

COOPERATION IN SCIENCE AND TECHNOLOGY BETWEEN ITALY AND KOREA

: OPPORTUNITIES IN ENGINEERING AND ARCHITECTURE



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Not many people in Korea, even if involved at institutional levels, are aware that relationships between Italy and Korea are extremely good and regard many issues, particularly as far as regard culture, business and science. About science and technology, cooperation is improving slowly but with a positive trend and, worth to mention, with a continuous action looking forward to upcoming and excellent initiatives.

At the moment four joint labs are on duties: Photonics since 2004 (SSSA-KIST), Biorobotics since September 2007 (SSSA-KIST), Fuel cells since June 2009 (ENEA-KIST), and Chemistry of Membranes since June 2011 (CNR-ITM-Hanyang University).

The cooperation with some excellent Italian research groups is well established and it is highly supported by South Korea within the frame of international collaboration. A few examples among several: Scuola Superiore Sant'Anna di Pisa (Robotics, ICT, materials), University "La Sapienza" (Fisics)/ICRA (Relativistic astrophysics), CNR/University of Calabria (Membrane technologies), CNR/Naples (Biomaterials and composites), University of Milan (Food chemistry) and ENEA (Fuel Cells, Environmental technologies).

The "X Executive Programme of scientific and

technological cooperation between Italy and Korea for 2013-2015" represents the framework to which refer our activities, as well as a further opportunity to establish and strength the bilateral collaboration based on the innovative issues addressed by the same document. On this regard "Projects of the highest significance" have always represented an excellent opportunity for collaboration, beside having a strong role in determining new bilateral activities.

The topics that have been selected as considered of primary importance for Italy and Korea in the years 2013-2015 are:

- ✓ Agriculture and Food Science (AFS)
- ✓ Basic Sciences (BAS)
- ✓ Biotechnologies and Health (BTH)
- ✓ Energy and Environment (EE)
- ✓ Information and Communication Technologies (ICT)
- ✓ Nanosciences and Advanced Materials (NSAM)
- ✓ Robotic and Automotive (RA)
- ✓ Space (SPA)
- ✓ Technologies Applied to Cultural and Natural Heritage (TACH)

On these issues the S&T Office of the Scientific Attache' will continue in 2014 to support and supervise bilateral exchanges, agreements and

joint projects. Such a work will mainly address basic sciences, as well as innovative S&T research activities that potentially could lead to significant economical and industrial advantages for both Countries.

This strategy follows the widely accepted idea that collaboration instead of competition is the best strategy to achieve best results throughout optimization and synergy of human and financial resources, an unthinkable way until a few years ago. By this approach it might be possible to reach effective and remarkable targets even within either mid- or long-terms, including the periods of financial crisis.

An “Agreement between the Governments of Italian Republic and Korean Republic as far as regard Scientific and technological cooperation” was signed in Italy on February 2007, during the visit of the Korean president Roh Moo-Hyun. Such a document has been later remarked during the “III S&T Forum Italy-Korea” that was held in Seoul on April 2007, opened by the Italian Prime Minister Hon. Romano Prodi, and finally validated by the Italian Government on July 20th 2012.

During 2014 quite a concern will be devoted, as illustrated in the S&T proposal of activities submitted to the Italian Ministry of Foreign Affairs, to novel and specific issues that 1) have already involved a preliminary collaboration between Italy and Korea, and 2) show good chances to be part of joint projects already next year:

- √ Energy
- √ Innovative materials
- √ Traditional food and benefits for human health
- √ Polar environments
- √ Marine sciences and technologies
- √ Biotechnology
- √ Space technologies for ICT

√ S&T in maritime navy

During the same period specific activities to support and promote research and industrial activities at the institutional level will be performed. Such a mission are going to be carried out in an independent manner but also according to the inputs received by Italian and Korean S&T entities, aiming to establish bilateral cooperation.

If we refer mainly to engineering and architecture opportunities for cooperation between Italy and Korea, with no doubts excellent Italian skills and talented people can be found looking back from ancient times until nowadays. Too many examples might easily be reported but, as far as regard the present situation, the best way to show how engineering and convergence sciences are developed in Italy is enough to mention that more than 50% of the International Space Station was built in Italy, by ThalesAneniaSpace in Torino. Such an achievement really represents one of the best example of multidisciplinary, putting together engineering, architecture, design, biology, psychology, and medicine.

At Academic level many are the opportunities to establish agreements and bilateral activities between Italy and Korea. I will report here just a few examples of academic programmes in engineering that are presently offered by four excellent universities: Polytechnic of Milano, Polytechnic of Torino, University La Sapienza of Roma, and University of Genova.

Mechanical engineering is one of the broadest areas of study in engineering: mechanical engineers are employed in significant percentages in almost all industrial and governmental organizations; the spectrum of activities in which they are engaged continues to expand. The wide variety of tasks a mechanical engineer has to fulfill and the huge number of competences involved calls for a strong training in research and

design, as well as construction and installation of machineries, altogether with the related services. The educational programme of Polytechnic of Milano is strongly focused on technical training in the key areas of mechanics, thus allowing a rapid adaptation to the widest professional requirements. The programme foresees the following specializations: Mechanical Systems Design and Industrial Production.

The MSc graduate in mechanical engineering can work in manifold industrial sectors: notably, he is trained in developing and designing mechanical systems with regard to the functional, structural and energetic standpoints. Further opportunities are also offered by the manufacturing industry for what concerns design and production, the development of new technologies, measurement techniques and the choice of the most appropriate materials. Besides the above-mentioned sectors, the graduate in mechanical engineering can also be employed in public administration and research institutes.

The Department of Mechanical and Aerospace Engineering (DIMEAS) is the point of reference in Polytechnic of Torino for the areas of knowledge that regard a broad spectrum of manufacturing activities that are typically associated with an advanced industrial society. These activities cover classical and cutting-edge domains in the mechanical and aerospace fields. DIMEAS promotes, coordinates and manages basic and applied research, training, technology transfer and services to the local community regarding the automotive, aeronautical (fixed and rotary wing), rail, food and agricultural, textile and industrial plant sectors, which span the cutting-edge fields of space exploration, system engineering, new materials, micro- and nano-technologies, environmentally-friendly vehicles and aircraft, and biomedical engineering.

The Faculty of Civil and Industrial Engineering of the University La Sapienza in Roma has a long tradition of teaching and researching. It has also an international reputation for excellence and strong relations with industrial partners. The Faculty is located in the historic center of Roma, directly overlooking the Coliseum and next to the ancient Basilica of San Pietro in Vincoli, home to Michelangelo's statue of Moses.

The Faculty is also present on modern campuses in Latina and Rieti. Today the Faculty continues its long academic tradition of providing students with a strong scientific grounding in core subjects. It also offers an innovative syllabus with solid foundations in a wide variety of sub-disciplines and focuses on the sustainability of both the natural and built environments.

Its undergraduates gain vital professional skills that can be employed in both the domestic and increasingly globalized job markets. Some of the courses on offer include: Civil and Environmental Engineering, Aerospace and Mechanical Engineering, Conservation and Restoration Engineering, Chemical and Materials Engineering, Management and Security Engineering, Building Engineering and Architecture and other innovative programmes that provide students with the opportunity to explore new topics in the field of renewable energy sources and power plants, nanotechnology, transportation and bioengineering.

Civil and Industrial Engineering's graduates influence the future through innovative design and construction of new infrastructure in Italy and around the world. The Faculty also organizes the State Exams of Accreditation that is legally required in order to practice the engineering profession in Italy.

A special mention deserves the last example because this is a very unique academic initiative and regards naval architecture and engineering, a

topic strongly link to an important business sector on which also Korea has largely invested during the last decades.

University of Genoa is a State University with a Faculty of Engineering where 4,500 students are enrolled. Within the faculty of Engineering there is the Department of Naval Architecture, the old “Naval School”, founded in 1870 by the Royal Italian Navy, from which the Faculty of Engineering of Genoa was then established.

In 1990 the Faculty of Engineering and the Faculty of Architecture founded the first Italian School for Pleasure Craft Design. Planned as University Diploma School, it was the first core of the University of Genoa detachment at La Spezia.

The school was supported by the joined engagement of “Comune of La Spezia”, Provincial Administration, Chamber of Commerce, Industrial Association and Fondazione della Cassa di Risparmio of La Spezia. Later the supporting group set up the Promostudy Company. Promostudy ? Polo Universitario of La Spezia, born in 2002, is a meaningful example of public-private mixed reality, aiming to create in La Spezia an University reality which would qualify itself at the excellence level with respect to the economic and production requirement of the territory.

In few years of activity, the Polo Universitario of La Spezia was distinguished for a significant growth, becoming an attraction and reference point for a high number of students coming from the whole national territory and from abroad as well. A particular attention is given to the development and implementation of research projects achieved in cooperation with important local industries working in the naval and nautical field.

In 2000 the Italian University reformed and the School of La Spezia became a first level degree

course in “Naval Architecture for Pleasure Craft”. In the academic year 2005/06, the University of Genoa started the “Naval Architecture for Pleasure Craft Second Level Degree”.

The professional tasks of the pleasure craft engineer require a cultural and technical knowledge that involves several and different fields. The courses that are offered include both some basic topics in common with other similar courses of study in engineering field and some specific topics for nautical and naval applications as described in the following main groups:

- Naval Architecture dealing with hydrostatics (hull geometry, buoyancy and stability) and hydrodynamics (ship resistance, propulsion and sea-keeping).
- Ship Structures, focused on the structural definition of the hull (loads, structural dimensioning and strength) and production methodologies;
- Plants and Services onboard ships including the propulsion plant (engine, shaft lines, propellers), the hull service plants and the ship specific and auxiliary plants;
- Composition and Design dealing with the criteria for space distribution on board, ergonomics and aesthetics of the boat from a general point of view and with special care for each element or detail.

The last group originates from specific demand from the nautical environment which is very customer oriented in the choice of boat outfitting. That is why Design is not included among the “Naval Architecture and Marine Engineering” units, but it is a unique feature characterizing the Pleasure Craft and Nautical Engineering Degree Courses.