

A SUMMARY OF ACTIVITY IN THE FIELD "HYDROTECHNICS ENGINEERING IN THEORY AND PRACTICE"

OCCASIONED BY CELEBRATING THE 20 YEARS
SINCE THE ESTABLISHMENT OF THE FACULTY OF HYDROTECHNICS
1990-2010

Eugen Teodor Man¹

Ioan David²

Ioan Șumălan³

INTRODUCTION

Timișoara, important administrative, cultural and industrial centre in the West of the Country acquired the quality of "*civitas academica*", gathering the legitimate hopes and efforts made by the most representative scientists of Banat and united Romania since the beginning of the XXth century, with the foundation of the Polytechnic School of Timisoara by Royal Decree no. 4822/11.11.1920.

The hydrotechnical works achieved during the XVIIIth century in the area, and furthermore the remarkable administrative works like industrial development and urban equipment works intensified the social and cultural activities of the town, created the prestige of Timisoara at a national and European level. This is the framework that marked the expansion and development of higher education establishments by the foundation of the Polytechnic School which meant a major achievement by making real the prophecy and the responsible engagement of the first Rector of the Polytechnic School, the great scientist and scholar professor Traian Lalescu concerning the perspectives of this institution: "*The Polytechnic School has a great future*".

1. HYDROTECHNICAL HERITAGE OF BANAT REGION AND TIMISOARA

Even during 1730-1740 there were achieved important hydrotechnical works in the hydrographical basins of the two main rivers in the Plain of Banat: the course of Timis and the course of Beghei or better known at that time as „the two Temes rivers”. The Timis river, from

the South-East and the South, a bigger hydrographical basin and „the Smaller Timis” from the east with smaller hydrographical resources had unstable beds and when there were floods the water mixed up generating an insalubrious marsh area with floods when raining and draught during summer. From Timisoara down the bed of the Beghei river was regulated by two locks and flood gates (two in our country and other such locks and flood gates in Serbia to the Tisa river) and it was then called „the Bega canal” (deriving from „Beghei” which means navigable water course). The Timis river was connected to the Beghei river from Costei to Chizatau to ensure a higher flow in the town of Timisoara during periods of drought. A second connection was established from the Beghei river at Topolovat to the Timis river at Sarbova, and the banks of the Timis river were highly reinforced on the Romanian territory to the Danube on the Serbian land, ensuring safe high flows. Besides navigation, this ingenious system of integral consolidation in double connection Timiș – Bega – Timiș ensures the use of energy to making possible the functioning of hydraulic wheels, agricultural land irrigation during drought periods in higher areas and avoiding floods in down areas of the plain.

Art works of hydrotechnical connections were made first in wood. During 1910-1915 this works were modernised by constructions of reinforced concrete of flood gates, metallic locks, etc. During the same period there were built massive bridges and metallic bridges that were meant to connect the banks of the navigable channel of the town of Timisoara. After 1990, the Timis – Bega double connection was rehabilitated.

The *hydroedilitary systems* achieved between 1910 and 1914 have an economic and social

¹Dean, Faculty of Hydrotechnical Engineering, "Politehnica" University of Timisoara

²Editor in Chief, Scientific Bulletin of "Politehnica" University of Timisoara, Series Hydrotechnics

³Scientific Secretary, Faculty of Hydrotechnical Engineering, "Politehnica" University of Timisoara

extraordinary significance, as the first centralised system of water supply established in 1914 based upon the capture and treatment of groundwater and the transportation and distribution network with two main pipes and two water castles that were interconnected and a capacity of 10,000 m³ / day; the second, the *sewerage system* of the Timisoara city, that was first used in 1912 and was equipped with two main collectors connected to appropriate collecting networks, and the first water purification plant in the country which was the pumping station of waste water and of meteoric water.

2. FIRST STAGE OF HIGHER EDUCATION ON HYDROTECHNICS ENGINEERING

The foundation of the first Polytechnic School in Timisoara in 1920 represented a very significant event not only for our western part of the country but for the whole country. The following quotation taken from the speech of King Ferdinand I made on the inauguration day of the first wings of the Polytechnic School of Timisoara on 11 November 1923: ***"The rich Banat region was reasonably chosen for this very needed school for our industrial more and more important development, as it shall be a centre of hard work, of preparation of the future generations of real pioneers, but also a nest of Romanian thinking and science, a connection between the old kingdom and this region"***.

During 1920-1941, until the foundation of the Department of Constructions (1941) the university centre of Timișoara, the Polytechnic School was made of two departments: the Department of Mines and Metallurgy.

For the subsequent development of the hydrotechnical education within the Polytechnic School the activity of the teaching staff had a major and essential significance, as during this period certain subjects of study related to Hydrotechnics, such as Hydraulics and Hydraulic devices began to be promoted founding indirectly the bases of these fields that were developed afterwards. We shall mention Prof. Pompiliu Nicolau, Prof. Aurel Bârglăzan, Prof. Victor Gheorghiu and their teaching assistants, among whom we mention acad. Ioan Anton, who established the Laboratory of Hydraulics and Hydraulic devices in the 1940s. They also brought prestigious scientific contributions, ensuring the professional training of the students in the fields mentioned above. Being both prestigious academic scholars and skilled scientists, thanks to their collaborations with higher education establishments across the country, they obtained remarkable results in hydraulics. Appreciating the preparation and level of

knowledge of the students and, generally, the research and educational programmes deployed here, Ludwig Prandtl, a famous scientist and scholar in the field of hydraulics at the University of Gottingen, Germany, praised the teaching staff for their great achievements, saying to his companions, while paying a visit to Timisoara: *"Sehen Sie, diese Wunder, hier in Temeswar"*.

The first series of graduating students of the Department of Constructions acquired remarkable speciality knowledge in constructions and hydrotechnical installations. They elaborated projects and papers on major aspects in the field, such as: The hydro-energetic system in Caraș - Severin County, The Bega navigable channel on the Romanian territory, a study on the potential establishment of a navigable channel connecting the Bega and the Mures rivers, sanitary systems of the town of Timisoara, and many others. All these aspects certify the beginning of the hydrotechnical teaching within the Polytechnic School of Timisoara.

In that period, there was a quite significant lack of engineers trained in hydrotechnical field that would be trained for study research and projects and particularly as far as technical execution and exploitation of construction works and hydrotechnical works, hydroedilitary works, improvement works and complex use of water resources and the continuous perspective on hydrotechnical teaching are concerned. The Education reform of 1948 brought many changes as far as organisation and university study programmes are concerned.

In the university centre of Timisoara there were founded 4 higher education institutes: Teaching Institute, Polytechnic Institute, Agronomical Institute and Medicine Institute.

The Polytechnic School became the „Traian Vuia” Polytechnic Institute of Timisoara and coordinated the teaching, technical, scientific and research activity of 4 different departments with 18 specialisations (sections) for future engineers: Department of Mechanics, Department of Electric Engineering, Department of Constructions, Department of Industrial Chemistry.

In 1948 the Hydrotechnical section was founded as part of the 18 specialisations provided by the Polytechnic Institute of Timisoara belonging to the Department of Constructions together with the Civil industrial and agricultural constructions specialisation. In the university year of 1952/53 the Water supply specialisation was established within the Hydrotechnical section. This specialisation functioned until 1956/1957 when the Department of Constructions was reorganised in two sections: Civil, Industrial and Agricultural constructions (CCIA) and Hydrotechnical Installations(CIH). In 1962/1963 the Agricultural Hydrotechnical section was founded (HA). In 1968/69 it became the Land

Reclamation section (IF). Thus was founded the Department of Hydrotechnical Constructions and Land Reclamation (CHIF)".

Since the foundation of the Hydrotechnical section until now, among the teaching staff there have been activated and are still activating prestigious professional academics with remarkable didactic, technical and scientific contributions in training future engineering specialists in hydraulic engineering and water works in Banat and all over the country. We shall be thankful to the academics that, although they are no longer among us, remain with us thanks to their human and professional values in the hydrotechnical school of Timisoara:

We shall also mention that a significant number of the teaching staff members of other departments of the Polytechnic School have had an essential contribution to the general training (mathematics, general culture, and basic technical culture) of students in hydrotechnics, especially during their first years of study.

When the Hydrotechnical department was founded in 1948, its members desired to establish an infrastructure necessary for the deployment of a high professional training of the students and for the sake of a significant scientific activity at the highest level.

In 1951 several members of the teaching staff of the Hydrotechnical department under the supervision of Prof. Pompiliu Nicolau, designed and established the hydrotechnical study and research Laboratory. The main construction and equipment works related to this laboratory took place between 1953-1956 covering a surface of about 5,000 m², mainly by autoequipment thanks to the students' participation. Part of the hydraulic circuits were meant to function in open space: main channel (trapezoidal), study basin (hydrodynamic similar aspects), transversal – rectangular channel, aspiration basin capture, distribution basin, lock stand, experimenting flood gate, under-pressure pipes, reversing stand, pumping station (about 1.000 l/s), etc. This study and research base has been expanded since its foundation. The main expansion works have been the following: establishment of a semi-industrial water supply laboratory (1961-1963), replacement of the old building of the laboratory in 1969 (establishment in the building of an ex-sports club), with a two floored new building (641 m² deployed surface) sheltering now a series of experimenting stands modernised and renewed and used in the study of Hydraulics, Water supply, Canalisations, Hydrotechnical buildings and Hydrology;

- establishment of the Land Improvement Department in Timisoara 32, Aleea Ghiroda (1974);

- establishment of a 220 kW pumping station in 1975 for the supply of the external circuits of the laboratory
- building and equipment of a hydraulic modelling hall with a surface of about 1.200 m² and a flow of about 1 m³/s, in 1980.

As far as the Agricultural Hydrotechnics and Land Improvement sections (1968) are concerned, since their inauguration there have been established specialty experimenting stands within the laboratories and units mentioned above. In 1974 the " Land Improvement Polygon" (PIF) was established (Timisoara, 32, Aleea Ghirodei) which had been designed as a specialised study and research unit with buildings having a surface of 705 m², with classrooms, project rooms, laboratories, offices for the teaching staff and the research staff. This unit is now disaffected but can be used by the university.

The students of the Hydrotechnical Constructions and Land Improvement Departments have been trained in these laboratories and study units. They had given a more and more complete and qualitative training. In 2007, the teaching staff of the PIF Department moved to the building unit of the faculty situated at 1A, George Enescu Street, and their related laboratories (soil science, irrigation and drainage) are about to be moved.

The graduates from the hydrotechnical sections in Timisoara have confirmed their high level of preparation and training on great constructions, hydrotechnical installation and land improvement sites all around the country and abroad, contributing thus to the increasing prestige of this school and department they had been trained in.

The fundamentals of the speciality research in hydraulics and hydrotechnics had been established in the Polytechnic School during the first years of hydrotechnical activity. The emeritus Prof. Pompiliu Nicolau, the founder of the hydrotechnical education in Timisoara cultivated and transmitted this tradition and heritage to the teaching staff members of the Hydrotechnical Department he had founded and supported to new achievements by his personal example and the high standard study and research works of the staff members, within their PhD theses, scientific works in theoretical and applied hydraulics published across the years in the Academy Magazines, in the bulletins of the higher education institutes and in specialised magazines from our country and abroad.

The research theme has focused on well oriented directions, having both applying and multi-discipline features:

- mathematical and hydraulic modelling of hydrotechnical systems, calculation and design of hydrotechnical constructions, study and optimisation of complex hydrotechnical works including locks, water ways, port constructions, integral works for water units;
- hydroedilitary works, optimisation of distribution networks, treatment and purification of water, elaboration of several efficient methods for industrial water

treatment, improvement of water filtering procedures, centralised installations of water supply and sewerage in rural areas and agricultural and zootechnical units.

- Improvement of hydrotechnical works, irrigation and drainage systems, measurement and control devices for the improvement of hydrotechnical systems, optimisation of irrigation and drainage systems.

Highly experienced teaching staff members with rich scientific activity, together with young teaching staff members and researchers in production and research institutes engaged themselves in current research studies that have contributed to numerous hydrotechnical and land improvement works across the country, many of which having a nation significance.

In the period mentioned above, research specialised schools were established ensuring for 4 decades, a specialised training in hydrotechnics of the graduates that are highly appreciated for their professional competences, both in our country and abroad.

3. HYDROTECHNICAL EDUCATION WITHIN THE HYDROTECHNICAL DEPARTMENT OF THE "POLITEHNICA" UNIVERSITY OF TIMIȘOARA

The hydrotechnical education of Timisoara entered a new era when the Faculty of Hydrotechnics was founded within the Technical University of Timisoara, in 1990. Prof. Dr. eng. Ioan David was the first elected dean. The Faculty of Hydrotechnics started its activity with 3 departments:

- Department of Hydrotechnical Constructions (CH), head of department: prof. eng. Dr. Gheorghe Popa;
- Department of Real Estate Improvements and Rural Development (IFDR), head of department: prof. eng. Dr. Andrei Wehry;
- Department of Hydraulics and Environment Engineering, head of department: Assoc. Prof. Dr. Eng. Petre Boeriu.

In 1994 Prof. Dr. Eng. Ioan David was detached at the Technical University of Darmstadt, Germany, than the dean position of the Faculty of Hydrotechnical Engineering was occupied by Prof. Dr. Eng. Popa Gheorghe by interim, and in 1996 he was elected until 2000, followed by Prof. Dr. Eng. Ion Michael (2000-2008).

These organising measures established the hydrotechnical education of the western Romania conferring it a prestigious place together with the academic centres of Bucharest and Iași where Faculties of Hydrotechnics had been existing for several years. From a content point of view, an optimal organisation of the teaching capacities and research abilities was established, according to the new needs in

the field of hydrotechnics completed in 1990 with aspects related to Environment Engineering.

In 2007, the teaching staffs of the Departments of Hydrotechnical Constructions, Land Improvement, according to the decision of the Senate of the „Politehnica” University of Timisoara related to the abolishment of departments, joined into the Department of Hydrotechnical Constructions and Land Improvement, coordinated by Prof. Dr. Eng. Man Teodor Eugen, as head of department.

Currently, when we celebrate the 20th anniversary of Hydrotechnical Engineering Faculty in Timisoara, the Faculty is composed of two departments: Department of Hydrotechnical Constructions and Land Improvement (CHIF) coordinated by Assoc. Prof. Dr. Eng. Laura Constantinescu, as head of department and the Department of Hydraulics, Sanitary Engineering and Water Management (HISGA) coordinated by Assoc. Prof. Dr. Eng. Carabeț Adrian. Since 2008, the management of the Faculty of Hydrotechnics has been ensured by:

Dean: Prof. Dr. Eng. Man Teodor Eugen;
Vice-dean: Prof. Dr. Eng. Doandes Victor;
Scientific secretary: Assoc. Prof. Dr. Eng. Sumalan Ioan;
Chief Registrar: Eng. Nutas Gabriela;
Registrar: Morosan Maria;
Administrator: Fechita Gabriela

The training process of specialists is organised on three specialisations (engineers, 4 years) in Civil Engineering: Hydrotechnical Constructions (ACH), Sanitary Engineering and Environment Protection (ISPM), and Land Improvements and Sustainable Development (IFDR).

The master programmes (2 years) are organised in the following fields: Hydrotechnical Systems Optimisation (OSH), Sanitary Engineering Systems Optimisation and Environment Protection (OESISPM), Rural Sustainable Engineering and Rehabilitation. (IRRDR), Environmental Protection Engineering (IPM) and Advanced Technologies for Water Treatment (TATA).

During all this period of about 20 years there have been significant changes concerning the content of the teaching and scientific research activity. The traditional themes have been reoriented and expanded accordingly to the new needs according to the framework conditions established by the integration of Romania to the European Union. Among all these, we shall mention certain major aspects such as the environmental impact of hydrotechnical elements of all kind, assessment of pollution level and technical and engineering measures necessary for water and soil conservation, of ecosystems in general, aspects related to the efficient and appropriate establishment of water supply

systems and sewerage in rural areas, used water purification systems, hydrotechnical and real estate improvement systems for a sustainable developments, major importance works necessary for enforcing the infrastructure of the country. Digital models and modern calculation techniques in all hydrotechnical engineering fields,

Gheorghe CRETU

Ioan DAVID

Cornel JURA

Teodor Eugen MAN

Ion MIREL

Gheorghe POPA

Gheorghe ROGOBETE

CIVIL ENGINEERING (Water management)

CIVIL ENGINEERING (Hydraulics and fluid mechanics)

CIVIL ENGINEERING (Water supply, sewerage)

CIVIL ENGINEERING (Real estate improvements)

CIVIL ENGINEERING (Water supply, sewerage)

CIVIL ENGINEERING (Hydrotechnical constructions)

CIVIL ENGINEERING (Real estate improvements)

These new achievements and trends established during the latest years concerning the education and research development, education planning and curricula restructuring, foundation of new sections have been mainly generated by the changes occurred since 1990 and the European orientation of our country, especially within the Trans-European mobility programmes for higher education (TEMPUS). Our Faculty, by its specialised staff has participated to such programmes:

1. TEMPUS JEP 266/1990; 1990-1994, "Environmental Sound River Basin. Development"

- coordinator UPT – Prof. Dr. Eng. Ioan David;
- partners: Universities of Delft, Karlsruhe, Viena and Budapest;

- achievements: equipment, mobility of teaching staff and students, inter-university conferences.

2. TEMPUS S-JEP 09781/95, 1995-1998, "Gestion et protection de la ressource en eau", coordinator UPT - Prof. Dr. Eng Gheorghe Crețu.

- partners: Universities with similar profile in our country (București, Iași); Universities from France, Italy and Switzerland; specialised Romanian Enterprises (Water Authority, INMH, ICIM, AQUATIM)

- achievements: organisation of post-graduate study schools, specialised books, IT equipment.

3. TEMPUS M-JEM 11341-96: 1996-1999 "WATER MOST", partners: Specialised Universities of our country, Universities from Greece, Italy, Portugal, Austria, France and Belgium.

- achievements: numerous mobility programmes for undergraduate students, PhD students and teaching staff, equipment.

4. TEMPUS JEP 08246-94; 1994-1997 "Training centre for inducing of advanced technology tools in sustainable agriculture"

- coordinator UPT - Prof. Dr. Eng Andrei Wehry;
- partners: Specialised Universities of our country;
- Specialised Universities and Enterprises of England, Germany, Scotland and Portugal;
- achievements: mobility programmes for students and teaching staff, IT equipment, organisation of post-graduate programmes.

environment protection and sustainable development have been applied.

The development of this specialisation and the diversification of the research activity led to the possibility of various qualifications by the young generation, by enrolling in a PhD programme, for instance, as there is the Dr. School in Engineering Sciences with the following attested PhD degree coordinators:

Other recent contracts and international projects:

1. International cooperation project The Netherlands – Romania (Water Authority Banat) (2007-2008) on: "Establishing measures to rehabilitate the polluted groundwater altered due to landfill, in order to reach the environmental objectives required by the Water Framework Directive and the Groundwater Directive", financed by the Dutch Ministry of Economics Affairs (EVD), 2007-2008, Owner: Grontmij The Nederland bv, Dutch consultancy company (Water, civil engineering). The Hydrotechnical Faculty was involved by a sub-contract „**Providing services for implementation of models and training in the field of groundwater and solute transport modelling**” (coordinator Prof. Ioan David), consisting of organising within the faculty of an international **training** on groundwater pollution elements transportation modelling (2007) and elaboration of **two models of similar digital models** of pollution propagation in water in waste warehouses areas of Parta and Jimbolia, coordinator UPT Prof. Dr. Eng. Ioan David.

2. University international research programme in co-operation with the World Bank „**Digital simulation research of environment pollution because of stationary and traffic sources** (2000-2002).

3. Involvement of the Faculty within a Romanian – German constitution collective of a Competence Centre on water and environment (UPT, AQUATIM, FH Ghelsenkirchen and Münchener Stadtentwässerung - **Centre of Competence Education and Services (CERES)** (2008-2009). We have a great pleasure and we are honoured to salute the presence of this Competence Centre within the anniversary symposium.

We shall also mention that within the international programmes organised recently most of the members of the teaching staff took benefit from European academic mobility.

As far as the international cooperation is concerned, we shall mention a strong collaboration with the Technical

University of Graz, Austria, on yearly mobility programmes for academics and students, and compact courses taught by specialised professors.

Prestigious academics have sustained presentations taught courses as invited professors in European Universities which has greatly contributed to the international fame and visibility of our establishment.

- Prof. Dr. Eng. Ioan David, Technical University of Darmstadt, Germany (1993-2005) and University of Applied Science Giesen (2006)
- Prof. Dr. Eng. Ion Michael, Technical University of Graz, Austria
- Prof. Dr. Eng. Ion Mirel, Technical University of Graz, Austria
- Prof. Eng. Dr. Man Teodor Eugen, University D'Artois, France, IUT Bethune (2008)

As far as the recent **development of the material infrastructure** is concerned we shall mention the constructions and establishment of the new unit of the Faculty of Hydrotechnics among the recent major achievements (1995), investment initiated by the first dean of the Faculty of Hydrotechnics, Prof. Ioan David. The project was elaborated by Prof. Aurel Dănilescu, its achievement being coordinated by Prof. Popa Gheorghe as dean between 1996-2000. We shall also mention the calculation, modern software and technical equipment by which we ensure the introduction of the newest design models in hydrotechnics and environment engineering.

A qualitative evolution occurred in 2007-2008 by the equipment of Hydraulics, Water Supply, Pedology, Topography laboratories with experimenting stands, calculation technique and devices of more than 500,000 euros and by the renovation of the old unit of the laboratory building and modelling hall realising an important investment.

In 2009 at the general rehabilitations works at the tree building, mentioned above, we managed changing furniture's in the classrooms H1, H2, H3 and H4; in the rooms H2, H3, H4 and H8 were mounted projectors fixed on the ceiling and projection screenings.

It should be noted that in the modeling hall in 2009-2010 were placed two hydraulic test stands: vacuumed Sewage plant type ISEKI (England- Hungarian Company), coordination provided by Prof. Ion Mirel and the hydraulic test stand HAWLE (German Company), coordination provided by Prof. Ioan David, both sponsored by the most specialized companies in Europe

Following the teaching and research activity evolution within the department and Faculty of Hydrotechnics of the "Politehnica" University of Timișoara, the teaching system in hydrotechnical field has had a constant evolution, each stage having an initiating, orienting and supporting role for the next one. The foundation and the development of the specialised education system does not represent isolated events, but must be assessed within the framework that have made them happen.

We currently have graduating students that became famous specialists in their fields and have largely contributed to the development of the national infrastructure and particularly to the design, execution and exploitation of hydrotechnical, water supply and sewerage, environment protection and public systems within establishments, local authorities and departmental authorities.

The foundation of the Polytechnic School in Timișoara had been a sparkle that led to a real platform of Romanian culture and science in hydrotechnics and other technical branches in the western part of the country.

Its scholars have transmitted a technical cult to future generations as basic elements of hydrotechnical education within the Faculty of Constructions and the specialised education system within the Hydrotechnical Section and, since 1990 within the Faculty of Hydrotechnics.

Now when we are celebrating the 20th anniversary of the Faculty of Hydrotechnical Engineering, we express our deep gratitude and honour to our forerunners, we appreciate the achievements of our present staff and hope in the successful achievements of our future generations.