The Master in Industrial Plant Engineering and Technologies of the Genoa University

Master MIPET industrial plant engineering and technologies

# MIPET

Facoltà di Ingegneria Università degli Studi di Genova · CONFINDUSTRIA GENOVA · Ordine degli Ingegneri della Provincia di Genova

**This Master is devoted to prepare on Industrial Plants Technical Issues, with special attention to Engineering. The goal is to organize a Master Program based on strong cooperation between Academic and Technical Experts coming from Leading Universities and Companies operating in this area with special attention to Engineering and Construction in Power Generation, Iron & Steel and Environment.**

*Sponsors*

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# Academia, Institutions & Industries

## MIPET ORGANIZERS & SUPPORTING INSTITUTIONS

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DIME

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# WHAT IS

The Master in Industrial Plant Engineering and Technologies (MIPET) is a one-year degree program organized in Genoa University focusing on preparing new generations of top quality engineers to be dedicated to process and project and activities related within plant engineering and construction companies.

The Master Program is directed by the Faculty of Engineering in close cooperation with a number of industrial partners which represent some of the best reputed global players in the Engineering and Construction market. The main goal of the Master is to meet the requirements of such industrial partners in terms of professional skills and technological competencies.

As a matter of fact, this project it is part of a larger program devoted to exploit the synergy between the Genoa University Engineering Faculty and the top level E&C companies established in this area to pursue the goal of excellence in processes and products through a continuous enhancement of their competitive assets: technology, know how and skills.

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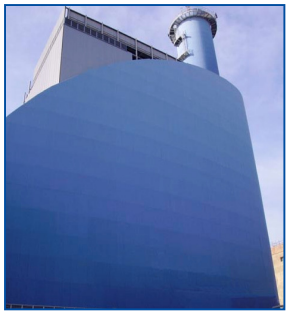
# INTELLECTUAL CAPITAL FOR FUTURE OF ENGINEERING

*Jack Welch* *(GE CEO 1981-2001* from $14 billions market value to over $410 billions): Globalization has changed us into a company that searches the world, not just to sell or to source, but to find Intellectual Capital - the World's Best Talents and Greatest Ideas








Scientists investigate that which already is; Engineers create that which has never been
*Albert Einstein, Physics Nobel Price 1921*

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# MASTER OUTCOME

The Master is devoted to create System and Process Engineers, Technical Coordinators operating effectively in Project Teams in Global Engineering and Construction. The Master provides a deeper insight in Industrial Plants and enables the students to get a complete overview of a project with all its technical aspects along each project stage: Proposal, Basic and Detail Design, Procurement, Manufacturing, Erection and Commissioning.
At the completion of the Master Program students have developed basic capabilities in all the critical areas (mechanical, materials, processes and components, electrical, instrumentation & automation, cost estimate, project planning, risk & safety, quality assurance) combined with a specific training in a particular industrial sector (i.e. Power Equipment, Iron & Steel...) as well as with In-Company Stage Experiences.

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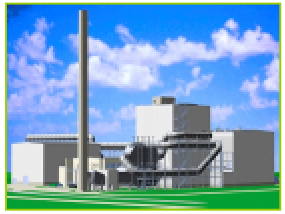
# WHO SHOULD ATTEND

- Young Engineers with strong potential and technical background
- International Excellent Students from Engineering Departments all around the world
- Engineers already employed in Engineering and Construction Companies who are interested in attending specific thematic educational modules of the Master Program such as Project Management, Constructions, Standards and Regulations, Safety and Security



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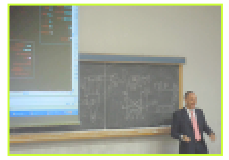
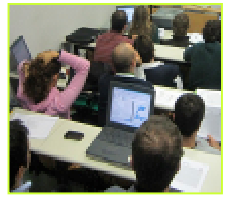
# MIPET ADDED VALUE

## BENEFITS FOR YOUNG ENGINEERS

- High Profile Professional Education devoted to provide High Value Skills in Industrial Plant Engineering and Technologies
- Continuous Interaction with Top Quality Experts from Academia, Institutions and leading E&C Companies.
- Very Qualified Selection and Evaluation Processes that guarantee the Master Attendees as highly qualified resources for top companies.
- Opportunities to complete experiences On Field on complex Industrial Plant projects
- Contacts and visibility to major E&C Companies operating at National and International level.
- Developing Human Potential of the attendees by training and improving Individual and Team Working capabilities.

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# INVESTEMENTS & SELECTION

- The Master is based on a agreement among the Sponsoring Companies and Genoa University. In fact the Industrial Sponsors have fully financed the edition of 2010 without any public funding, confirming their strong interest in this initiative
- To attend the Master each applicant is requested to pass a selection process based on Interview (Live or by Phone/Skype) and Qualification (i.e. Curriculum Vitae).
- The MIPET Selection Process is based on a mixed team of Technical and Human Resources Experts from Academia and Industry able to select candidates with very high potential (e.g. in 2010, 120 applications, 60 selected interviews, 15 selected master attendees)
- The MIPET Tuition Fee is 7'500.00 Euro (two payments: 1'500.00 at beginning and 6'000.00 after 4 months); therefore all Selected Candidates receive a 6'000.00 grant Euro from Companies and Governmental Institutions and have to pay 1'500.00 Euro in total for being enrolled after selection procedure completion (no extra payment required to students)
- In Last MIPET Edition 100% of the Students achieving the Master Degree obtained full 100% coverage of Tuition Fees
- MIPET is establishing agreements with major university around the World for promoting this initiative and cooperation in Industrial Plant Engineering & Technologies

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# PLACEMENT

- All the Sponsor Companies are interested and committed to evaluate best MIPET students (able to complete successfully the Program) for working positions and, in case of selection, the Sponsors will hire these people and recognize them the efforts for attending MIPET, at least, by refunding the full tuition fee (1st Payment 1'500.00 Euro)
- The job placement is very good both in terms of numbers and quality; placement statistics show that more than 80% of the previous Master student were hired by leading industries and major companies operating in industrial sector
- Master Students and Companies have the opportunities to know each other during the Internship & Project Work
- In addition MIPET organize periodic group and individual meetings between Sponsor Companies and MIPET Students, as well as orientation meetings, in order to finalize internship and cooperation agreements

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# GENERAL PROGRAM

**The Master in Industrial Plants includes:**

- **Base Modules for Industrial Plant Engineering and Construction, including Plant Automation.**
- **Operative Modules on Critical Issues for Industrial Plants (e.g. Engineering Standards and Regulations, Project Management, Quality Assurance etc.)**
- **Thematic Modules on Specific Plant Sectors (e.g. Power, Iron and Steel, Environment)**
- **Company Internships devoted to acquire on-field experience, including the development of the Project Work related to a Real Case**
- **Visits to Industrial Plants and Engineering, Research & Development Centers and Labs.**
- **Tests for certifying individual skills and capabilities acquired by the attendees on each topic**
- **Professional Modules, integrated in the Master Program, but open for external attendees as stand alone courses. These modules include individual and team Projects Works to be carried out in competition/cooperation interacting with experts.**

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# OPERATIVE MODULES

Operative Modules are compact and specific courses (3-5 days), which are an integral part of the Master and at the same time open to be offered to technical employees or professionals.

These modules are carried out jointly by the Industry and the Academy and are are characterized by strong interaction between students and teachers through simulations, business games and RPG performed on specific case studies. Among the others the following modules are foreseen:

- **Engineering Standards and Regulations**
- **Construction**
- **Project Management**
- **Safety & Risks**

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# EDUCATIONAL PATH

## Educational Framework




**Base Modules** ~140 hours → **Operative Modules** ~140 hours → **Thematic Modules** ~140 hours → **Internship** ~400 hours

420 hours as Classroom Lectures

650 hours as Project Work

The Education framework of MIPET is focusing on industrial plant engineering and technologies by adopting different methods such as lectures, case study, exercises, common experiences, RPG (role play games), simulations, use of models and software tools, interactive blended education (i.e. clickers) & industrial plant guided visits

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# MODULES

## Educational Module Topics

### Base Modules
~140 hours

- Fundamental Concepts related to Industrial Plants Projects
- Fundamentals of Financial Analysis for Industrial Plants
- Processes Engineering and Components in Industrial Plants
- Design and Engineering for Industrial Plant Systems
- Material Technology, Mechanical Design and Industrial Plants
- Automation in Industrial Plants
- Software Systems for Supporting Industrial Plant Design & Evaluation

### Operative Modules
~140 hours

- Standards & Regulations
- Project Management
- Construction
- Safety & Risks

### Thematic Modules
~140 hours

- Power Plants
- Iron & Steel Plants
- Plants for Environment
- Processes & Machines in Industrial Plants
- Desalination & Water Treatments
- Environment & Sustainability for Industrial Plant Engineering
- MIPET Other Modules English, 2nd Language, Orientation

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# Engineering Standards & Regulations

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## *Operative Module of MIPET*

**Industrial Plant Engineering & Technologies**

## Objectives

***Engineering Standards & Regulations*** is devoted to organically present the existing and future norms to be adopted for the design and construction of Industrial plants; the course provides knowledge for supporting problem solving for companies facing for the first time regulations and codes in National and International industrial plant projects

## Course Attendees

***Engineering Standards & Regulations*** is designed for young engineers, specialists and professionals active in Industrial Plants enabling them to make use of the state-of-the-art norms, codes and standards for the design of equipment and systems.

## Structure and Approach

This modules is organized as a 35 hours course to be completed in 5 days by interactive sessions with experts coming from Industry and R&D. The approach includes lecturing, case studies, exercises, experiences, RPG, competitive and cooperative simulations

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# Safety & Risk

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## *Operative Module of MIPET*

**Industrial Plant Engineering & Technologies**

## Objectives

***Safety and Risk Module*** is devoted to present methodologies, techniques and technologies related to safety and risk evaluation during design, construction and operation of an Industrial Plant.

## Course Attendees

***Safety and Risk Module*** is designed for young engineers, technicians and professionals active in the engineering of Industrial Plants enabling them to deal with safety rules and risk analysis according to the state-of-the-art legislation.

## Structure and Approach

This modules is organized as a 35 hours course to be completed in 5 days by interactive sessions with experts coming from Industry and R&D. The approach includes lecturing, case studies, exercises, experiences, RPG, competitive and cooperative simulations

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## MIPET Operative Modules

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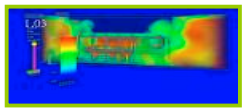
### Standards & Regulations

- Large Industrial Plants: an Overview on Standards, Regulations and Administration Authorization Processes along Project Life Cycle
- Case Study on Impact of International Regulations on Industrial Plants with Special Attention to Directive 2006/42/CE, ATEX, PED.
- Quality Assurance and Control in Industrial Plants
- Quality, Safety and Environment Integrated Management in term of standards and regulations
- Environmental Impact Evaluation
- Introduction on Fire Safety and Explosion Risk for Industrial Plants. Risk Analysis for Fires and Explosions: methods, documents and classification
- Safety Concept. Innovative Engineering Solutions forn Fire and Explosions in Industrial Plants. Combination of Explosion/Fire Risks
- Fire Safety and Explosion Simulation
- Actions: organization, prevention, protection and mitigation solutions
- EXPLOSAD (Experience on Process Plant Safety Design): Case Study based on Simulation applied to fire and explosion protection applied to an industrial plant



### Safety & Risk

General Safety concepts related to Industrial Plants Life Cycle (accident pyramid, cause effect analysis, risk analysis, training and information, BBS, main indexes and matrixes, organization)
- Specific safety characteristics on Process Plants
- General Risks on Industrial Plants
- Methodologies and behavioral aspects related to safety and risks to be considered in plant design and construction
- Behavioral aspects influence on accident frequency
- Safety Design
- Quantitative and Qualitative methods to support risk evaluation and management
- Introduction to integrated safety and risk evaluation systems
- Case Study on Safety Integrated Solutions
- Introduction to SBRA Methodology
- Exercise: application of SBRA (Scenario Based Risk Assessment) Methodology on a Construction Yard
- Case Study Resolution on the Construction and Debriefing on SBRA (Scenario Based Risk Assessment) application
- Introduction to Industrial Plant Service impact on Safety along Plant Life Cycle: Availability and indexes, Alternative Approaches, EOH, Impact of Engineering on Service and Safety, Service Inventory, Consistency and Optimization of Inspection and Revision Policies
- Service for Complex Industrial Plants

*Each Operative Module includes a knowledge assessment and the attendees successfully completing each single Module receive a certificate from Genoa University. The Educational Material specific of the course is provided to each attendee*

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# Project Management

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## *Operative Module of MIPET*

**Industrial Plant Engineering & Technologies**

## Objectives

***Project Management Module*** presents critical aspects related to Industrial Plant PM and provides basic concepts and methodologies in Project Management. The course provides knowledge for facing issues in Project Organization, Risk Management, Cost and Time Management, Planning & Control, Quality, HR and Communications

## Course Attendees

***Project Management Module*** is designed for young engineers, technicians and professionals intended to operate as Project Engineers in complex Industrial Plants projects;

## Structure and Approach

This modules is organized as a 35 hours course to be completed in 5 days by interactive sessions with experts coming from Industry and R&D. The approach includes lecturing, case studies, exercises, experiences, RPG, competitive and cooperative simulations

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# Construction

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## *Operative Module of MIPET*

**Industrial Plant Engineering & Technologies**

## Objectives

***Construction Module*** presents critical aspects related to Constructions in Industrial Plant and provides basic concepts and case studies as methodologies. The course provides knowledge for facing issues in Site Management, Erection Planning, Cost and Time Control, Safety and Risks during erection and commissioning.

## Course Attendees

***Construction Module*** is designed for young engineers, technicians and professionals active in Industrial Plants and dealing with Construction issues, enabling them to understand and make use of the key tools for the control and the management of the construction stage of an Industrial Plant.

## Structure and Approach

This modules is organized as a 35 hours course to be completed in 5 days by interactive sessions with experts coming from Industry and R&D. The approach includes lecturing, case studies, exercises, experiences, RPG, competitive and cooperative simulations

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## MIPET Operative Modules

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### Project Management

- Project Management and specific issues related to Industrial Plants
- Project Life Cycles
- Reporting & Metrics for Project Management: PMB & KPIs
- Cost and Time Management, Techniques and Methodologies for supporting planning and control
- Risk Analysis & Risk Management: Risk Source Identification, Quantification, Decisional Trees, Statistical Methods and Simulation
- Communications: Technological Solutions, Information Distribution Policies
- HR in Project Management, organizational planning, People Management
- Quality Management: methods, constraints and critical issues in Industrial Plants
- Project Management Networks and Certification Processes
- Coordination Engineering, Purchasing, Erection, Commissioning
- PM Certification, Societies and International Overview
- Role Play Game: Celebes (Cooperative Engineering Plant, Project Business Exercise and Simulation), work to be completed by coordinated teams concurrently working on a complex industrial plant under coordination of real Project Managers and operating on a distributed simulation

### Construction

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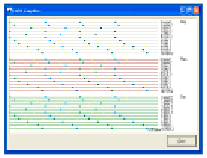
- Construction of Industrial Plants
- Industrial Plant Construction from Project Start, Precommissioning, Commissioning, Closing
- Case Studies on Project Logistics in National International Frameworks
- Interaction between Engineering and Purchasing
- Case Study on Engineering Purchasing interactions
- Managing Construction Projects on Site
- Case Studies on Construction Yard Management
- Planning and Control on Site Construction
- Case Study on Construction Yard Activities
- Safety on Erections, Heavy Transport and Heavy Lifting during Construction
- Babel Experience: competition between two teams each one divided between Site and Office on a Construction Project; the experience is devoted to outline the critical issues related to coordination/cooperation between engineering and constructions as well as aspects related to communication, human resource management and project documentation



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# MASTER: FACULTY & LABS

**The Master Teachers are an effective mix of Academic and Industrial Experts**

- **Genoa University Professors**
- **Italian Top-Quality University Faculty**
- **International Teachers and Experts**
- **Company Experts**
- **Professional Experts from Institutes and Organizations**

**All the Sponsor Companies of this Master Program have the possibility of being actively involved in Lecturing, driving Project Works, providing Case Studies, developing Class Exercises and offering Internships & Project Works.**

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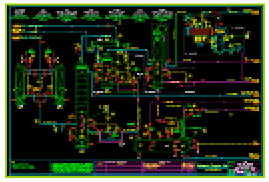
# ORGANIZATION

This Master is coordinated by a Technical Scientific Committee composed by the following members:

- **Agostino Bruzzone** (Full Professor Industrial Plants, DIME)
- **Carla Gambaro** (Professor Technologies)
- **Pietro Giribone** (Full Professor Industrial Plants, DIME)
- **Aleramo Lucifredi** (Full Professor Applied Mechanics, DIME)
- **Giancarlo Parodi** (Full Professor Electronics Engineering, DIBE)
- **Andrea Reverberi** (Professor Chemical Processes, DICHEP)
- **Luca Tagliafico** (Full Professor Thermo-Energy, DIME)
- **Flavio Tonelli** (Professor Industrial Plants, DIME)
- **Alberto Tremori** (Simulation Team)
- **Maurizio Barabino** (ABB Italia)
- **Alessandro Donetti** (Danieli Centro Combustion)
- **Piergiorgio Fontana** (Paul Wurth Italia)
- **Giorgio Migliorini** (Fisia Italimpianti)
- **Carlo Raggio** (Tenova)
- **Massimo Romairone** (Bombardier)
- **Stefano Sadowski** (Projenia)



The Master Support Services are provided by:

–PERFORM - Service for Continuous and Professional Education, Genoa University

–Simulation Team MISS DIPTEM University of Genoa

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# SPONSOR COMPANIES

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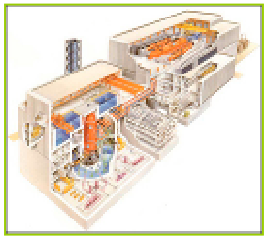
## BENEFITS FOR SPONSORS

- Active role in selection processes of Master Candidates
- Opportunity for deep evaluation and selection of Master Attendees during Selection, Educational Modules, Internship and Project Work
- Opportunity to register in the Operative Modules their Engineers already employed in the Company for improving their skills
- Sharing High Quality Education Costs
- Cultural Interaction among the different Actors of this initiative:
  Industrial Companies, University and Local Institutions.
- Joint University-Industry stimulation of interest and research projects on subjects related to plant engineering.
- Development of a Fertile Background in Industrial Plant, Global Engineering and Construction devoted to enhance the competitiveness of the whole system.



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# MIPET & INDUSTRIES

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## HOW A COMPANY BECOMES SPONSOR OF MIPET

- Subscribing an Agreement that includes an annual fee and the commitment to provide resources (i.e. 15 hours of experts for specific contributions to educational modules to be developed under Technical Scientific Committee Coordination).
- Providing information about its requirements and preferences with respect to the characteristics of Master Attendees to be selected.
- Registering its employees to specific Operative Modules
- Offering Internships to Master Program Students
- Providing Expertise as well as Real Case Studies


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# MIPET STRONGHOLDS

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Also for the forthcoming edition, excellence continues to be the main goal of MIPET. In view of this, the partners have agreed to strengthen the following aspects:

- ***Strong commitment of all Partners in promoting MIPET at the National and the International level.***
- ***Internationalize the MIPET structure involving teachers from foreign Excellence Centers and hiring students from other Countries.***
- ***Introducing new contents, especially through the Operative Modules, related to the management of international projects.***

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# MIPET 2011/2012

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## AS STEP FORWARD FOR MIPET

The ongoing cooperation among partners and sponsors aims at introducing new features capable to bring MIPET to a top quality level. For the 2011/2012 edition, improvements already defined are the following:

- Lectures given in English
- Language Course for Attendees (English plus other optional Courses)
- Issuing of a Reference Book of MIPET
- High Involvement of Foreign Students (i.e. India, Brazil)
- Agreements with International Schools active in Plant Engineering and Technologies for Exchanging Trainers and Students

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# References

***www.itim.unige.it/mipet***

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