

OPENING ADDRESS

Commander Teixeira, Dr. Cid, Your Excellencies, Honoured guests, ladies and gentlemen. It is a very great pleasure for me to open this Eleventh International Congress of the Aeronautical Sciences in this beautiful and historic city of Lisbon. We are deeply grateful, Dr. Cid, for the kind invitation from the Grupo Português de Aeronáutica which made it possible for us to hold this Congress in your attractive and colourful country.

We are most honoured that his Excellency, the President of the Republic of Portugal - General António Eanes -, has extended his patronage to the Congress through the presence here, today, of his personal representative, Commander Gomez Teixeira.

Our last congress was held in Ottawa - our first venture into North America - and while it was quite successful, I must say that in returning to Europe via Lisbon - one of the great aerial gateways to both North and South America - we are once again much closer in distance, to the home cities of most of our member societies.

Our Honorary President, the distinguished aeronautical scientist, Professor Maurice Roy, is, for reasons of health, unable to be with us today on this happy occasion, and has asked me to express his deep regrets to you. However, we are hoping that circumstances will permit him to be present for a couple of days later this week so that many of his friends in this audience may have the chance to renew their acquaintance with him. Six years ago, at our Eighth Congress in Amsterdam, the Council of ICAS took note of the fact that in that year, 1972, Brazil and Portugal, two countries represented on our Council, were celebrating the 50th anniversary of the first crossing of the South Atlantic Ocean by air, this pioneering flight having been made by two naval officers of the Aeronautical Branch of the Portuguese Navy.

In a letter of greeting which I had the honour, as President of ICAS, to send at that time to the Chiefs of State of Brazil and Portugal, the following memorandum concerning this flight was included.

"Rear Admiral Gago Coutinho, navigator, and Captain Sacadura Cabral, pilot, left Lisbon on 30 March 1922, with a small group, in three Fairey seaplanes. Admiral Coutinho was using a sextant for celestial navigation which he had developed himself. After those heroic Portuguese airmen had contended with the difficulties inherent in the pioneering aircraft of those early days, which necessitated the sub-

stitution of two of their seaplanes, the two officers arrived at Rio de Janeiro on June 17. Bearing in mind the very early date at which this flight was undertaken, only nineteen years after man's first successful controlled flight in a heavier-than-air machine, it stands out as a truly remarkable feat in aeronautics."

ICAS sent its greetings and was happy to join with these two countries in commemorating this early and great achievement by two courageous naval officers.

In looking back on this remarkable flight and noting that Admiral Coutinho, the navigator, used a sextant which he had himself developed, it is perhaps appropriate to remark that he was only following a great Portuguese tradition - the dedication to personal excellence in navigation. For in the World's great period of discovery, the fifteenth century, Portugal was the greatest maritime power in Europe and she owed this greatness and success very largely to her cultivation of the art and science of navigation. And it seems that three men deserve most of the credit. Very early in the fourteenth century, King Diniz, who I believe founded the National University in this city, had the ambition to create a navy. So he imported 21 Genoese mariners, and others later, to maintain a nucleus of pilots, instructors and ship's captains for the Portuguese Marine. Today, we would call this 'technological transfer' - a vitally important procedure which most countries pursue vigorously, especially in aeronautics. In fact, King Diniz appears to have been one of the originators of the custom.

Then a hundred years later came Prince Henrique, son of King John I, known to all as Henry the Navigator, the greatest patron of the art of navigation up to that time. Not only did he inspire his captains to daring feats of navigation into the unknown land regions of the African continent south of Portugal, he also founded a nautical school at Sagres where he encouraged his mariners to study astronomy, mathematics, and geography, and to develop the art of navigation by the scientific application of these subjects to their tasks. He enticed the world's best astronomers and geographers to come to Sagres, and an observatory was built there, to provide, among other things, better tables of the sun's declination. He taught his mariners how to make charts and maps of the strange waters and lands they visited, and he encouraged them to construct navigational instruments, just as Admiral Coutinho did for his flight across the South Atlantic Ocean, 500 years later.

Then after Henrique's death in 1460, King John II carried on the astronomical research which Henrique had started, so that men with knowledge and skill and innate personal qualities of courage and ingenuity were able to make great voyages and discoveries. And these lifted their country to a pre-eminence that has left its indelible mark on the world over the intervening centuries. So we recall the names of great Portuguese navigators, some of them household words - Bartholomeu Dias (1450 - 1500), the first European to round the Cape of Good Hope; Vasco da Gama (1460 - 1524), who reached India and founded Portuguese India; Ferdinand Magellan (1480 - 1521), whose expedition was the first to circumnavigate the world, and Pedro Alvares Cabral (1460 - 1526), who took possession of Brazil in 1500 in the name of Portugal. I wonder if he was an ancestor of Captain Sacadura Cabral who flew the South Atlantic Ocean to Brazil, in 1922. I rather hope he was. I think of all the fascinating stories of exploration and discovery, including that of Labrador as well as Brazil, which were an integral part of Portuguese history in this period of some 200 years - the so-called Golden Age of Portugal.

I am sure that many, if not most, of the persons in this audience are familiar with this great history, certainly our Portuguese friends must be. But I thought that these historical reflections would be of timely significance today, for we know, as Admiral Coutinho knew, that the basis of navigation in the air is firmly rooted in the art and science of marine navigation in which Portugal was pre-eminent 500 years ago. So while we pursue our program, and at intervals enjoy the warmth and hospitality of Portugal, its colour and beauty, the famous wines and marvellous beaches, we shall perhaps ponder on the inspiration which lies in its history, based on a technology so closely linked to that of aviation.

To close my address, I would like to tell you something about the program we have arranged for this week. Authors from 16 countries will deliver a total of 69 lectures - about ten more than in past congresses. Six of these are truly joint international papers, the authors of which live, and work in, and are nationals of different countries. And a seventh paper deals with a joint European study. In four of these joint papers, scientists and engineers from the Federal Republic of Germany are collaborating with colleagues in France, the Netherlands, Sweden and the United States. I offer my admiration and congratulations to these Germans and hope that their leadership will inspire other countries to emulate them in this important and beneficial international co-operation.

As in the past, our program addresses the major problems in aeronautics and aviation. Beginning today, we shall hear about aerodynamic and structural developments which are steps which in the long run, will collectively mitigate the problems created in aviation by the fuel crisis. One of our general lectures will describe the innovations in aircraft engine technology aimed at reducing fuel consumption. Implicit in many of the aerodynamic lectures is the need to reduce aircraft drag, with the promise of further savings of fuel. Similarly, in the aircraft structures sessions, both explicitly and implicitly, the lectures will focus on improved structural efficiency, leading to savings in structural weight, and again, fuel economy.

The development of composite materials for more efficient structures, began in earnest several years ago and is now reaching fruition. We have no less than eight lectures which will look at the mechanical properties of composites, their performance under stress, their vibration characteristics and their response to environmental factors.

The modern electronic computer has become a powerful tool with growing applications in all walks of life. It has figured in aircraft design almost from its original development. So it is not surprising that we will have some fifteen lectures in four sessions devoted to computational aerodynamics. Two of these will be concerned with the design of transport aircraft and two more with the design of component elements of aircraft wings.

Looking at aviation as a transportation system, we will have seven lectures on aircraft noise and environmental problems. We shall be looking at helicopter noise and the noise around heliports, and there will be a lecture on the status of a European joint research program in light aircraft noise. Another lecture will review our researches to-date into noise created, not by the engine, but by the airframe.

As we continue to strive for the convenience and economic benefits of higher and higher speeds in air transportation, our interest in transonic air flow characteristics grows ever more imperative. There will be seven lectures on this important subject. Looking even further into the future are two lectures on supersonic airflow and three that will discuss the characteristics of vehicles to cruise at hypersonic speeds - upwards of several times the speed of sound.

The wind tunnel, ever since the days of the Wright Brothers, has remained the single most powerful tool for the development of new air-

craft. How very appropriate then, that Dr. Smelt's Guggenheim lecture will examine its relevance in future aircraft development. Not only that, but it will be followed, later in the week, by ten lectures dealing with new wind tunnels, new configurations in their adaptations, co-operative wind tunnels such as the European transonic, high Reynolds number, tunnel and the German-Dutch wind tunnel, and anechoic and aero-acoustic wind tunnel testing techniques for aircraft noise research.

In three lectures we shall hear discussions of aero-elasticity and flutter - manifestations of the interaction of the oscillation characteristics of aircraft structures and the resulting aerodynamic forces. We shall have seven lectures on fatigue of aircraft structures and fracture mechanics - problems which never cease to plague the structural engineer, and the maintenance engineer who is responsible for the operating safety of civil and military fleets of aircraft.

We shall hear lectures on advanced instrumentation for flight testing, improvements in engine-airframe integration and in aircraft flight control. But surely, the most intriguing title is that of our last lecture this afternoon - "Recent Aerodynamic Contributions to Problems of Bird Flight". Have the birds somehow come to us for assistance from our specialists? or have we discovered from the flight of birds how to deal with the fuel crisis? I can only tell you to come and find out for yourselves. We look forward to a very stimulating week of lectures and discussions, and above all, we once again can meet with old friends from other countries to discuss matters of common interest, and to renew these valued friendships.

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John J. Green
President, ICAS