

PerForm - Centro di Formazione Permanente dell'Università degli Studi di Genova



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#### WHAT IS

The Master in Industrial Plants, Engineering and Technologies (MIPET) is a oneyear degree program organized in Genoa University focusing on preparing new generations of top quality technical experts for process engineering and power equipment supplier as well as construction contractor

Its main aim it is to satisfy the expectation from Leading Industries in term of high technical skills and excellence capabilities in Industrial Plants and Engineering. The Master Program is directed by Faculty of Engineering in strong cooperation with leader industries and major companies operating in these industrial sectors, this aspect guarantees the relevance and effectiveness of the initiative.

In fact this project it is part of a large initiative devoted to develop excellence in Industrial Plants and Engineering through the synergy between the expertise of Genoa University Engineering Faculty and Top Level Companies with long

traditions that are leading this Area Nationally and Internationally in term of turnovers, size, processes and products complexity as well as know how and technical skills.







## **MASTER OUTCOME**

This Master is devoted to create System and Process Engineers, Technical Coordinators operating effectively in Project Teams in Global Engineering and Construction. This Master provides deep technical skills in Industrial Plants as well as the capability to get the whole overview on the project and its technical aspects along the whole project phases: Offering, Engineering, Purchasing, Construction and Erection and Commissioning.

At the completion of the Master Program students develop transversal capabilities in all the critical areas (mechanics, high power, electronics, automation, computation, management, security and safety, materials, processes and components) combined with their specialization expertise in specific Plant Sectors (i.e. Power Equipment, Iron & Steel) as well as with the Company Internship Experiences











- Young Engineers with strong technical background (5 years degree, Bachelor and Master)
- Engineers interested in attending specific thematic educational modules of the Master Program that are already working in Companies involved in Construction and Engineering of Industrial Plant and related sectors













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Prof. Agostino Bruzzone

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## WHAT KIND OF BENEFITS FOR YOUNG ENGINEERS

- High Profile Professional Educational devoted to provide High Value Skills in Industrial Plants, Engineering and Technologies
- Continuous Interaction with Top Quality Experts from Academia, Industry and Institutions and Societies leading Industrial Plants
- Very Qualified Selection and Evaluation Processes that guarantees 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 Companies leading Industrial Plants, Engineering and Technology at National and International Level
- Developing Human Potential of the attendees by developments and improvements in Individual and Team Working capabilities



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## **Master in Industrial Plants, Engineering and Technologies**

## **INVESTEVEMENTS, SELECTION & PLACEMENT**



- This Master is based on explicit cooperation among the sponsoring companies and the University of Genoa, in fact the Industrial Sponsors have fully financed the edition of 2010 without any public funding confirming their firm interest in this initiative
- To attend this Master is requested to pass a selection process where experts in term of industrial plant engineers as well as human resource resource: the Genoa University and the Industries have provided resources to support this process to select candidates with good potential (i.e. in 2010, 120 applications, 60 selected interviews, 15 master attendance selected)
- The internship developed within the Master are based on group and individual meetings between sponsor companies and candidates as well as orientation meeting leading to an effective and efficient process in term mutual satisfaction; the job placements are very good both in terms of quality and statistics

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## **GENERAL PROGRAM**

The Master in Industrial Plants includes:

- Base Modules for Industrial Plants, Construction and Engineering (i.e. Plant Automation)
- Operative Modules on Critical Issues for Industrial Plants (i.e. Standards and Regulations, Project Management)
- Thematic Modules on Specific Plant Sectors (i.e. Power or Steel)
- Company Internships devoted to acquired direct experience on the field with real projects
- Tours in Industrial Plants and Engineering Centers and Labs.
- Testing for Certifying Individual Skills and Capabilities acquired by the attendees on each topic
- Professional Modules, integrated in the Master Program, but open for being attended as stand alone courses, including individual and team Projects Works to be carried out in competition/cooperation interacting with experts





## **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 outside to personnel already in service in Industry or as 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 others are active the following modules:

- Standards and Regulations Module
- Construction Module
- Project Management
- Safety & Security Module





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



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# Standards & Regulations

#### Operative Module of MIPET



**Industrial Plants, Engineering & Technologies** 

#### Objectives

**Standards & Regulations Module** is devoted to present in organic shape the situation as well as trends in this sector for Industrial plants; the course provides knowledge for supporting problem solving for companies facing issues on regulations, policies and standards in National and International industrial plant projects

#### **Course Attendees**

*Standards & Regulations Module* is designed for young engineers, technicians and professionals active in Industrial Plants and interested to related standards, regulations and policies issues; special focus is devoted to face themes including environmental issues, quality, safety for Industrial Plants

#### Structure and Approach

This modules is organized as 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 & Security -

Operative Module of MIPET



**Industrial Plants, Engineering & Technologies** 

#### **Objectives**

**Safety and Security Module** is devoted to present methodologies, techniques and technologies related to this subject within Industrial Plants; the course provides knowledge for supporting the design and engineering related tosafety and security issues for Industrial Plants

#### **Course Attendees**

Safety and Security Module is designed for young engineers, technicians and professionals active in Industrial Plants and interested to safety and security in Industrial Plants and its evolution; the course is special focusing on techniques, methods and technologies for supporting Industrial Plant in term of Safety and Security

#### Structure and Approach

This modules is organized as 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





## **Standards & Regulations**

#### Sponsors



DANIELI CENTRO COMBUSTION

Duferco

Engineering

IRIDE

PAUL WURTH

PMS

projenia

tenova

FAGIOLI

BOMBARDIER

- 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 & Security

- 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 Security on Industrial Plants
- Methodologies and behavioral aspects related to safety and security 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 security 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

Operative Module of MIPET



**Industrial Plants, Engineering & Technologies** 

## **Course Attendees**

**Project Management Module** is designed for young engineers, technicians and professionals interested to operate as Project Team in complex Industrial Plants projects; the course provides a complete overview of the industrial plant projects and PM evolution in the sector; the course presents tools and methodologies for being effective in PM applied to the industrial plants

#### **Objectives**

**Project Management Module** presents critical aspects related to Industrial Plant PM and proceeds by providing basic concepts and methodologies in Project Management; the course provides knowledge for supporting the problem solving for Companies active in Industrial Plants facing issues in PM, Risk Management, Project Costs and Time Management, Planning & Control, Quality, HR and Communications

#### Structure and Approach

This modules is organized as 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 PerForm Centro di Formazione Legistati Permanente Facoltà di Ingegneria Università degli Studi di Genova

# Construction –

Operative Module of MIPET



**Industrial Plants, Engineering & Technologies** 

#### Objectives

**Construction Module** presents critical aspects related to Constructions in Industrial Plant and proceeds by providing basic concepts and case studies as as methodologies; the course provides knowledge for supporting the problem solving for Companies active in Construction and Engineering

#### **Course Attendees**

**Construction Module** is designed for young engineers, technicians and professionals active in Industrial Plants and interested in Construction Issues; the course is special focusing on case studies, techniques, methods and technologies for supporting Constructions in Industrial Plants

#### Structure and Approach

This modules is organized as 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



## **Project Management**

Sponsors	<ul> <li>Project Management and specific issues related to</li> </ul>		• (
ABB Constitution A Intercented Company	Industrial Plants <ul> <li>Project Life Cycles</li> <li>Reporting &amp; Metrics for Project Management: PMB &amp; KPIs</li> </ul>		•    F • (
BOMBARDIER © DANIEU CENTRO COMBUSTION Duferce Engineering	<ul> <li>Cost and Time Management, Techniques and Methodologies for supporting planning and control</li> <li>Risk Analysis &amp; Risk Management: Risk Source Identification, Quantification, Decisional Trees, Statistical Methods and Simulation</li> </ul>		•    • () • N • () • F
🧟 FAGioli	<ul> <li>Communications: Technological Solutions, Information Distribution Policies</li> </ul>		• (
IRIDE	<ul> <li>HR in Project Management, organizational planning, People Management</li> </ul>		• E
PAUL WURTH	<ul> <li>Quality Management: methods, constraints and critical issues in Industrial Plants</li> <li>Project Management Networks and Certification</li> </ul>		C F is
tenova	Processes Coordination Engineering, Purchasing, Erection, Commissioning PM Cortification Societies and International Overview		e te p
	<ul> <li>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</li> </ul>		
	Each Operative Module includes a knowledge assessment and the certificate from Genoa University. The Educational Material specific	he a of th	itten ne co

## Construction

- Construction in Industrial Plants
- Industrial Plant Construction from Project Start. Precommissioning, Commissioning, Closing
- Case Studies on Project Logistics in National nternational 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 o communication, human resource management and project documentation



dees successfully completing each single Module receive a ourse is provided to each attendee

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# FACULTY

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 to being actively involved in Lecturing, driving Project Works, providing Case Studies and developing Class Exercises.





## **MASTER ORGANIZATION**

This Master is coordinated by a Technical Scientific Committee :

- Agostino Bruzzone (Full Professor Industrial Plants, DIPTEM)
- Pietro Giribone (Full Professor Industrial Plants, DIPTEM)
- Giancarlo Parodi (Full Professor Electronics Engineering, DIBE)
- Luca Tagliafico (Full Professor ThermoEnergy, DIPTEM)
- Flavio Tonelli (Professor Industrial Plants, DIPTEM)
- Alberto Tremori (DIPTEM)
- Paolo Cremonini (FAGIOLI)
- Piergiorgio Fontana (Paul Wurth Italia)
- Carlo Raggio (TENOVA)
- Stefano Sadowski (Projenia)
- Raffaele Traverso (ANSALDO Energia)
- The Master Support Services are provided by:
  - -PERFORM Center for Continuous and Professional Education, Genoa University
  - -Simulation Team MISS DIPTEM University of Genoa

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## **BENEFITS FOR SPONSOR COMPANIES**

- Active role in selection processes of Master Candidates
- Opportunity for deep evaluation and selection of Master Attendees during Selection, Educational Modules and Internship
- Opportunity to involve in the Operative Modules engineers already employed in the Company for improving their skills
- Sharing High Quality Education Costs
- Cultural Interacting with other Actors of this Initiative
- Interaction with other Companies and Institutions active in Industrial Plants
- Promotion of Joint Initiative on Industrial Plants with University Active Subject both in term of Education and R&D
- Development of a Fertile Background in Industrial Plant, Global Engineering and Construction devoted to support competitiveness







## HOW A COMPANY BECOME PART OF THE MIPET

- Subscribing a Memorandum of Understanding 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 Techncial Scientific Committee Coordination)
- Providing information about specific requirements and preferences respect Master Attendees characteristics and Selected Individuals
- Registering Employees and Engineers to specific
   Operative Modules
- Offering Internships to Master Attendees during the Program
- Providing expertise as well as industrial plant case studies







## **INDUSTRIAL PLANT INITIATIVE FURTHER DEVELOPMENTS**

- This initiative is based on its capability to attract young engineers with high potential as well as in creating a sustainable framework through partnership Academia Industry; due to these reasons among further developments are included:
  - Strong commitment of Genoa University, Industries and Institutional Agencies for promoting the MIPET and for emphasizing its impact
  - Full International Approach as further improvement of the Master both in term of faculty and attendees based on contacts with Excellence Centers (i.e. Georgia Tech, Masdar IST, Beijing UAA, MIT)
  - Introduction of new themes characterized by high value for the sector (i.e.Standards & Regulations, Project Management, Safety, etc) both in term of benefits to the Master Program and to the Industrial and Professional Development







## 2011 IS ALREADY HERE AS STEP FORWARD FOR MIPET

The Industrial Plant cooperation among the partners and sponsors is devoted to create a new framework to develop in joint cooperation initiatives for Industrial Plants able to improve Industries, Institutions, R&D Centers under the coordination of Engineering Faculty of Genoa University, for 2011 improvements are already setup in term of:

Master in Industrial Plants, Engineering and Technology 2011:

- English Lectures
- Educational Material in English
- Reference Book for Industrial Plant and Master
- Involvement of Foreigners Students
- International MoU for Exchanging Faculty and Students with International Universities active in Industrial Plants, Engineering and Technologies
- Courses in other Languages for Fast Developing Areas (i.e. Portuguese, Spanish)

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### REFERENCES







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