The Development of Gliding and the Design of Sailplanes in Yugoslavia

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Mr. President, Honoured Guests and Members of the OSTIV Congress,

It is my great honour, at the beginning of the XIIIth OSTIV Congress, to say a few words about the development of gliding and the design of sailplanes in Yugoslavia to date, as well as to try to determine our position in relation to the world gliding movement.
I hope that, in addition to this specific aspect, it will be helpful for you to get to know the country this Congress is being held in.
First, I would like to point out the fact that the interest for the research work on the problems of human flying in our country started from the early period of the aeronautical history.
Mr. Fausto Vrančić, from Šibenik, in his well known book entitled 'Macinae Novae' published in Venice in 1595, succeeded in establishing the dependence between the size of a parachute and the weight of the parachutist on the example of windmills and on the original construction of one of the first parachutes, and so described the existence of drag during the fall. The problems of aerostatic flight were more practically tested by a few of our balloon designers at the end of the 18th and the beginning of the 19th centuries. Mr. David Švarc from Zagreb and Mr. Ognjeslav Kostovic from the Vojvodina District designed the original dirigible structure, experimenting with the use of laminated wood and aluminium in production of their air-ships.
In 1841 the first flying attempt was recorded in our country. This was the attempt of an amateur designer name Manojlo, from Belgrade, who jumped from the Customs building roof, wanting to fly across the river Sava by means of wings made like those of a bat, and Vrančić type parachute. This attempt ended close to the 'take off' point in a pile of snow. Since that event almost 75 years passed until there came again a man whose life's ideal was to design a flying machine, heavier than air, which was controllable. Meanwhile, owing to the experiments of a number of pilots from all over the world, the basic laws and principles of flight by heavier than air machines were established and numerous fine gliders were produced. These gliders were the foundation for designing powered aircraft, which at the beginning of this century started the fascinating evolution which brought us to the success of contemporary aeronautics. The natural method of progress, starting by designing and experimenting with gliders and then turning to the production of aeroplanes, was not different in our country either. Although coming a little later, our designers too were forced to start with experiments on gliders, being without the necessary data and experience in the design and production of powered aircraft. Thus, a few designers, from various parts of Yugoslavia, at the end of 1908 and the beginning of 1909 started with the construction of gliders, having as a goal the designing of an aeroplane. Mr. Oskar Ržiha from Maribor was among the first who during April 1909, succeeded in flying over 650 meters in a glider, which was a remarkable success for that time, bearing in mind that the greatest distance flown by a glider until World War I was 950 meters, the distance that Ing. Etrich from Austria achieved.
Test flights by gliders like Ržiha's were made by Dr. Vladimir Aleksić from Pančevo in 1909 as well, while Mr. Edvard Rusjan of Gorica in November 1909 achieved the first success in the history of Yugoslav aeronautics by flying an aeroplane called 'Eda-1'. An aeroplane was constructed by Oskar Ržiha in 1912 too, but Dr. Aleksić's early death prevented him from realising the same goal.
A group of high school pupils from Belgrade during 1910, 1911 and 1912 constructed a few gliders. The most prominent people in that group were the brothers Deroko and Dragoš Adamović, while the most successful flights were performed by Bane Nušić and Srbobran Stojanovic in 1910. The members of this group of young glider pilots became, during World War I, excellent army pilots, which demonstrated the fact that gliding could play an important role in aeroplane pilot training.
Design and production of gliders was restarted in Yugoslavia five years after the end of the First World War. By then the new-born country was able to bring together the basic aero-technical staff, whilst the first factories for producing aeroplanes opened their gates in Novi Sad and Belgrade. The idea of constructing gliders specially dedicated to the purpose of sporting flight was raised right then. The first glider which was constructed by the engineers Mikl and Fizir in the beginning of 1923 had for that time an up-to-date conception, and the test flight proved its good flight characteristics. However, lack of suitable grounds for slope soaring in the area of Novi Sad prevented the achievement of significant results. The second glider, a triplane, was constructed by Ing. Tišma, and the pilot Hosu performed in 1923 successful flights with it near Sisak, in which the glider was towed by a running motor-car. The activity of these groups, however, was not continued, partly because of the fact that the Aero-Club did not show any interest in the development of this branch of aviation.
The continuous development of gliding started therefore only in 1929 when a group, formed by the aircraft factory 'Ikarus' in Zemun, started the production of sailplanes, constructed mainly like the German ones. These sailplanes were used by the first glider pilots schools in Belgrade and Zagreb, while in the meantime pilots from Maribor and Ljubljana were constructing their own, also according to foreign designs.
The National Aeroclub, now being aware of the great advantage of gliding for the training of powerplane pilots, started in various ways to support the gliding movement, so that at the beginning of World War II there were found gliding groups (50 in total) in almost all parts of our country, whilst gliding schools were located in Vršac and Bloke.
After 1935 Yugoslav sailplane pilots started successfully to participate in the international competitions in Switzerland, Czechoslovakia, Germany and Poland.
The best results were achieved by the group called 'Ninth'. Many records in connection with duration, height and distance were set up in our country and by the number of silver 'C' badges gained, Yugoslavia, according to the records of the FAI, was eighth among the members of this organisation in 1939.
All the above showed that Yugoslav gliding, after all the difficulties had been overcome, became one of the most beautiful and most interesting sports of aviation, being also important for the training of aeronautical personnel.
This favourable development of the gliding movement led to the resurrection of design activities, since it is obvious that a well developed gliding movement would not prosper using only sailplanes of foreign origin. Thus ten sailplane types, from training to high performance, were designed in

the period 1933 to 1939, when the Second World War broke out. Some of them, as for instance the 'Vrabac' and the 'Cavka', designed by Ing. Ivan Šoštarić, were really good ones for the basic and advanced training of glider pilots. After the war they represented the basic types for the training of the new generation of young pilots.

Very interesting types of advanced sailplanes suitable for slope soaring were designed by Ing. Anton Kuhelj from Ljubljana and by Stanko Obad, a student of the Department for Aeronautics at the Technical University of Belgrade. However, the most successful Yugoslav sailplane, call 'Utva', was designed by Ing. Milenked Mitrović in 1938. This high performance sailplane was supplied with all latest achievements in the field of design including a built-in water-tank in order to increase the wing loading in strong thermal conditions. With this sailplane Aca Stanojević attained the first place at the international gliding competition at Lwow, Poland, in 1939.

For the progress of Yugoslav gliding, in the period close to the Second World War thanks are due to the 'Utva' Gliding Company, for it was 'Utva' which started the series production of sailplanes, and materials needed for home-building by amateur gliding groups. This Company later became an aeroplane factory, but continued with the production of sailplanes after the end of the war.

It should be mentioned that in the period between the world wars glider design in Yugoslavia did not succeed in attaining the achievements reached in the field of design and construction of aeroplanes. The reason for this lies in the fact that, due to the relatively small numbers involved, the aeronautical industry was not interested in designing and constructing sailplanes, whilst the State's financial help was not enough for encouraging home design. Only young designers, as yet inexperienced, were dealing with the problems of design and construction of sailplanes.

A new and much more significant period of Yugoslav gliding development started after the end of World War II. Changed social conditions, which led to more intensive care for the development of gliding, resulted in the gliding movement being organized on a much wider basis. The war operations were still going on in the western parts of our country, while here at Vršac in 1945, a school for the training of gliding instructors was founded which became in 1947 the United Gliding Center. Soon the center was the source the experts were coming from. It also became the organizer of several competitions, the body which decided the conditions for gliding badges, and homologated the flight results. In conformity with this center, a number of new aeronautical centers were founded throughout all Yugoslav Republics, which paid specific attention to the development of gliding. Owing to such a wide activity during the last 25 years, almost 10,000 glider pilots were trained, 600 of them gaining the silver 'C' badge, 80 the gold 'C', 27 two diamonds and 10 three diamonds.

In the post-war period the design activity in the field of gliding experienced a very positive transformation in Yugoslavia. This transformation consisted not only of an enlargement of the number of prototypes, but, as well, the highest standard of some of the designs, whose characteristics included new aerodynamic, design and technological solutions. This was in a way a contribution to the world progress of sailplane design.

I will mention, in connection with the above statement, the sailplane 'Orao', designed by the engineers Boris Cijan and Stanko Obad. It was constructed in 1949 in the Ikarus factory, Zemun. This sailplane was among the most interesting sailplanes present at the World Championship in Sweden in 1950. It was characterised by a semi-laminar profile which permitted higher cross-country speeds, helping pilot Borišek to reach the third place.

The second important sailplane which made history in the gliding world was the two-seater Košava, which was designed by Ing. Miloš Ilič and Adrijan Kisovec in 1953. On this type the designers used full span trailing edge flaps, which could be deflected upwards to improve penetration between thermals, the outer parts working as ailerons.

This and some other aerodynamical innovations on the Košava showed that this was one of the most successful two-seaters built until that time. It was proved when, in 1954 the pilots Zvonimir Rajn and Božidar Komac, with a great lead in points, won the first prize in the World Championships in England. During the next contest in France in 1956, the pilots Rajn and Stepanović attained the second place with it. With this sailplane a number of national records of high value were set up too. The crew, Komac-Bogojevic, in 1956 set up a world record out and return flight of 300 km, and Cvetka Klancnik in 1958 set up a women's record for a 100 km triangle with a speed of 85 km/h. This record was not surpassed for eight years, and even now has been exceeded by only 10 percent.

The high performance sailplane 'Meteor' designed and built in 1956 by Ing. Stanko Obad, Boris Cijan and Miha Mazovec represented the culmination of a logical development which was started by the 'Orao'. This metal single-seater with a span of 20 m and a laminar profile, had a best glide ratio of 40 and a minimum rate of sink of 0.66 m/sec at an indicated speed of 110 km/h. The manoeuvring abilities of the Meteor were outstanding at speeds down to 70 km/h which was very useful while circling in thermals. With these characteristics the Meteor was for a couple of years ahead of its time. This sailplane enabled the Yugoslav pilots Saradić and Komac to reach the fourth place in the World Gliding Championships 1956 and 1958, whilst the pilots Komac, Mrak and Dolinar set up world records with it for the 100 and 300 km triangles.

Immediately after the Second World War the activity of designing and building sailplanes, described before, started with the single-seater 'Galeb' by Ing. Cijan (in 1945), and with the training sailplane 'Jastreb' by Ing. Šoštarić (in 1946).

For the sake of training larger numbers of pilots, the Yugoslav designers paid great attention to build school gliders, designed for different conditions of training. In the first post-war years single-seat trainers like the (already mentioned) 'Jastreb', and the 'Vrabac'; however, since it was very quickly discovered that the solo-method was unsuitable, Ing. Šoštarić, in 1952, suggested training with a two-seater for which purpose he designed the 'Roda' sailplane with open cockpit. This two-seater has been used largely in Yugoslavia since 1953.

The training was further improved by Ing. Cijan's 'Kobac' with metal construction and closed cockpit and by the 'Letov 22' in 1956, and subsequently by the 'Libis 17' and 'Cirrus HS-64' glider of Ing. Kisoveac and Hrisafović.

This made the training of glider pilots possible without flying on intermediate sailplanes, so that pilots continued their training straight on 'Delfin' standard sailplanes, constructed by Ing. Dragović and Gabriel and by the instructors Kučera and Berković. These sailplanes represent the basic type used by all the clubs and aeronautical schools of the Union of Aeronautical Organisations of Yugoslavia.

Besides the sort of sailplanes mentioned before, some gliders for special purposes are designed and built in Yugoslavia as there are the seaplane gliders 'Jadran' and 'Split', designed by Koser from the designers group at Zagreb, for exploration of soaring conditions along the Adriatic coast, and the acrobatic gliders 'Maćka' and

'KBI-14', designed by Ing. Ilic.
Only a few days ago, a new contribution to the development of gliding in Yugoslavia, the SSV-17 motor-glider, made its first flight. This glider is constructed of plastics and was produced by Vršac Aeronautic-technical Center, according to the project of Ing. Šoštarić of Yugoslavia and Ing. Vogt of West Germany.
I would like, in conclusion, to point out a few of the vital facts which define the place of Yugoslav gliding in relation to the world gliding movement.
First I must mention that Yugoslavia has been producing sailplanes for more than 60 years. The second fact is that almost all Yugoslav designers were, if we may say so, born at the Aeronautical Department of the Faculty of Mechanical Engineering of Belgrade University and Technical Faculties of Zagreb and Ljubljana Universities. This certainly testifies to the quality of the Institutions mentioned, as well as the technical and practical capabilities and experience of Yugoslav designers.
And, as such, the contribution of Yugoslav designers and glider pilots, to world gliding, has a very special importance for all of us.