R E S U M E

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Vladimir H. Pavlecka
Technical Director
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U.S. Citizen, Cert #3572669
Birth Date: May 20, 1901
Born: Czechoslovakia
Member: ASME
Hon. Life Member of the Lighter-Than-Air Society of America (LTA)

EDUCATION:

Gymnasium, 8 years.
Czech Technical School of High Learning, Praha, Czechoslovakia.
Mechanical & Electrical Engineering.
Equivalent Degree of M.S. in Mechanical Engineering.
Union College, Schenectady, New York.
Electrical Engineering, Degree of B.S.

MAJOR: In elastic fluid turbomachines, under Professor Zvonicek, at that time a world authority in his field. In thermodynamics, fluid dynamics, mechanics, dynamics, (vibrations), machine design, elasticity and materials and structures. Has been constructively working in all these disciplines since 1925, and in turbomachines since 1927, beginning with the application of steam-turbine propulsion to airships. Has accumulated one of the largest libraries on this subject, produced innumerable designs, analyses and inventions resulting in patents. Was the first in the entire United States, in 1935, to propose jet engine propulsion to the management of Douglas Aircraft Co., Inc., without acceptance at that time.

EXPERIENCE:

General Motors Research Corp., Detroit, Michigan: One year. Advanced work on power plants, theoretical as well as design experience, testing, mathematical analysis, etc.

Metalclad Airship Corp., Detroit, Michigan: 7¼ years.
Chief of Hull Design. This association included the following projects:

a. Development of all-metal airships, design and construction of the ZMC 2 Airship for the U.S. Navy, one of the most successful airships in History. Developed analytical methods of design, light metal girder structures, at a time before the aircraft industry accepted all-metal construction.

b. Produced design studies and proposals for large flying boats and generated extensive engineering studies and planning for their developement for intercontinental service (in 1930).

c. Produced design studies, supervised construction and tested experimental structures for airships of 10 million cubic feet displacement and capable of 100 mph speed. This work resulted in singularly new structures, later adopted by the Goodyear Corporation for its airships, in preference to the German and their own system.

d. Developed the thermodynamic system of Helium management in airships. Also proposed designs of steam turbine power plants for the propulsion of airships with heat recovery into lift from the condensers inside the hull. These designs were the first aircraft turbine propulsion system and demonstrated unlimited possibilities of obtaining large powers for aircraft propulsion. This was the precedent that later lead to gas turbine jet engines.

Douglas Aircraft Company, Inc. Santa Monica, California; 6 years. Head of the Structural Research Department. An extensive and broad experience in the development of light, strong and rigid metal structures, beginning with the DC-3; DC-1 & DC-2 were too heavy to be useful. This work established the principles not only of the design of light aircraft shell structures but also developed the procedures for fabricating them, particularly the use of rubber plattens in hydrallic presses, rolling of profiles, spotwelding, etc.

a. Development of analysis of structures of thin shells, light and rigid profiles, joining of components into large bodies, static and endurance testing, etc.

b. Development of the tricycle landing gear, now in general use on all land aircraft. This was one of the major developments in the thirties and although old in principle, its modern acceptance has indeed made possible large air transports. Analyzed and designed the first tricycle landing gear, established design criteria and supervised its testing, first on a vehicle and then on the Dolphin amphibian. Explored and reported all its characteristics and at once was ordered to design the tricycle landing gear for the then largest airplane in the world, the B-19. It was successful and from then on, it came into general use.

c. Invented, analyzed and designed the automatic wing-folding for naval airplanes, now in general use. Obtained a patent on it. U.S. Patent No. 2,166,564.

d. Designed and tested the first pressurized cabin for the DC-4, using by necessity, a flat floor as part of the structure. This method of maintaining near ambient state inside air transports is now in general use.

e. Developed flush riveting, obtained patent on the method and on the rivet for it, U.S. Patent No. 2,233,820; this method and the 100° rivets used with it, have become standard in the U.S. and now also, all over the world. It contributes not only to securing lower drag in flight, but perhaps even more importantly, to a high order of structural integrity of the aircraft, because of greater rivet strength and fatigue endurance, inherent in the method.

f. Developed new methods of making light alloy structural components now standard in aerospace industry, by hydropressing with rubber pads. This method of fabrication is now a master tool of airplane fabrication.

g. Developed and persuaded the firm to switch to sheet metal profiles in place of extrusions, of unusual convenience, strength and rigidity. These profiles are obtained inexpensively by rolling from narrow strips. The structures fabricated from these elements are superior to any other concepts and became the standard Douglas system in 1938. This system has since been adopted by Boeing, Convair and others. When the war broke out in 1941, a pernicious crisis arose at once in the scarcity of extrusions, caused by insufficient number of presses. The rolled profiles were not hindered by any limitations and Douglas was producing airplanes at a record schedule, while other firms suffered long delays without a possibility of conversion from unavailable extrusions.

Northrop Aircraft, Inc. Hawthorne, California: 2¾ years. Serving as Chief of Research:

a. Developed all-magnesium alloy aircraft structures with prospects of using pure monocoque basic bodies. Twenty sets of wings for corrosion evaluation were built, as well as an interceptor. During this program, it was necessary to also develop a new and appropriate method of welding The HELIARC and ARGONARC method, now called either the TIG or the MIG welding; both were developed by Pavlecka already in 1940, as well as water-cooled torches with suction removalof gases, etc., refinements which only now are being introduced commerically, almost 35 years later! The intert gas shielded welding was at once applied to all other alloys with complete and overall success and has become our best fusion welding process. It is now in general and increasing use and in not too long a time, it will be used as electric arc exclusively. Pavlecka received the 1942 "First Prize" from the Lincoln Arc Welding foundation for this development. In 1942, Northrop sold the Heliarc and Argonarc welding to the firm of Linde. This was a considerable set-back, delaying wide use of this method by several years. In spite of this, the TIG and MIG welding now totals approximately 20 billion dollars a year worldwide.

b. Contributed substantially to the developement of the flying wing airplanes, designed shaft driving systems for proprellers, etc.

c. Originated and carried out the TURBODYNE development, the first American Jet Engine, converted by the order of the U.S. Navy into a turboprop!! This was one of the most intense developments, a miniature Manhattan Project, developing new principles without any precedent. It included educational programs for those who were unfamiliar with thermo-dynamics, fluid dynamics and rotating machines. First American axial compressor was analyzed without any prior references whatever, was designed, constructed and tested with a close agreement of expected values. This intensive, basic effort established a new industry, trained people and resulted in other enterprises; among them AiResearch entered into compressor manufacturing as a spin-off of the Turbodyne work transferred to Garrett Corp. Turbodyne work resulted in a number of patents, later bought by G.E. Several makers of gas turbines reached out and helped themselves to these specific concepts and made fortunes with them. Among them: Lycoming, AiResearch, Canadian Pratt & Whitney, Turbomeca, and others.

Lockheed Aircraft Corp: Burbank, California. One year. Consulting Engineer on Propulsion and Gas Turbines.

Self-employed one year.
Dedicated to private studies of new principles of turbomachines; developed the principles of Contra-Rotation (CR), subsonic and supersonic centripetal compressors. Applied for numerous patents on CR turbomachines, produced several useful designs based on these new concepts. During this time, the original technical work, the accumulated knowledge and the skill to use it, amounted to much more than is required for a PhD Degree in the most demanding Universities.

Hughes Aircraft Company Culver City, California ½ year
This was a job of necessity, compelled by the rejection of the industry of the possibilities of CR turbomachines.

a. Worked on specialized design tasks in telecontrols, mechanical designs, gears and gear trains; designed by request a 15 hp gas turbine for starting Constellation engines and supply electrical power early in 1945. This design got to the notice of the then Air Corps, which had a critical need for a larger machine for the B-29. The Air Corps wanted to develop it at once; in their unforgetable statement "Let's concentrate on this and forget about AiResearch" was contained the fundamental decision to support this completely. But, in spite of the war, the Hughes Aircraft could not see its way!

Douglas Aircraft Company, Inc Santa Monica California
Thereafter followed what seemed an endless line of "fill-in" jobs, while a relentless effort was being made to arouse interest, of the financial sources and industry, in the CR Technology without success.

The job at Douglas was only of necessity. The activity included technical work in supersonic aircraft, power plant studies, supersonic ramject development and general work in supersonic fluid dynamics.

On loan to the El Segundo Division, Pavlecka was asked to propose a large Turboprop power plant for the dive bomber. This work, done in considerable detail and completeness of design, with supporting thermodynamic, fluid dynamic, stress and performance analysis, was carried out under the then Chief Engineer. Mr. E. Heinemann, curiously, when accepted by the U.S. Navy, it was turned down by Douglas and ultimately was given by the U.S. Navy to the Allison Division of G.M. It became, in the final form, the Allison T-40 Turboprop used in the Lockheed Electra.

On loan from Douglas to the Rand Corporation, (for 6 months) Pavlecka performed secret work on turbo power plants based on nuclear reactors for the source of heat, for aircraft propulsion; one on Helium closed cycle and one on Mercury closed cycle. Secret technical reports were written in 1949.

Hughes Aircraft Company, Culver City, California 3 years.
Design Engineer. Asked to propose a 20,000 SHP turbo power plant for interceptor aircraft, driving a supersonic propeller. The concept was discontinued not due to technical causes but, soley because of the timidity of management; at that time existed a deficiency in power plants, which was not made up for at least ten (10) years, until the advent of the two-spool jet engine from England.

Special design assignments, including a telescope and its mount for celestial navigation, long distance electromechanical telecontrols for power plants.

Wright Aeronautical Div, Curtiss-Wright Corp. Woodridge N.J. 3 years
Head of the Design for the Aero-Thermo Research & Development Divison. This responsibility embraced allproposals, all test engine design and instrumentation, design of test rigs for turbine, compressors and combustor testing, etc. It included the supervision of 24 engineers and draftmen at the home office as well as approximately 80 professional men and two sub-contractors. It was a productive department, initiated new ways of manufacture, new concepts and decascade testing, blade design, etc. In the last year of his stay at Woodridge, Pavlecka, also was put in charge of the IBM computer division, one of the first industrial installations for scientific work.

American Machine & Foundry Company, New York, N.Y. 5½ years.
Head of a new division for the development of Turbomachines according to Pavlecka's own patents, on License to AMF. Successfully developed the first large centripetal compressor in the world, using contra-rotation. Proposed many power plants designs based on CR, and applied for many additional patents. This work was carried out almost on nothing, with only three men, including Pavlecka, without any facilities. It was financed exclusively against the tax burden. It was terminated when AMF had to write off over 60 million dollars loss in one year due to imprudent leasing of their Pin Setters.

McCulloch Corp. Los Angeles, California 2¾ years.
Senior Project Engineer. The principle effort was the design of the structure of an autogiro. Also, the design of gear drives for the autogiro using the locked gear principle applied for the first time to an aircraft power plant. The project intensity varied with tax burden and eventually was reduced to a holding state.

Rocketdyne Division, Rockwell Corp , Canoga Park, California, 3 years
Specialists in the stress analysis of turbomachines. Analysis of turbo pumps, turbines, components, resolving particular problems; one of these was the solution of a pernicious difficulty in the J-2 Apollo Hydrogen pump. The turbine broke off the shaft on a number of tests and never reached full rotor speed. The project lagged, NASA was urgently impatient and the organization under utmost pressure. Asked to contribute his anlysis of the problem, Pavlecka suggested a solution which was at once accepted, carried out under non-stop circumstances and when the pump was put to the test, it reached at once its full speed. No further calamities happened and the Apollo program could commence. Pavlecka received a generous citation for his contribution. Pavlecka wrote numerous basic reports on fundamental technical subjects. Analyzed and corrected many prior works and left behind a voluminous library of original reports of enduring value. Besides these fundamental activities, Pavlecka was the leading person in the evaluation of the French SEPR turbopumps and contributed a mass of work to this task.

Turbomachines, Inc. Irvine, California To present
The first year of this organization (TI) has been productive. The group consists of people of integrity and industrially oriented, but not "BIZNIS" minded. Two principle projects were initiated; one; the Supercharger for piston engines and second, the Wind motor, a part

of the CR technology.

Supercharging is in rapid ascendancy; compound superchargers are being introducted. The TI Supercharger has the capability of displacing two compounded orthodox supercharges with their two intercoolers and provide rapid speed changes, of which the present supercharges are not capable. (The TI Turbo-supercharger cannot be stalled and will not surge). They have a bright future because the piston engine industry is powerful and will last still a long time.

The wind turbine is at least 2.25 times more effective in extracting wind energy from wind for useful power than propeller turbines, because it uses also external wind momentum as suction. It is highly cost-effective and should have broad utilization, also in the megawatt range.

The marine turbine version of the wind turbine for sea and river currents concept is now also in the process of consideration, indicating high promise.

The top-most priority of the TI organization is the development of CR gas turbine power plants for vehicles, from turbocycles to locomotives. This program relates to the application of CR Technology to create unique prime movers for vehicles and constitutes one of the most far-reaching advancements of this century, because the CR gas turbines meet all requirements for the propulsion of all vehicles, to a degree of perfection comparable to electric motors and now extinct steam engines.

The second, and as important task, of the TI is to continue with development of Lighter-Than-Air (LTA) vehicles, particularly of the metalclad airships, an inheritance for which TI is particularly responsible now.

V. H. Pavlecka, Technical Director
TURBOMACHINES, INC.