

PROFESSOR JAN ODERFELD

*The Laudatio speech delivered during the ceremony
of awarding Prof. Jan Oderfeld an honorary doctorate
by Warsaw University of Technology
and on the occasion of his 100th birthday*

I have a great honour of presenting a portrait of Professor Jan Oderfeld in all aspects of his scientific activity; i.e., as engineer, researcher, university teacher, promoter of scientific activity both in Poland and within international co-operation, doyen of the staff of Warsaw University of Technology (WUT), and a distinguished senior of Polish aviation.

Professor Jan Oderfeld is an extraordinary man. It is impossible to present in brief all his important achievements in a variety of fields he has been dealing with. One of his most distinctive characteristics consists in the fact that despite undertaking many different tasks at the same time and taking on many duties, he always executed and fulfilled them in excess, earning his places in all fields of his activity.

Professor Jan Oderfeld was born in Częstochowa on February 19th 1908. In 1924 he passed his school leaving exams in the Henryk Sienkiewicz Public Secondary School in Częstochowa. On August 31st, 1930 he obtained a Warsaw University of Technology diploma, after graduating at the Faculty of Mechanical Engineering. As early as in the course of studying he started coping with industrial problems of his interest; i.e., he got a job in the well-known machine-production plant “Pioneer” in Warsaw. After doing his military service he had built a team of engineers who undertook a very challenging task of constructing a turbine jet engine. In 1931, thanks to a private financial support they had managed to construct two prototypes of the engine that then underwent successfully their tests. In 1932, on the premises of Experimental Workshop of the Public Engineering Production Plant “Ursus” near Warsaw, the team constructed also a pulsatory jet engine intended for using in unmanned aerial vehicles. The pioneering work of young Polish engineers – Jan Oderfeld, Władysław Bernardzikiewicz and Józef Sachs was stopped in 1933 due to the lack of funds. A model of the jet engine designed that time can still be seen at the Museum of Technology in Warsaw. From 1932 to the beginning of World War II, engineer Jan Oderfeld was working for the Engine Production Plant “Skoda” – PZL in

Warsaw, at first as a production engineer and then, from 1936, as a design team head. He contributed actively to the design process and supervised testing of the aircraft piston engine “Foka” (Seal) that was mounted in the aircraft “Wilk” (Wolf) in 1938. Together with his team he had also constructed a gas turbine that could be assembled with the piston engine Cirrus. The turbine underwent its tests successfully in 1938. At the same time, i.e., from 1937 to 1939 he was engaged also in his individual engineering activity; e.g., he converted a carburettor aircraft engine into the injection one, which those days was really a novelty.

Those days, starting from 1937 he had launched his teaching activity and delivered a course in aircraft engines at the Air-Force Officer Cadet School in Warsaw. About seventy of his students fought in the Battle of Britain, many died.

Under German occupation within 1940–1945 engineer Jan Oderfeld worked in Skierniewice (a small town near Warsaw) running the cooperative machine-shop “Rolnik” (Farmer). Under his effective supervision, a small repair shop with few workers became a large production plant manufacturing agricultural machinery, nowadays known as the Mechanization Shop for Horti- and Agriculture, Limited Liability Company.

Immediately after the war had ended, starting with the academic year 1945/46, engineer Jan Oderfeld began to work for the Hipolit Wawelberg and Stanisław Rotwand High Engineering School, where in a position of temporary professor he lectured on engineering mechanics, aircraft engines and statistical quality inspection. At the same time, starting from 1945, he worked for the Polish Committee for Standardisation (PKN), where he made a significant contribution to restoring and completing of the standardisation achievements the interwar period had brought forth in Poland. He also initiated the statistical quality inspection in Poland achieving its successful implementation in both the industry and army. In the PKN at first he got the position of Standard Editing Department Head, becoming then the General Secretary and finally in 1948 he was appointed to the position of General Executive Officer, holding the post till 1951. The research he conducted in co-operation with Professor Hugo Steinhaus, a famous mathematician, was of crucial importance for standardisation and production inspection in the field of conformity assessment. Among many mathematical papers published that time by engineer Jan Oderfeld it is worthwhile to note those on the so-called principle of duality, that had created a basis for the Ph.D. Thesis on *Statistical set of products classified according to the alternative*, he defended successfully at the Wrocław University and Wrocław University of Technology (that time it was one academic centre) in 1951 (his supervisor was Professor Hugo Steinhaus). In co-operation with Professor Zdzisław Rytel he developed the Classification Scheme of Standards that in Poland has only recently been replaced with the International Classification of Standards (ICS). Within

the years 1951–1974 he pursued his activities in the field of applied mathematics heading the Group of Statistical Quality Inspection at the Mathematical Institute (now, the Industrial Application Department at the Institute of Mathematics of the Polish Academy of Sciences). The research conducted there covered a broad scope of mathematical apparatus applications; i.e., in machine-building, rubber and military industries, as well as in medicine, biology and pharmacology. Moreover, within the years 1951–1954 he gave lectures on statistical quality inspection at the Central School of Planning and Statistics (before World War II and at present known as the Warsaw School of Economics).

Professor Jan Oderfeld pursued his activity in many different fields developing co-operation with a variety of scientific and industrial centres. However, since 1949 he joined the staff of Warsaw University of Technology, his *Alma Mater*, where at first he took a temporary professor position, then in 1955 he was appointed an associate professor and in 1961 he became a full professor. Within the years 1949–1955 he headed the Chair of Aircraft Engines, while since 1955 till his retirement in 1978 he was heading the Chair of Theory of Machines and Mechanisms (at present: the Department of Machine and Robot Theory at the Faculty of Power and Aeronautical Engineering WUT). It was the first TMM chair in Poland, and it was founded by Professor Jan Oderfeld. In first several years of its activity the chair staff taught the subject at all faculties of the Warsaw University of Technology. Professor Jan Oderfeld had created a material base on which the chair pursued its activities, including laboratory, workshop and library. Soon after founding the Chair he developed the teaching course in the Theory of Machines and Mechanisms (TMM) and wrote several first handbooks on the subject in Poland. Within the years 1964–1966 he served as a Dean at the Faculty of Power and Aeronautical Engineering WUT. It was upon his recommendation that, later on, the teaching courses at all mechanical faculties of WUT were changed accordingly, including the following subjects: fundamentals of control engineering, dynamical metrology and fundamentals of experiment planning. He also forced through the idea of introducing numerical methods into both teaching and research.

Since his first paper published in 1933 Professor Jan Oderfeld has prepared over 200 works in a broad scope of fields (over forty of them were published after his retirement), including 15 books and course books. One can never separate his magnificent scientific achievements from the expert knowledge he gained in practice. Due to the fact that his interests were always many-sided, it is very difficult to classify his works into particular fields. One can only attempt at dividing his activity into three intervals, that overlap each other to a large extent.

The first one, the origins of which date back before the war lasted over 30 years and covered the field of **aircraft engines**. As it was mentioned before, Professor Oderfeld was one of those who constructed the first Polish jet engines.

He dealt also with piston engines, mainly in the aspects of their cooling, timing gear and balance. After World War II he co-operated with the well-known Polish aircraft engine designer Wiktor Narkiewicz, dealing with the timing gear system design (including cams), optimal balance of crankshafts and combustion problems in the engines known in Poland as the WN – type ones. His contribution towards the success of those engines was significant (they were used in Polish aircraft; e.g., of the Bies (Demon) type).

The second interval of his activity that lasted over 30 years, was devoted to **applied mathematics**, mainly in the fields of standardisation and quality inspection. Among his significant achievements one should mention the results he obtained when solving the problems of concentrations in distribution, sign autocorrelogram, dimensional functions in standardisation and similarity of empirical curves. As a good example of his interdisciplinary interests may serve the research into biological system behaviour, conducted with the use of statistical mathematics apparatus.

A significant role Professor Jan Oderfeld played in struggling for standardisation of the system of units, and putting it into order should be emphasized as well. That issue was very important to him, he always claimed that from the engineering point of view, mathematics did not consist only in relations between dimensionless numbers. From the very beginning of his activity professor Jan Oderfeld has been far-sighted; for instance, against many prominent scientists he was in favour of the {kg, m,s} unit system. In the years 1946–1960 he had defended his viewpoint against the opponents within the international activity of ISO, which contributed significantly towards the world-wide implementation of SI system of units.

In the third interval lasting over 50 years the Professor has been dealing with the **theory of machines and mechanisms**, in its broad meaning, i.e., including metrology, control engineering, robotics and biomechanics. It has always been the main field of his activity. One should mention here the research he conducted into the engine balance and the timing gear cams he designed before the war. Later on, the Professor engaged, in a most creative way, into the development of theory of machines and mechanisms, especially in the aspects of classification, kinematics and precision of mechanisms, as well as dynamical similarity, fundamentals of experiments in mechanics of machines and optimisation in machine design. Being the world pioneer in engineering applications of optimisation he became a big name in the last of the aforementioned fields. His first approach to the problem was published as early as in 1954 within the context of economical machine design analysis. Later on, Professor Oderfeld established his scientific school in the field, based on the application of linear and non-linear programming to optimal design of machines and mechanisms. Many algorithms and methods the Professor had developed were implemented into the design practice of complex machines and

mechanisms; e.g., optimisation methods were employed in the design process of many well-known Polish jib cranes.

An original design of magnetic memory drum he patented together with Wiktor Narkiewicz should also be mentioned among his most significant achievements implemented on a large scale. For many years, those drums (produced by ELWRO Wrocław) were part of standard computer equipment in the countries of Eastern Europe, members of the former Council for Mutual Economic Assistance.

For several dozen of years, Professor Jan Oderfeld has pursued an intense activity within the frameworks of different national and international scientific and technical organisations; he was a member of the Committee of Machine Design of the Polish Academy of Sciences, worked for groups and committees of the Polish Federation of Engineering Associations, engaged into the activities of International Standard Organisation, being also a member of the Warsaw Scientific Society.

In 1969, when Professor Jan Oderfeld had served as the President of the Polish Committee for Theory of Machines and Mechanisms, he chaired the organising and scientific committee of the 2nd World Congress on the Theory of Machines and Mechanisms in Zakopane, Poland. During the Congress, representatives of 16 countries founded the International Federation for the Theory of Machines and Mechanisms (IFTToMM) (at present: the International Federation for the Promotion of Mechanism and Machine Science). Professor Jan Oderfeld was one of the founding fathers of the organisation and served for ten years in its governing boards. Nowadays, the IFTToMM association comprises several dozens of National Committees of TMM. The Professor was a tutor of many Polish scientists who have nowadays performed many prestigious duties within authorities, committees and working groups of the federation, proving the fact that the Polish School of TMM established by Professor Jan Oderfeld has become highly appreciated. Up to now, the Professor has maintained a close co-operation with both the Polish Committee of TMM (being its Honorary President) and IFTToMM.

In 1953 Jan Oderfeld was among those who founded the Journal “*Applicationes Mathematicae*”. Within the years 1954–1991 he was a member of the Editorial Board of scientific journal “*Archives of Machine Design*”.

His accomplishments should be also recognised for his over thirty-year-activity within the framework of very popular in Poland Technical Knowledge Contests for secondary school pupils, he was one of the founders and organisers.

His remarkable achievements in the fields of science and teaching as well as his organizational activities, have brought him about many state decorations and medals, including a Commander’s Cross of the Order of the Rebirth of Poland (1964), and a Commission of National Education Medal (1976). He was also

awarded many times by Polish and foreign authorities; e.g., Ministry of Higher Educations (including individual awards of the first degree in 1963 and 1978), Polish Society of Mathematics (1974) and other institutions. He was awarded a Gold Badge of Merit issued by the National Federation for Engineering Associations (NOT), was conferred with the rank of Honorary Member of Polish Society of Theoretical and Applied Mechanics, and received a “Pulaski Wings” award granted by the Aviation Chapter of Polish Association of Mechanical Engineers. During the 9th International Congress of IFToMM (Milan, 1995) he was conferred with the rank of Honorary Member of the Federation and Honorary Member of the Editorial Board of the journal “Mechanism and Machine Theory” published by the IFToMM. Recognizing his accomplishments in working for his Alma Mater, the Warsaw University of Technology awarded him a Medal of Merit.

The achievements of Professor Jan Oderfeld outlined above have proved that he can definitely be recognized as an eminent scientist of versatile mind, creative engineer, talented and effective initiator and supervisor of many organizations and various undertakings. For many followers of Professor Jan Oderfeld, including me, he is first of all a magnificent well-respected Teacher who has always been demanding and fair. For over fifty years of his teaching activity he educated a few classes of Air Force officers, many classes of engineers and ten doctors in technical sciences.

The following three rules constitute the motto he has always emphasized and recommended:

- **the theory cannot be separated from the engineering practice, they both must combine forming the engineering art;**
- **each experimental result obtained needs the error estimation;**
- **any detail may occur important for an engineer.**

Now, these rules we recommend to our students.

In view of the above, it is unquestionable that Professor Jan Oderfeld rendered a great service to both the academic community of Warsaw University of Technology as well as Polish and international academic communities. This fully justifies the decision taken by the WUT Senate and supported by the Senates of Universities of Technology in Łódź, Cracow and Gdańsk of awarding the Honorary Doctorate of WUT to Professor Jan Oderfeld.

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