

Aurel OPREAN, 1925-2015, DESTINY OF A MAN OF EXCEPTION – Biographical sketch

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Abstract: *Professor Oprean dedicated his life and work to the school and science. During the nearly 90 years of life he passed by majority hypostasis, statutes and social functions: peasant, worker, student, engineer, professor, employee, enterprise manager, researcher, designer, etc. and perhaps for this reason he managed to do well in the most complex and delicate situations, to find a common language with people from various professions and social statuses, from ordinary people to ministers or even heads of governments or states, from factory workers to executives, writers and readers or editors. He formed generations of students, many PhDs, he published or supported more than 250 scientific papers (treaties, monographs, books, scientific papers and communications) in the country and abroad.*

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With great respect and appreciation we evoke the professor Aurel Oprean's personality, our colleague and mentor who in the nearly 90 years of life served the academic school in the field of machine tools and more specifically in the field of hydraulics of machine tools.

He consistently supported the activity of the team of the journal Proceedings in Manufacturing Systems from the position of peer reviewer and member of the Advisory Board since its foundation, and also from his position of member of the Academy of Technical Sciences of Romania.

Professor Oprean dedicated his life and work to the school and science. During the nearly 90 years of life he passed by majority hypostasis, statutes and social functions: peasant, worker, student, engineer, professor, employee, enterprise manager, researcher, designer, etc. and perhaps for this reason he managed to do well in the most complex and delicate situations, to find a common language with people from various professions and social statuses, from ordinary people to ministers or even heads of governments or states, from factory workers to executives, writers and readers or editors.

As he stated at the eightieth anniversary, he as professor guided himself in life after several precepts, many of them acquired from personal experience:

"Man possesses huge reserves of effort, ability, resourcefulness, flexibility, adaptability, self-protection, conservation, investigation, etc., it is important, however, to discern and find in all circumstances and situations, the key, optimum solving algorithm of each of the new situations that arise. Here comes the ability of critical analysis, selection, balance, calm, patience, wisdom, and especially the will unflinching faith in and succeed".



Fig. 1. Aurel Oprean, Professor, PhD.

"Pomposity, arrogance, a sense of superiority, selfishness, envy, rapacity, are defects of character diametrically opposed to modesty, decency, dignity, honesty, simplicity, generosity, attributes that are specific to the great spirits and human values, which exalts and ennobles making it everlasting".

In all the teams he worked, he tried to realize what is called "harmony", "collegiate", "mutual respect", atmosphere of trust and moral balance.

From his experience he founded that, "generally speaking, the age is not a merit of someone but only a state quantity. It could become a virtue if it is accompanied by a generous, honest and dignified living".

During his lifetime Prof. Oprean learned another precept that is a fundamental law of the human solidarity: "helping someone is not an obligation, it is natural. It is not allowed and acceptable in any circumstances to cause difficulties to anybody".

Here is, in short, who professor Oprean was and where he came from. He was born on August 4, 1925 in a large family with seven children of a poor peasant from a commune on the Mureş Valley, Târnăviţa, Hunedoara county. His family, in order to survive only with two hectares of land, it had to work "in part" the land belonging to the wealthiest farmers and also in a rock quarry in

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loading, unloading and transport of gravel wagons manually, infernal work and underpaid.

Although he was rewarded in all seven primary classes, to go to school further it was excluded with all the teacher's and priest's warm recommendations. From all of the 700–800 families in the villages of the six villages of his commune, only one family was able to send one of his sons to school in Deva, who then followed the Cluj medical school and became a doctor.

Because of indigence and a life full of hardships, he was forced, in winter, when they could not work on the farm or field, to go with an older brother to Deva (on foot 30 km, because they had not money for train) where they did various services and unskilled work (cutting and carrying wood, shoveling snow, carrying heavy furniture or goods to various families or stores, and at night sleeping in the stables of a wealthy more merciful man). This was life in interwar Romania (30–40 years) for tens and hundreds of thousands of poor peasant families in Transylvania.

The fact that he became an engineer is due to pure happenings in life, afterwards being determined to become destiny. He had seen as a child a construction engineer at a construction site for an improvement work on Mores River. This man and his name impressed him so much that he decided to become like him. So he had chosen a model and followed it, because an engineer was at that time in high esteem.

The opportunity arose when his brother heard of the possibility of being an apprentice, boarding provided, in large weapon factory in Brasov.

Because it was away from home and he had no money for train, and also no suitable clothing, another brother employed as a servant for a year and acquired the necessary things. This was in 1939–1940.

Without going into details, he managed the entrance exam, in fact pretty hard, especially the application called "psihotechnics", inspired by the German model.

He worked in factory for eight years starting from 1940. Between 1940 and 1944 he worked as an apprentice, learning the turning profession, and at the end, after an exam given at the Chamber of Labour centralized by the city of Brasov, he got the title and the journeyman diploma, becoming a qualified worker.

His destiny as skilled worker in a factory had changed through a favorable complex of circumstances. In the period, an Industrial Experimental High School had been opened, where he was admitted in the fifth grade (4 classes he had graduated previously in a vocational school). He finished the school in 1948 as valedictorian, for which reason he was selected to study abroad by a government commission coming from Bucharest for recruiting baccalaureate graduates.

So he became a student of the Polytechnic Institute of Leningrad, USSR (now Sankt Petersburg, Russia). Despite language difficulties, then his arrival two months after the school start, he managed with an exhausting effort (four hours sleep per night) to finish well the first three years of study. The next years, the fourth and the fifth ones, it was much easier, because the factory experience proved to be very helpful in the specialty of machine tools he had chosen, which coincided largely with the job that he had qualified. In many practical

classes at the high school he went through the whole range of mechanical professions (turner, miller, locksmith, mechanic, rectifier, etc.) and then plant laboratories and workshops of physical chemistry, materials testing, repair and testing of machines, technical control quality, design, etc.

He performed the diploma work in a large plant for building special automatic machine tools, designing assemblies that were produced effectively in the factory.

He graduated in Mechanical Engineering with diploma "of merit" (cum laude), returning to the country as a young engineer in 1954. Having applicative formation as a factory man, his wish was to have such a job, the job in which he trained for 14 years. It was not to be so, because the Ministry of Education assigned him to the Machine Tools Department of Polytechnic Institute of Bucharest, led by Professor Emil Botez.

Thus, his teaching and scientific career began 1954, having the periods of ups and downs, satisfactions and dissatisfactions, joys and troubles of accomplishments and failures, according to professor's statements.

In the department he found an environment conducive to normal work activities, with good colleagues, sober, of good skilled. Since young assistant, his principal concern was to perfect himself on the teaching and scientific line, being aware that these two aspects are essential in the life of a university professor.

He started the research activity on his own in the first year, and on teaching line in discipline "Theory of cutting", together with the first discipline holder to whom he was assigned, lecturer Zoltan Duca. Together they developed the first laboratory guide, being in fact the first guideline according to which practical works were based on experimental research. The model was then extended and used by other professors, and the result of that experiment led to the development of his first scientific papers published in the journal "Machine Construction".

The real scientific research and teaching in parallel on his own he approached four years later (1958) when he was entrusted with the course of "Hydraulic Drive of Machine Tools", which he taught until 1996, discipline in which he defended his doctoral thesis *Contributions to the study of pumps and motors with gearings* under supervision of Professor Emil Botez.

At the time, he had as close collaborators the generation colleagues Stefanuță Enache, Gheorghe Biber, Victor Tabără, and from professors, apart from Zoltan Duca, Mihai Popovici and Victor Radetchi, holders of disciplines "Cutting tools" that contributed to the study of surface generation on machine tools.

Machine tools hydraulics was the fundamental direction of his professional activity, in which he was trying to create a school of scientific activity and publishing. He published or supported more than 250 scientific papers (treaties, monographs, books, scientific papers and communications) in the country and abroad.

He carried out technical and organizational activities as board member of the Central Institute for Scientific Research Electrical, Electronics, Automation, Machine Tools and Precision Mechanics; member of the International Technical and Economic Cooperation Department; member of the Scientific Council and Dean of the Faculty of Engineering and Management of



Fig. 2. A. Oprean, Al. Dorin, D. Drimer, A. Paris, I.A. Ionescu, *Fiabilitatea mașinilor-unelte* (Machine Tools Reliability), Editura tehnica, Bucharest, 1979.



Fig. 3. A. Oprean, *Hidraulica mașinilor-unelte* (Machine Tools Hydraulics), (editions I, II and III), Editura Didactică și Pedagogică, Bucharest, 1983.

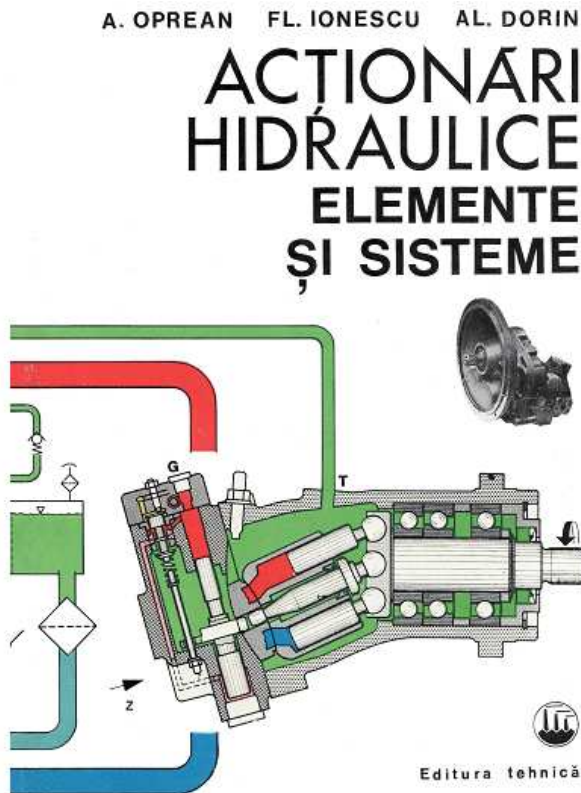


Fig. 4. A. Oprean, Fl. Ionescu, Al. Dorin, *Acționări hidraulice, Elemente și sisteme* (Hydraulic driving, Components and systems), Editura Tehnică, Bucharest, 1982.



Fig. 5. A. Oprean, Al. Dorin, L. Măsălar, S. Medar, *Acționări și automatizări hidraulice, Sisteme mecano-pneumo-electrohidraulice*, Editura Tehnică, Bucharest, 1983.

Technological Systems (1968–1976), member of the Senate of the University "Politehnica" of Bucharest, director of the Technical Publishing House (1959–1968), member of the State Committee for Culture and Art (1960–1968), head of the Department of Machine Tools (1990–1995), etc.

Professor Oprean had the great joy and honour to get in contact or collaborating with a number of personalities from the scientific, cultural and political life in the country and abroad, such as: academics Mark Duiliu, Petre Antonescu; Grigore Moisil, Eugen Bădărău, I.S. Gheorghiu, Remus Răduleț, Iorgu Jordan, Alexandru Graur, Stefan Balan, Virgiliu Constantinescu, Radu Voinea, Costin Nenițescu, Elie Carafoli, etc.; writers – Zaharia Stancu, Titus Popovici, Eugen Barbu, Marin Preda, Mihail Sadoveanu, Tudor Arghezi, Mihai Beniuc, etc.; people in administrative or political leadership (ministers, secretaries of state), and a number of people of culture, science and politics from countries on three continents (Europe, America and Asia).

As director of the Technical Publishing House, member of the State Committee for Culture and Art and the Central Institute for Research in the field, he worked with or had collaborations with many of these individuals both at home and abroad, participating in numerous travel documentaries, various thematic meetings or conferences, learning many things of great utility.

Since 1996, he was retired, but due to teaching, and scientific achievements, he was granted the status of professor consultant, making him the honour to figure still in the top of the list of the teaching staff of the department. He performed at the department as director of scientific research projects, PhD advisor or scientific-technical expert of national research programs.

The greatest satisfaction and joy, however, caused him the direct election as a Member of the Academy of Technical Sciences of Romania in May 1999, the very same month in which he reached 45 years of activity in Romanian higher technical education and science.

After entering the Academy and as a professor consultant, he continued the scientific activity as member of the Program Committee of the International Conference on Manufacturing Systems being representative of Academy in organizing this international scientific event, ICMAS. Also, when the journal Proceedings in Manufacturing Systems was founded 2006, Prof. Oprean accepted to be member of the Advisory Board. From this position he constantly helped our journal to increase its quality.

In same time he participated in the achievement of research contracts with research institutes, ministries or national programs as partners or beneficiaries, such as design and construction of machinery and installations:

- Vertical Lathe SC 16000-20000, being the project manager of the Hydraulic Team (beneficiary Machine Tools and Aggregates Factory);

- Installation for shrinking on naval shafts (beneficiary Heavy Machines Factory Bucharest – IMGB);

- Heavy machine tool of "Gantry" type with movable bridge and fixed table having a working length of 4 m (beneficiary RELANSIN);

- Forging manipulator semiautomatic with hydraulic drive (beneficiary "INTEC");

- Radial piston pump with low pulsation (beneficiary Machine Tools and Aggregates Factory), etc.

In 2002 he was awarded "Diploma of Excellence" by the University "Politehnica" of Bucharest, and in 2004 he received the title of "Honorary Citizen" of the native village, commune Brănișca, at 650 years of documentary attestation of the settlement on Mureș valley in the county of Hunedoara during the Austro-Hungarian Empire.

The scientific activity after Doctoral Thesis had some distinct directions including

- Rotary and linear hydraulic motor dynamics, where unitary calculation methods by using Lagrange equations and therefore mathematical models were achieved together with some conclusions regarding the dimensions and special arrangement of components of rotary motors and their connection to the use in CNC kinematic chains with hydraulic drives of machine tools. New pump construction without pulsations was studied and achieved, which was intended to bring great improvement upon dynamic quality of the driven systems.

- Stability studies of automated adjustment of the hydraulic drive systems. The researches in the field started from the ascertainment that the classical systems for adjustment and stabilization of the speed in the hydraulic driven feed kinematic chains of the machine tools, both control and driving were done on the same channel, the assembly throttle valve-regulator. The separation of the control and force circuits led to a driving system with "hydraulic reaction" associated with a simple regulator for making the junction of the three signal types. This system was able to discharge a liquid volume corresponding to the perturbation force, this leading to a constant feed speed.

- Studies of hydraulic drive systems reliability. Some researches were achieved for determination of the mean life time of the hydraulic driving systems. Also, Prof. Oprean led the researches in the frame of a doctorate thesis regarding a new original method of the study of the running safety using accelerated tests and prognosis in gear pumps produced in Ploeni factory.

Throughout his life and career, Professor Oprean was also guided by some clear principles, sober and austere, learned from his parents and brothers, simple just and honest people. He followed them in all what he was doing and also stayed close to percept that says "treat people with righteousness and wisdom and above all love them all."

He was a professor model and the founder of the Romanian hydraulic machine tool school, a researcher with many important results. He was faithful to the principle that most legacy of a professor and scientist consists of his works and books, but especially of his disciples meant to continue his work and thinking.

Professor Aurel Oprean was esteemed as a professional and a man of great value by generations and generations of students, PhDs in the difficult demarche of the doctorate way, departmental colleagues in didactic and scientific activities, colleagues from other collectives where he had led or worked with.