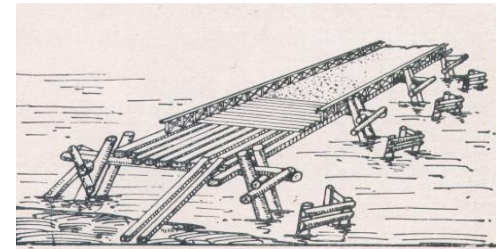
Significant and historic publication by prof. Santarella on: *Acts Research Studies*

And the precious monography:

"ART AND TECHNIQUE - EVOLUTION OF BRIDGES"



Figure: the activities of the Master School, viewed from two main perspectives, as lectures hold and as a research program.

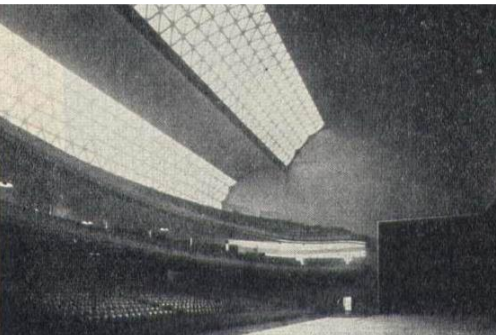
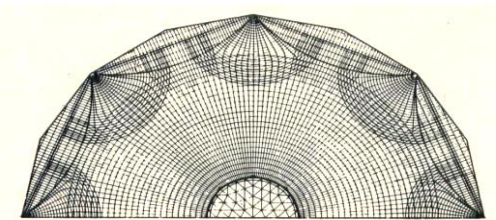
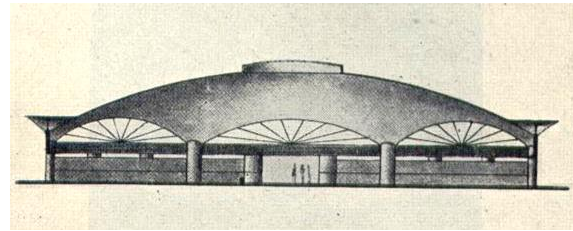


Figures: Reconstruction of the wooden bridge of Giulio Cesare, on Reno river – 55 a.C. De Bello gallico – Lib. IV-XVII

Publication by **prof. Luigi Santarella**

A description of the diversity and the importance of the courses held in the Master School.

In 1949 prof. Stabilini makes a discussion about the changes of the Master School, including use of concrete and the perfection of the courses, treating issues and problems that were not studied in such a detailed way by the other courses of the University.





MASTER COURSES

- **COURSE DURATION: 12 months**
- **ORGANIZED IN 3 PARTS:**

First part lectures, theory + exercises

Second part work-sites visit, tests, laboratories, seminars and presentation of the internships offered by firms and consulting offices

Third part full immersion on the training internship, with two supervisors

- **FINAL THESIS**

The Master Diploma is achieved after a final thesis dissertation, which consist on the most significant experiences developed during the internship and the whole master course.

From the Academic Year 2012/2013 The Renewal of the Traditional teaching



Politecnico di Milano
Scuola Master Fratelli Pesenti



Italcementi
Italcementi Group



Blackboard

THE HIGHEST LEVEL OF POSTGRADUATE STUDIES DIRECTLY AT HOME

Blackboard is the **FIRST** platform used in the academic world.

Online recorded lectures
Webinars

(Blackboard LEARN)

(Blackboard COLLABORATE)

Reasons to offer the online master...

...to **CONTINUE** the traditional teaching - a worldwide recognized learning experience

... to give Students of all Masters (On-Site and Online) an effective, understandable and easily accessible **ONLINE SUPPORT**

... to offer high quality and excellent **ONLINE MASTER** courses of Polytechnic of Milan to whom lives out of Milan or abroad

... make them benefit from the **SAME SERVICES** provided to students on-site, without having to move to Milan and continuing their work activities.

1st and 2nd Level SPECIALIZING MASTER (60 ETCS)

November 2015:

LEADERSHIP IN GLOBAL ARCHITECTURAL DESIGN



ON-SITE + ONLINE

**PROJECT MANAGEMENT OF CIVIL STRUCTURES
AND INFRASTRUCTURES**



ON-SITE + ONLINE

SUSTAINABLE BUILDINGS AND INFRASTRUCTURES



ON-SITE + ONLINE

**ARCHITECTURAL DESIGN AND ENGINEERING
OF SPORTING FACILITIES**



ON-SITE + ONLINE

DESIGN OF REINFORCED CONCRETE STRUCTURES



ON-SITE + ONLINE

1st and 2nd Level SPECIALIZING MASTER (60 ETCS)

March 2016:

DESIGN OF SEISMIC SUSTAINABLE STRUCTURES IN
CONSTRUCTION WORKS



ON-SITE + ONLINE

PROJECT MANAGER IN INTERNATIONAL
CONSTRUCTION SITES



ON-SITE + ONLINE
Only 2nd Level

BIM MANAGER



ON-SITE + ONLINE



POSTGRADUATE PROGRAM (WITH ECTS) ONLINE

November 2015/January 2016:

PROFESSIONIST SPECIALIZED ON SEISMIC RESPONSE OF CIVIL STRUCTURES AND INFRASTRUCTURES ACCORDING TO THE NATIONAL AND INTERNATIONAL ROLES

PROJECT MANAGER AND SAFETY MANAGER: INTERNATIONAL CERTIFICATION CAPM AND PMP (PMI) AND IGC (NEBOSH)

ENERGY AND ENVIRONMENTAL MANAGEMENT IN BUILDINGS AND INFRASTRUCTURES

DESIGN OF SPORTING FACILITIES

BUILDING INFORMATION MODELING IN TECHNICAL OFFICES: MODELING AND PROJECT MANAGEMENT

PROFESSIONIST SPECIALIZED ON ACOUSTICS

Professional training courses (CFP Courses)

Design Area

- The preliminary project with use of software structural
- Elements of engineering seismology applies to engineering
- Structural Analysis
- Precast structures
- Bridges
- Foundations and support works
- Existing Buildings
- Properties and potential of wood in architecture

Sustainability Area

- Comparison between different protocols for certification of sustainability at different scales planning
- Development of diagnostic techniques in renovation
- Green Building Council and LEED
- Materials in architecture: durability and sustainability performance
- Software for BIM: basic - use through practical examples
- Acoustics applied to buildings to residential use
- Thermophysics building geometry, when and how, compared with the techniques for saving energy
- Professional accreditation for energy certifiers CENED and insights the environmental impact of buildings

Project Management Area

- Fundamentals of Engineering Management 2
- Site management, construction and the built
- Introduction to value investing
- The real estate investment and "Macroeconomics trends"
- The international competitions
- The developer in the management of a real estate project
- The profession in the fields of economic and management: principles of forensic engineering
- Decision making - to avoid mistakes and make the right choice
- Health and safety in the workplace
- Certification Project Management (CAPM® and PMP®)



LEADERSHIP IN GLOCAL ARCHITECTURAL DESIGN

TRAINING OBJECTIVE: The master program will be a machine to decode and understand the creative advantages of Brand Italy, and the power of “Made in Italy”, as it could be successfully applied in different contexts around the world.

- UNITS:**
- Design & Inspiration
 - Architecture & Process
 - Data driven Architecture
 - Restoring the productive city
 - Business + Architecture + Brand

INTERNSHIP: 500 h
in companies leaders in their field for onsite students.



LEADERSHIP IN GLOCAL ARCHITECTURAL DESIGN

MASTER IN GLOCAL DESIGN 2015/2016

gLOCAL 

PROJECT MANAGEMENT OF CIVIL STRUCTURES AND INFRASTRUCTURES

TRAINING OBJECTIVE: Professional specialization in economic assessment of real estate investments and executive management of big building sites.

- UNITS:**
- Fundamentals of engineering management
 - NEBOSH IGC (International General Certificate)
 - An Introduction to Value Investing
 - Public Administration: rules and procedures
 - The Principal in the management of a real estate project
 - The Designer in a real estate project
 - Forensic Engineering
 - Certification on Project Management PMI (CAPM - PMP)
 - Decision Making

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

PROJECT MANAGEMENT OF CIVIL STRUCTURES AND INFRASTRUCTURES

Examples of Master Thesis and Internships

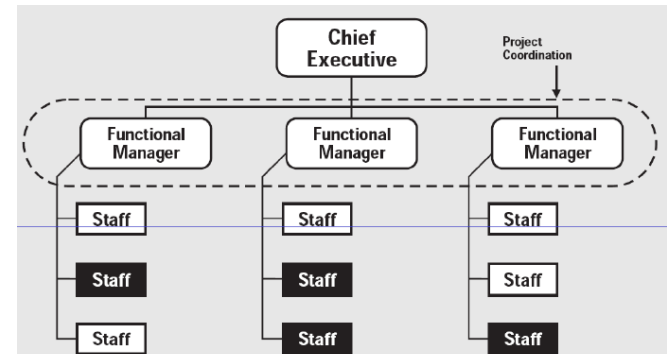
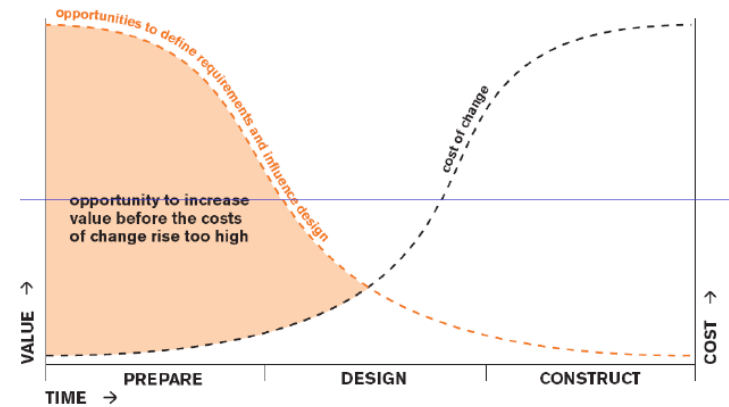
Case study

Construction Management of the project City Life in Milan,
by CityEdge – Daniel Libeskind Local Partner



Practical Diagrams

The start of the project is when most can
be done to add value through careful
preparation and adequate time for design



(Black boxes represent staff engaged in project activities.)

SUSTAINABLE BUILDINGS AND INFRASTRUCTURES

TRAINING OBJECTIVE: Professional specialization in design of energy - efficient buildings and specialists in the acoustic field.

- UNITS:**
- Energy certification of buildings in Lombardy (CENED)
 - “Almost zero” energy buildings
 - Energy management
 - Static and dynamic energy modeling
 - Green Building Council and LEED
 - Fundamentals of acoustics and psychoacoustics
 - Environmental and building acoustic
 - Theory of vibrations
 - Conceptual Design
 - The materials in architecture

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

SUSTAINABLE BUILDINGS AND INFRASTRUCTURES

Examples of Master Thesis and Internships

Case study

Stefano Boeri's Bosco Verticale, Milan



Case study - Italcementi Group

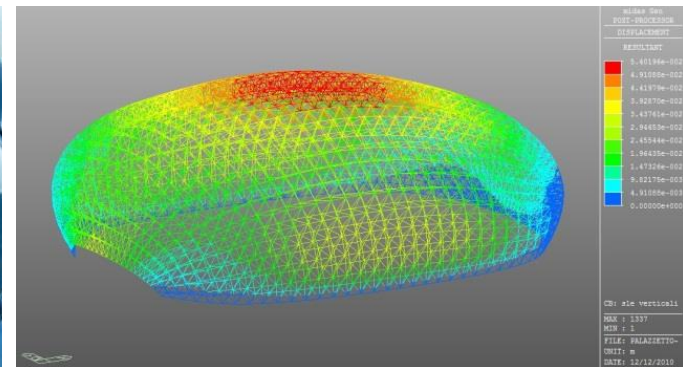
i.lab, the new Centre for Research and Innovation



Thesis and Internship at V.G.A. AND PARTNERS s.r.l.

Student: arch. Slavko Milanovic (Serbia)

ETFE TECHNOLOGY ANALYSIS: CASE STUDY OF A SPORT ARENA ENVELOPE





ARCHITECTURAL DESIGN AND ENGINEERING OF SPORTING FACILITIES

TRAINING OBJECTIVE: Professional specialization in design, testing and maintenance of sporting facilities.

- UNITS:**
- The sporting facilities and the current regulations
 - The materials in architecture
 - Solutions of the sporting facilities
 - The energy performance of the sporting facilities
 - Energy and plants
 - Certification for sustainability
 - Special structures
 - BIM (Building Information Modeling)
 - Conceptual Design
 - The design of the site and safety
 - Project management bases
 - The financing opportunities

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

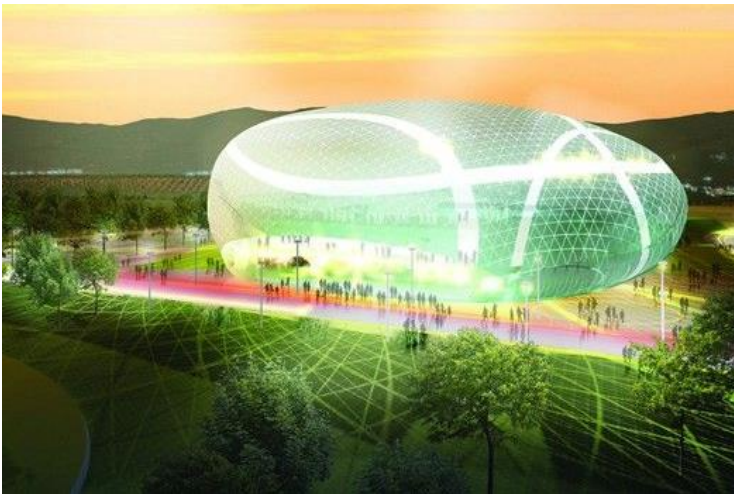
ARCHITECTURAL DESIGN AND ENGINEERING OF SPORTING FACILITIES

Examples of Sporting Facilities

Olympic Stadium, Torino



New Stadium, Milan



Palasport, Lamezia Terme



Olympic Ice Rink, Torino

DESIGN OF REINFORCED CONCRETE STRUCTURES

TRAINING OBJECTIVE: Professional specialization in design, testing and maintenance of reinforced concrete constructions, according to the new rules and procedures in Europe.

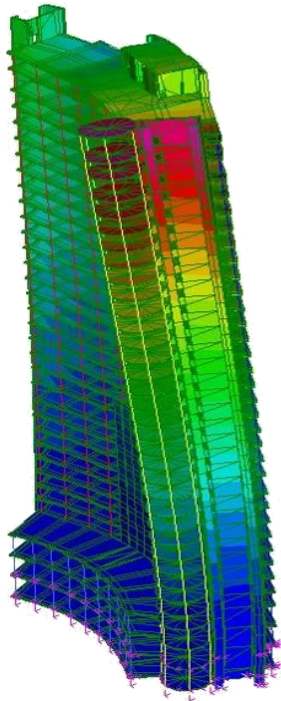
- UNITS:**
- The materials in architecture: performance durability and sustainability
 - Finite Element Analysis
 - Il BIM (Building Information Modeling)
 - Structures in reinforced concrete: NTC and EC2
 - Seismic design: NTC and EC8
 - Special structures
 - Case studies

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

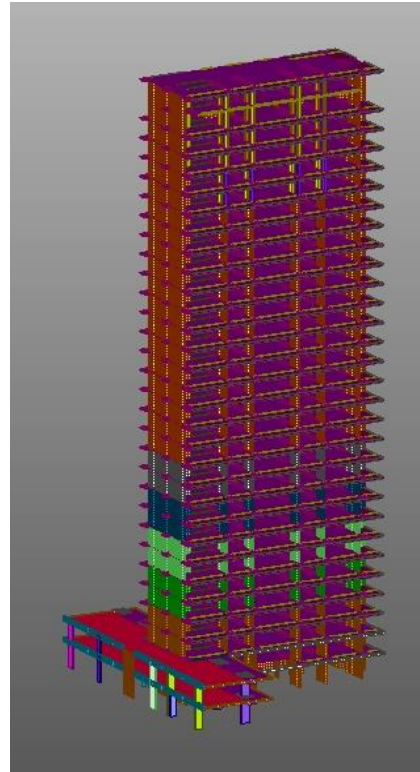
DESIGN OF REINFORCED CONCRETE STRUCTURES

Examples of Master Thesis and Internships

Effects of wind on Tower A
in Garibaldi-Repubblica, Milan



Structural Analysis for
an historical reinforced concrete building, Milan



DESIGN OF SEISMIC SUSTAINABLE STRUCTURES IN CONSTRUCTION WORKS

TRAINING OBJECTIVE: Professional specialization in design and seismic retrofit of buildings, bridges and special structures in reinforced concrete, masonry and mixed concrete, with reference to the Eurocodes and the most common international standards, in terms of sustainability.

- UNITS:**
- The materials in architecture
 - Elements of seismic engineering
 - Structural Analysis
 - Structural modeling
 - Building design
 - Pre-casted structures
 - The seismic isolation
 - Existing buildings
 - Bridges
 - Foundations and retaining

INTERNSHIP:

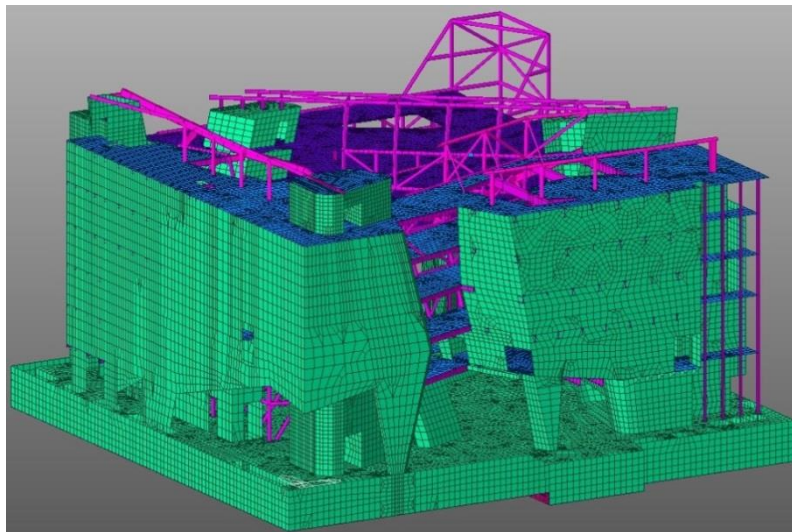
550 h

in companies leaders in their field for onsite students.

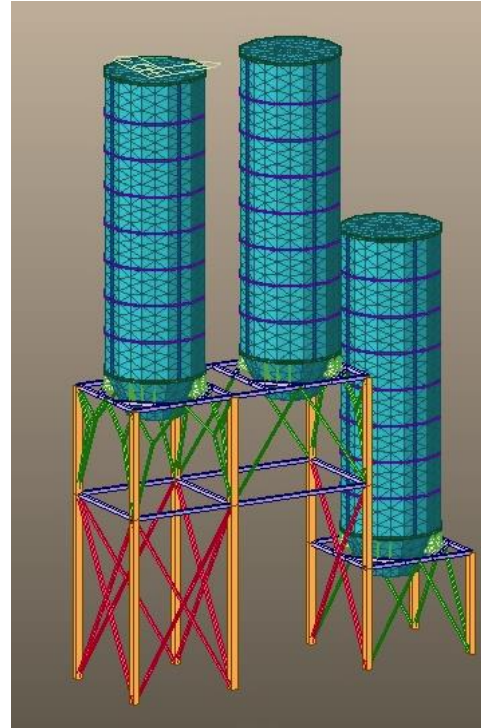
DESIGN OF SEISMIC SUSTAINABLE STRUCTURES IN CONSTRUCTION WORKS

Examples of Master Thesis and Internships

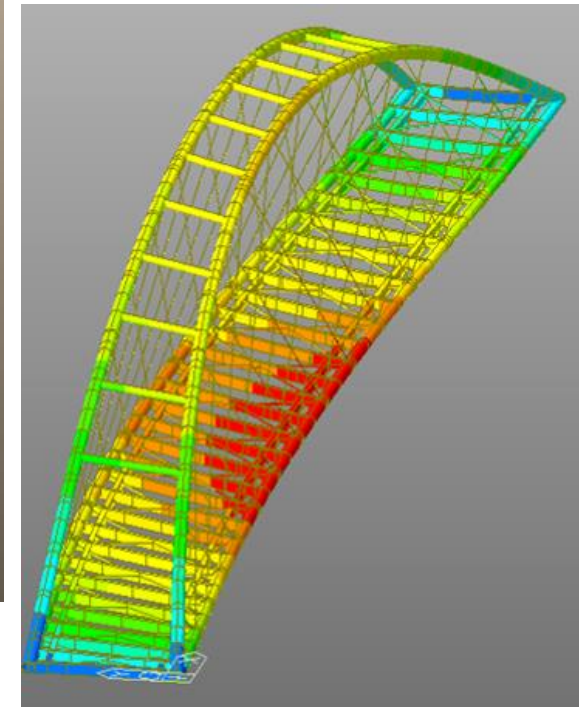
Structural analysis for Palazzo Italia EXPO 2015



Structural analysis for Dust and Lime Silos, England



Dynamic analysis for a new footbridge, Lombardia



DESIGN OF SEISMIC SUSTAINABLE STRUCTURES IN CONSTRUCTION WORKS

Examples of Master Thesis and Internships

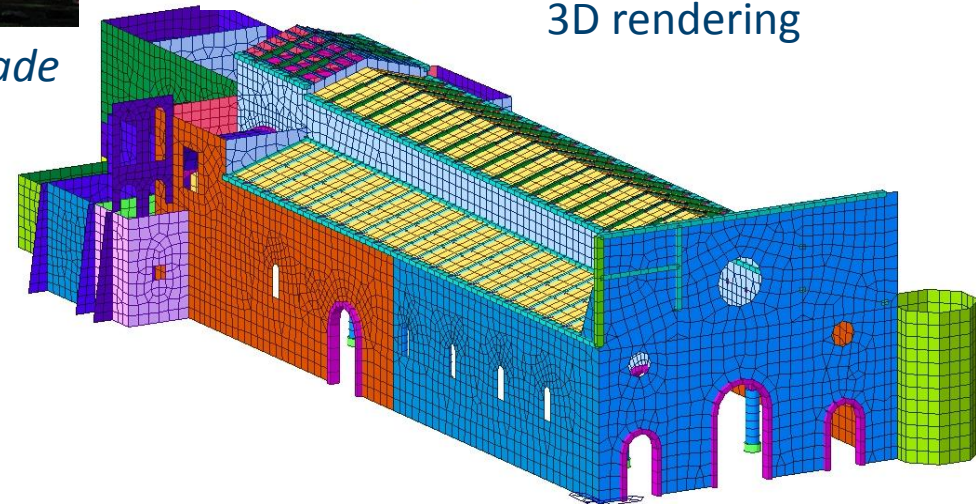


the facade



3D rendering

Structural Analysis for the seismic restoration of the «Basilica di Collemaggio» in L'Aquila



the Finite Element Model

PROJECT MANAGER IN INTERNATIONAL CONSTRUCTION SITES

TRAINING OBJECTIVE: The Master is sponsored by Salini - Impregilo SpA , which chosed the F.lli Pesenti Master School as the academic partner for the training of project managers in international construction sites.

- UNITS:**
- Introduction and delivery methods
 - Basic scheduling tools (Project, Tilos, Primavera)
 - Fundamentals of engineering
 - BIM - Software and design tools
 - Management of the competitions at national and international calls
 - The carrying out of a project
 - Contractual and legal matters
 - Cost Control
 - Risk Management
 - Construction site tools & machines
 - Construction materials
 - Provisional works
 - The fundamentals of rock excavating
 - Concrete structures and earth moving
 - The fundamentals of tunneling

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

PROJECT MANAGER IN INTERNATIONAL CONSTRUCTION SITES

Examples of Master Internships



Salini Impregilo
Construction Sites

BIM MANAGER

TRAINING OBJECTIVE: Professional specialization in management of BIM based projects (from Integrated design to Program Management).

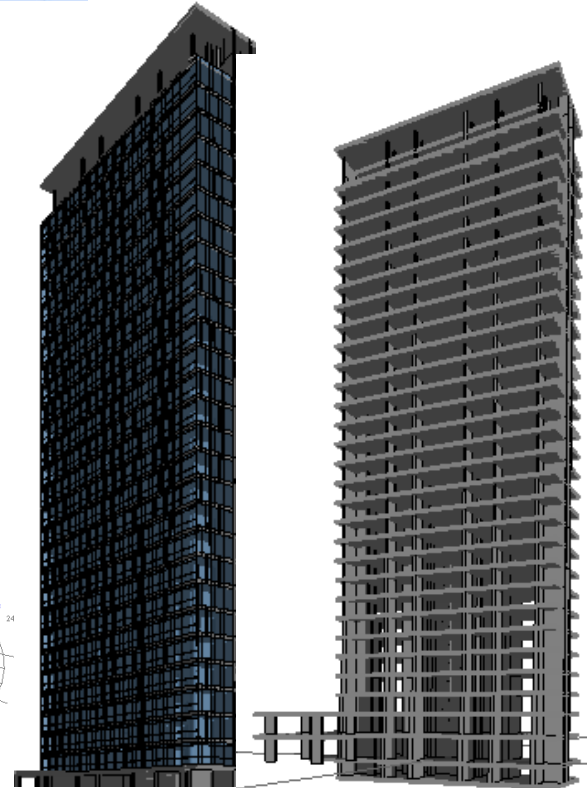
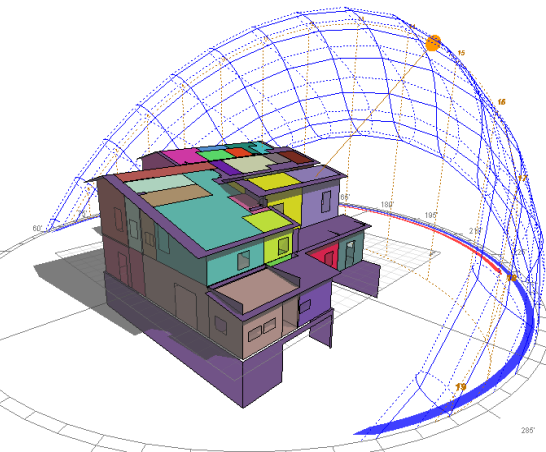
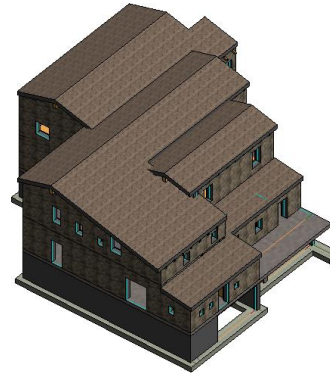
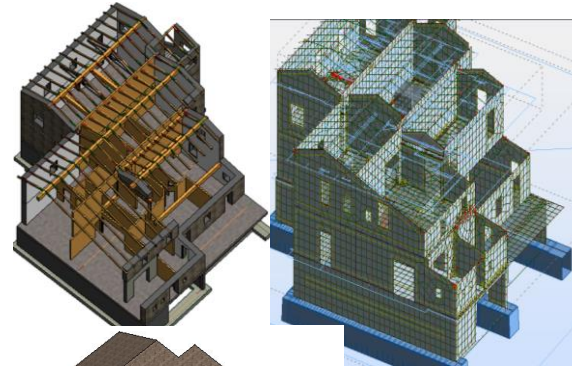
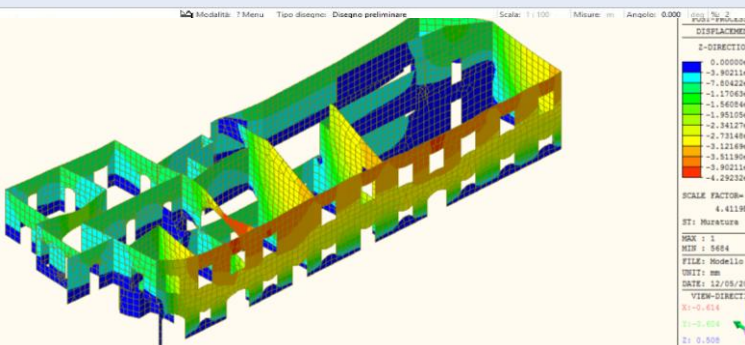
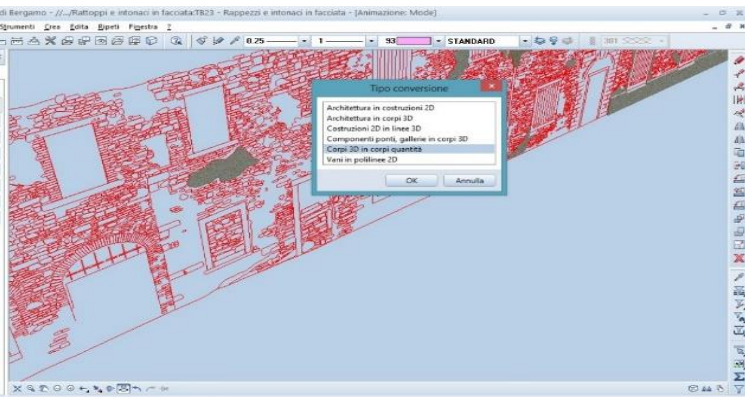
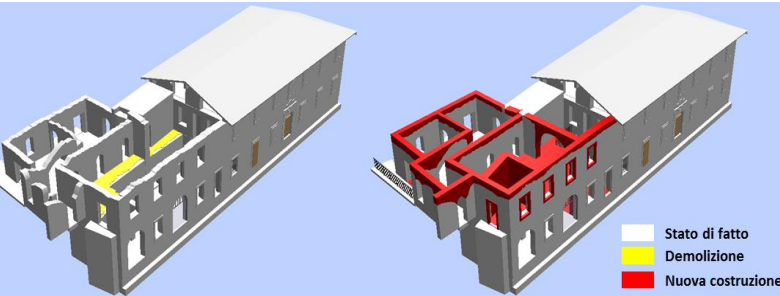
- UNITS:**
- Introduction (BIM, Integrated design, Program Management)
 - Regulatory Framework and BIM, the European directive on public procurement, BIM and public administrations
 - Data Management, the Building Information Exchange
 - BIM-based design
 - BIM modeling (Allplan and tools)
 - Software BIM (Tekla Structure, Vianova and DDS-CAD)
 - BIM modeling: introduction to Revit
 - Revit for integrated design: structures, infrastructures and systems
 - Energetic and environmental design
 - The coordination, the simulation of the building with the help of Navisworks, the model checking

INTERNSHIP: 550 h
in companies leaders in their field for onsite students.

Examples of Master Thesis and Internships

BIM MANAGER

BIM applied to existing buildings: from survey to energy and structural analysis





POSTGRADUATE PROGRAM PROFESSIONIST SPECIALIZED ON ACOUSTICS

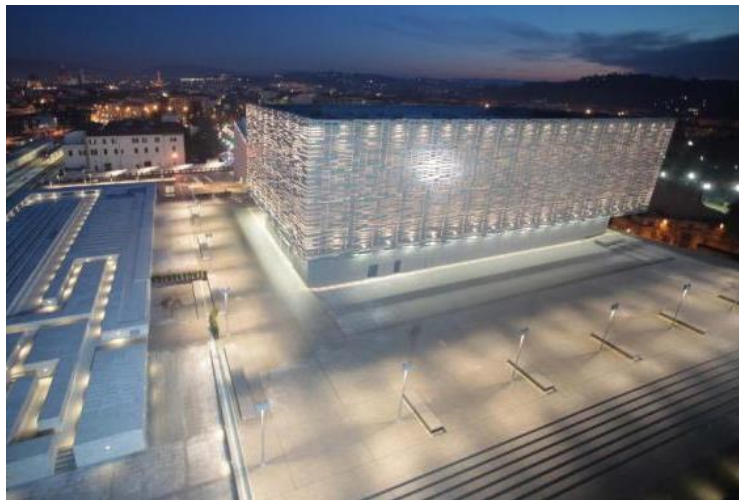
TRAINING OBJECTIVE: Professional specialization in acoustic design in buildings and infrastructures.

- UNITS:**
- Fundamentals of acoustics and psychoacoustics
 - Rules and examples to evaluate environmental acoustic impact
 - Technical instruments
 - Environmental acoustics
 - Acoustics for buildings
 - Instruments and software to evaluate environmental acoustic impact
 - Conceptual design

PROFESSIONIST SPECIALIZED ON ACOUSTICS

Example of Case Study

Opera Theater, Firenze



International Master Courses

“New engineering education paradigm “

Practical intelligence

Analytical intelligence

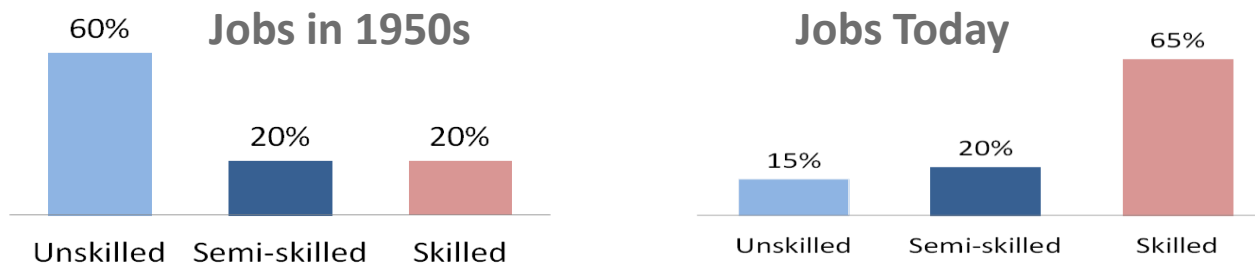
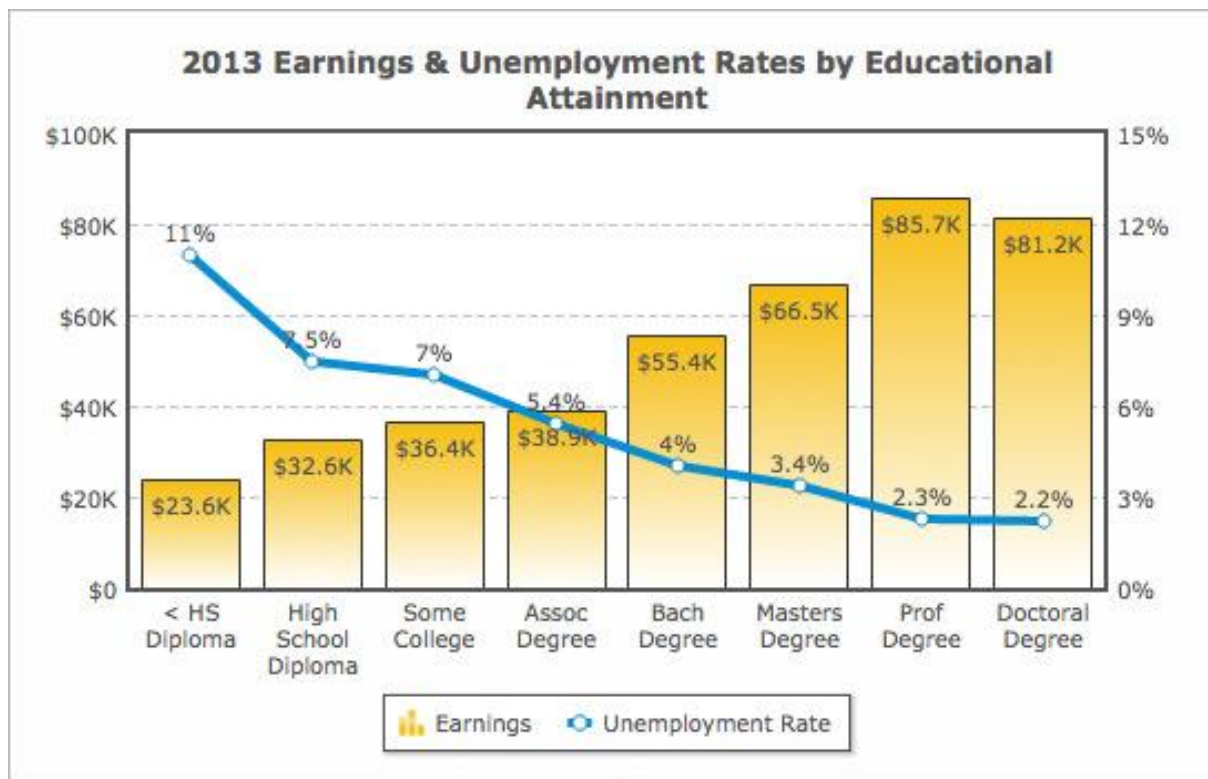
Creative intelligence

“A four/five years engineering curriculum can no longer do the job of training future engineers at the time when new knowledge in science and engineering is exploding...

other professions have moved ahead : it now takes nine years to train a doctor, seven years to educate a lawyer, etc”.

Delon Hampton, ASCE’S President

What about engineers and architects?!



We believe that:

