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## HENRI COANDĂ – THE INVENTOR OF JET AIRCRAFT

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**Abstract.** The roots of many great Romanians are coming, genealogically speaking, from the Romanian villages. One of these great Romanians was born in Bucharest, but his father was born in Craiova, and his grandfather in Perișor-Dolj, having roots that go back to Tudor Vladimirescu. He studied in his home country, but his activity was acknowledged abroad. Being interested in aeronautics, he studied hard and he had numerous inventions (250 patents). He came back to his homeland in order to initiate the technical activity. After doing that, he left to meet his father, and his grandfather, and maybe with Tudor Vladimirescu, and maybe with other Romanian creators. This great Romanian was Henri Coandă.

**Keywords:** jet aircraft, Henri Coandă, Coandă effect, lens-shaped aerodyne.

**Rezumat.** Rădăcinile multor mari români provin, genealogic vorbind, din satele românești. Unul dintre acești mari români s-a născut la București, dar tatăl său s-a născut la Craiova, iar bunicul său la Perișor-Dolj, având rădăcini care coboară la Tudor Vladimirescu. A studiat în țara natală, dar activitatea sa a fost recunoscută în străinătate. Interesat de aeronautică, a studiat din greu și a avut numeroase invenții (250 de brevete). S-a întors în patrie pentru a începe activitatea tehnică. După ce a făcut asta, a plecat să se întâlnească cu tatăl său, și cu bunicul său, și poate cu Tudor Vladimirescu, și poate cu alți creatori români. Acest mare român a fost Henri Coandă.

Cuvinte cheie: aeronave cu jet, Henri Coandă, efect Coandă, aerodină în formă de lentilă.

### A Short Biography

He attended „Sfantul Sava” National College of Bucharest and the Military High School of Iasi, which he graduated the head in his class in 1905, with the rank of an artillery officer. Passionate of flying technique, he built at the Army Headquarters in Dealul Spirii, between 1905 and 1906 model rockets and a jet aircraft with a turbo-propulseur. He was only 19 then. However, he was aware that he could not finalize his ideas without a scientific theory. This is why he went and studied mechanics at “Technische Hochschule” from Charlottentburg (Berlin), he attended the courses of the Science University of Liège (Belgium) and of the Electrotechnics Institute of Montefiore, then the Aeronautics Superior School of Paris. In order to check experimentally the results of the theoretical research, he built, with the help of the

already famous Gustave Eiffel and of the savant Paul Painlevè, a platform mounted on a locomotive. It reached a speed of 100 km hour on Paris- Saint Quentin railway. Henri Coandă studied quantitatively some aerodynamic phenomena, a "flying saucer" shaped aircraft that used an unspecified source of high-pressure gases to flow through a ring-shaped vent system. The photos taken during the experiments allowed him to bring a significant contribution to the shape of the wings, his results being used by other plane builders.

### Jet Aircraft

In October 1910 he displayed at the Second International Aeronautics Show, organized at Paris, in the sumptuous Grand Palais on Champs-Élysée, the aeroplane without a propeller COANDĂ- 1910. The aeroplane was distinctive due to its dark-red colour, but also due to its numerous original elements: the lack of a propeller, the main bars mounted on the wings were made of an iron alloy instead of wood, they were covered in a thin plywood instead of cloth used until then, the wings were curved, their thickness was constant except the edges, and their shape was rectangular with rounded ends, the two wings had different lengths, and the superior wing was positioned in front of the inferior one, being shorter for the currents formed round the wings not to interfere. All these solutions resulted from the experiments carried out on a mobile stand. Moreover, the gas tank was placed inside the superior wing, a solution which is used here today. Of course, many people didn't believe that the plane could fly using a propulsion mode than was revolutionary at that time. The visitors and the specialists could not accept that a aeroplane without a propeller could fly. Nobody had seen such a thing before. But Henri Coandă, a genius, imagined a solution. Maybe the discussions he had with the visitors, maybe enthusiasm made Henri Coandă go with his jet on the 16<sup>th</sup> of December 1910 on the field from Issy-les-Moulineaux in order to check the engine. Here is what Henri Coandă wrote in a letter sent in 1964 to Constantin C. Gheorghiu, member of the International Association of the Aeronautics History: " ... few minutes after the engine heating, I operated the stick and the plane started moving faster and faster, then it took off too fast, it wasn't my fault, but at a certain moment it leant on one side, it fell down and it burnt completely. My luck was that I didn't fasten the seat belt, so I was thrown out and I wasn't burnt". Nevertheless, he was hurt. His left hand was broken, being forced to cease his sculpture lessons he was taking from the famous Rodin.



Henri Coandă in 1910.

This attempt was the first flight of a jet aircraft. The media (*Le Technique Aeronautique* no. 21 from 1910 ) noticed that „The Coandă jet is one of the few jets with everything new, and the rational and detailed way the inventor uses in order to build a new plane is a sufficiently strong reason for us to examine carefully the means the inventor uses in his invention”. He built other planes, but with propellers. Between 1911 and 1914, as a technical manager of Bristol Plants in England, he built a monoplane aircraft, then a biplane one, which were named Bristol- Coandă. Between 1914 and 1916 he worked at Dalauney- Belleville from Saint-Denis, he designed and built three different models of propeller jets, including the Coandă-1916, with two propellers mounted close to the tail.

### **Other inventions**

His creative spirit can be observed in other fields, too. In 1914 he invented the rocket cannon for aviation which didn't put any pressure on the jet structure. In order to use less metal, he built reservoirs and wagons made of reinforced concrete. He built an oceanic tank for oil storage. He invented the material called *béton-bois*, more resistant than wood, used for ornamenting the buildings. In 1925, the architect I.A. Berindei used it for the interior decorating of the Culture Palace of Iași. He designed equipment for extracting salt from sea water.

### **Coandă Effect**

Everything that is bad can become good one day, the Romanians like to say. And not only they. During his unplanned flight on the 16th of December 1910, Henri Coandă was captivated by the image of the flames which were coming out from the two sided nozzles that glued on the craft fuselage. Maybe this is why he didn't manage to control the plane, but this observation reained in his mind for almost ten years. He found the explanation and he did even more. On the 8<sup>th</sup> of October 1934 he patented "The Procedure and the device for diverting a fluid into another one. Later, professor Albert Mètral named this patent "Coandă effect". The main idea of the phenomenon: the tendency of a very thin stratum of fluid to glue to the walls of the recipient it is put in. If this thin stratum of fluid is evacuated through a narrow slot, on a rounded solid surface, the fluid jet turns around with 180° towards the direction of the fluid flow. Most of the Coandă effect applications are in aviation, but it can also be used in sprayers or ventilation systems in closed spaces.

### **Lens-shaped aerodyne and outer space flights**

One of the most important Henri Coandă's inventions, lens-shaped aerodyne, known also as "flying saucer" was designed in 1935. He said: "I want to use a new concept in designing a flying machine, a concept that denies all the previous ones. I consider that the plane for the future should take off vertically, should fly in any position, with any speed, should be able to stop in the air and to land also vertically. In order to achieve this, no moving parts should be used in this plane".

Remarkable vision. His name is also mentioned in relation to some of the accomplishments regarding the man's flights to outer space. Among others, he is considered the inventor of some extremely complex technical devices, named "flying epaulettes" which were used to brake down the lunar module of "Apollo 11" and "Apollo 12" during moon landing.

### **Acknowledgment**

His activity was acknowledged, receiving a lot of diplomas, medals and orders: "Vielles Tiges" Diploma and grand gold medal; "Merit for scientific research" awarded by UNESCO; military Medal of the French aeronautics; "Pour le mérite" Order as Commander; Doctor Honoris Causa of the Polytechnics Institute of Bucharest, awarded in 1967. The Romanian Academy organizes the symposium entitled "Coanda Effect and its Applications" in his honour.

### **Reference**

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