

## 50 Years of the Institute of Hydro-Engineering in Gdańsk

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The Institute of Hydro-Engineering was established in 1953 and this year will celebrate the 50th anniversary of its foundation. The founder of the Institute and first director was Prof. Romuald Cebertowicz, future member of the Polish Academy of Sciences. The Institute was established on the basis of Gdańsk University of Technology Hydraulics Institute. The development of the Institute of Hydro-Engineering, as an establishment of the Polish Academy of Sciences, arose from Poland's needs for fundamental and applied research in the field of water resources management, inland and maritime hydraulics, as well as soil mechanics and foundation engineering.

The building of the Institute was financed from the state budget. Initially, the Institute worked in close co-operation with the Faculty of Hydraulic Engineering of Gdańsk University of Technology. The scientific activities of the Institute are based on the methods of applied mechanics and mathematics, both analytical and numerical, as well as methods which are specific for particular problems. Classical methods of hydromechanics, hydraulics and geomechanics were adapted for standard investigations, and some new and original methods developed. Theoretical studies are supplemented with extensive laboratory and field investigations. In the hydraulics laboratory, numerous model studies of hydraulic projects designed and developed in Poland and abroad (Iraq, Libya) were carried out. They concerned inland water, maritime, soil mechanics and foundation projects, as well as groundwater problems.

Many fundamental studies in hydraulics and foundation engineering were completed and presented as theses for doctorate degree in technical sciences. The scientific and engineering staff of the Institute developed rapidly and after 10 years of existence reached more than 200 persons.

Subsequent directors of the Institute were:

Prof. Witold Tubielewicz	1957–1960,
Prof. Stanisław Hueckel	1960–1974,
Prof. Piotr Wilde	1974–1986,
Prof. Stanisław Massel	1986–1991,

Prof. Andrzej Sawicki	1991–1997,
Prof. Piotr Wilde	1997–2000,
Prof. Wojciech Majewski	2000–

The important moment in the activity of the Institute in 1969 was the development of a large open-air hydraulics laboratory in Gdańsk-Oliwa, which was necessary for hydraulic model studies of the newly designed North Harbour (new harbour in Gdańsk) and Świna Strait. Numerous hydraulic studies, both fundamental and applied, were conducted later using these facilities.

In 1970, the Institute moved to new premises located in Gdańsk Oliwa close to the open-air hydraulics laboratory. In 1970 the Coastal Research Station (CRS) Lubiатовo was also developed and commissioned. Its main interests were in situ measurements of waves, currents, sediment transport and changes of the coastline. CRS organized numerous international field expeditions.

During the 50 years of its existence, the Institute awarded 98 degrees of doctor of technical sciences. 19 members of the Institute's scientific staff received the degree of habilitated doctor, and 12 the title of professor. Four members of the scientific staff received the title of Correspondent Member of the Polish Academy of Sciences and subsequently the title of Ordinary Member.

### **Present Research Activities**

The Institute's research activities changed with time and now cover basic and applied problems related to inland and maritime hydro-engineering, geotechnics and geomechanics, as well as other disciplines connected with environmental engineering. The subjects and research issues arise from the problems which are on the contact between the natural environment and human activities, which are important for sustainable development.

At present, research is carried out in five Departments:

- The Department of Wave Mechanics and Structural Dynamics,
- The Department of Hydrodynamics of Rivers, Reservoirs and Estuaries,
- The Department of Coastal Engineering and Dynamics,
- The Department of Geotechnics,
- The Department of Geomechanics.

The Institute now employs 63 persons, including 35 scientific staff (5 professors, 6 docents, 17 doctors, and 7 research assistants). The Institute has an ample scientific library with numerous textbooks, international and Polish technical journals. It also has very well equipped soil mechanics laboratories with modern measuring and recording apparatus. In a separate building there is a new 64 m long wave flume equipped with very good measuring and recording apparatus.

For 22 years the Institute has organized, together with the Committee for Water Resources Management of the Polish Academy of Sciences, National School of Hydraulics for 40 to 50 persons, which included one week lectures, seminars and technical study tours. Proceedings of each School are published by the Institute.

The Institute organized two international conferences:

- Coastal Dynamics '95: International Conference on Coastal Research in Terms of Large Scale Experiments, Gdańsk 1995,
- the XVth International Symposium on Ice, IAHR (International Association of Hydraulic Engineering and Research) Gdańsk 2000.

The Institute publishes quarterly journal *Archives of Hydro-Engineering and Environmental Mechanics* as well as monographs and habilitation dissertations.

Apart from statutory research funded by the Ministry of Science and Information, the Institute participates in several EU projects. These are:

ALARM – Assessment of landslide mitigation in engineering and mechanics (2001–2004),

MANTRA EAST – Integrated strategies for the management of transboundary waters of the Eastern European Fringe, Vistula Lagoon (2002–2004),

HUMOR – Extended human integration with large-scale coastal morphological evolution (2002–2004),

LIMAS – Liquefaction around marine structures (2002–2004),

MAXWAVE – Rogue waves, forecast and impact on marine structures (2002–2003).

Centre for Environmental Engineering and Mechanics CEM commenced activities in the Institute in December 2002, and will operate until 2005. The aim of the CEM is the integration with European Research Area and the creating of scientific contacts with other scientific Institutes from Central and Eastern Europe. Conferences, seminars and workshops will be organized.

At present, the Institute carries out several important engineering projects and grants. These are:

- Programme of flood protection of the city Gdańsk. This project is realized by the Institute together with three other collaborating institutions.
- Programme of development of the Vistula mouth with sedimentation cone. Realization of the project is by the Institute together with Design Bureau AQUAPROJECT.
- Extension and modernization of the mathematical model of water circulation in the coastal zone, by supplementing currents generated by additional sources based on analysis and field studies, Grant KBN (Committee for Scientific Research).

- Investigations of a representative landslide process in the Carpathian Flysh; experimental landslide in Beskid Niski, Grant KBN.
- Impact of progressive waves on an elastically supported block, Grant KBN.

### **Concluding Remarks**

Over 50 years the Institute changed its scientific and engineering profile. From a purely technical approach in hydro-engineering, during the first years of activities, now our studies turned more towards environmental problems. Numerous problems are now solved by means of professional computer programs, instead of expensive hydraulic laboratory experiments. Field measurements, however, remain a vital source of data for the verification of computer models.

Despite significant decrease in staff and important economic transformation the Institute has proved to be a valuable and unique research establishment in Poland, in both basic and applied research. For three years the Institute has developed close scientific collaboration with the European Research Area, which constitutes good prognosis for our existence in European Union.