

# Foreword: ISABE and the 2019 symposium in Canberra

Propulsion systems have revolutionised human activities and made the world smaller. They have brought transport advances that enabled the conversion of dreams into reality. Very large, international, high-technology investments are being made to continue to develop efficient and affordable gas turbine and ramjet propulsion while implementing knowledge that is bringing large environmental benefits. Following the collaboration between International Society for Air Breathing Engines (ISABE) and the Royal Aeronautical Society in 2017, this special Issue of *The Aeronautical Journal* offers a technical and international selection of research papers highlighting a wide range of topics featured in the 24th ISABE Conference that took place in Canberra, Australia between 24–27 September 2019.

ISABE was founded in 1972 to bring together the international community that creates these changes. Professor Valensi from Institut de Mécanique des Fluides de Marseille and Dr J. Bubb from Wright Patterson AFB concluded that there was not a proper international forum for airbreathing propulsion. It was agreed, after the International Council for Aerospace Sciences (ICAS) in 1970 held in Rome, to organise a symposium and continue on a voluntary basis. Professor Valensi offered to hold the first symposium in Marseilles, France in 1972. The participants came from a group of high-speed propulsion specialists. Since then the organisation has organised biennial symposia that rotate around the world, the latest global round including 2015 in Phoenix, Arizona, USA; 2017 in Manchester, UK; and the most recent conference, the 24th for ISABE in Canberra, Australia. This last conference was delivered by the Australian National Organising Committee led by the ISABE vice president Prof Andrew Neely and the conference secretary Dr Bianca Capra, both of the University of New South Wales, and the acting Australian national representative Dr Dries Verstraete from the University of Sidney. They led a large team of students, industrialists and academics.

ISABE aims to disseminate and encourage aerospace knowledge. The knowledge needed to deliver increasingly efficient, economic and environment friendly propulsion systems will give rise to many exciting and challenging careers. It is significant to note that a modern civil aircraft engine commands a price worth several times the value of its weight in silver. Much of this value stems from the knowledge needed to conceive, design, develop, certify and maintain it. Increasingly, concern for the environment gives rise to large investments in propulsion technology. As a result, the industry will continue to demand highly talented young individuals to meet and overcome the challenges the propulsion community is facing. Many illustrious individuals have received ISABE awards on the basis of their technical contribution. The 2019 awardees listed below are hopefully an inspiration to young individuals considering careers within the propulsion community and delivering outcomes that will be valued by future generations.

The 2019 ISABE International Collaboration Award was shared between two recipients. The first 2019 award was posthumously awarded to Prof Greg Walker from the University of Tasmania. Professor Walker played a leading role in ISABE, initially in the early years as one of its founding members. His long tenure as the ISABE Australian National Representative included bringing the ISABE conference to Australia for the first time in 1995, which he also chaired. The award also recognises Greg's long-standing collaborations in gas turbine compressor aerodynamics with academia and industry in the UK and further afield. The second 2019 ISABE International Collaboration Award went to Prof Allan Paull from the University of Queensland. This was made in recognition of his key role, both at UQ and then at the Defence Science and Technology Group, in instigating and leading Australia's world-recognised hypersonic flight-test programs (HyShot, HyCAUSE, HIFiRE) in collaboration with a wide range of international partners.

The 2019 ISABE award went to Prof Herbert IH Saravanamuttoo in recognition of his remarkable career spanning two continents plus a breadth of contributions in education and research. Directly as a leading academic in Carleton University and indirectly through his best-selling textbook *Gas Turbine Theory*, he has brought many young, bright, and talented individuals into our industry.

The best paper award for the 2017 conference was received in Canberra by Dr Ioannis Goulos, representing the authors, Ioannis Goulos, John Otter, Tomasz Stankowski, David MacManus, Nicholas Grech, and Christopher Sheaf. Their technical paper 'Design Optimisation of Separate-Jet Exhausts for the Next Generation of Civil Aero-Engines' was the outcome of a longstanding industrial academic collaboration on civil aircraft engines between Rolls-Royce and Cranfield University.

In the 2019 conference many high technology aspects were covered. These included advances in power plant components, accessories, whole engine performance assessment and a wide range of integration aspects. A key topic, hypersonics, attracted and continues to attract a large amount of attention. The Australian government has made important investments in this area and has fostered government-industry-academia relationships to give the country a global leading position in this exciting area. The advanced technology and complexity of the relevant propulsion systems became very clear through several keynote presentations and a large number of technical papers presented in several sessions. These systems are giving rise to large multi-disciplinary investments and activities to achieve large benefits.

Beyond hypersonics, there were detailed technical presentations plus an extensive programme of very senior international aerospace speakers covering many aspects of the value chain of aerospace. These experienced individuals shared with us relevant aspects of their valuable knowledge and promising projections for the future of airbreathing propulsion. Preeminent and properly celebrated was the important milestone of the 100th anniversary of the first UK-Australia flight by Captain Ross Macpherson Smith, his brother Lieutenant Keith Macpherson Smith, Sergeant W.H. Shiers, and J.M. Bennett.

2019 also saw the launch of ISABE Education, with two 4-day courses delivered the week before the conference. The courses were Gas Turbine Performance, Simulation & Diagnostics, and Propulsion System Performance & Integration. Eighteen delegates from Australia and other countries attended these two advanced programmes. Given this successful start, it is the intention of ISABE to plan similar events in the future, adding to the attraction and benefits of the conference.

Another important innovation in the 2019 conference was a focused exercise to enhance awareness of the attraction and challenges of our industry to female entrants. On the last day of

the conference, a large group of young ladies interested in STEM for their pre-university studies enrolled in a workshop that included engineering activities and attendance to the ISABE panel ‘Disrupting Distance with Advanced Propulsion Technologies’. This very important endeavour to eliminate the gender gap is an absolute necessity given the need to continue to attract top STEM talent into the many activities that underpin propulsion engineering at a time when so many challenges are being overcome.

Against a local backdrop of climate change and environmental protests occurring close by, the conference identified technology advances to further enhance the environmental performance of propulsion systems. Gradually our industry, through vehicles such as ISABE and the Royal Aeronautical Society, is beginning to make its message heard: technology solutions can protect the environment AND protect employment. The voice delivering this all-round beneficial message needs to be strengthened.

So whether you are an experienced technologist, an eminent scientist, an active researcher, a busy commercial executive, or a young person seeking career inspirations, you will find many interesting and challenging topics covered at ISABE and in this issue of *The Aeronautical Journal*. Our next conference will take place in Ottawa, Canada in 2021. Please follow the details in our website: <https://www.isabe.org/>. Further information about the 2019 conference details can be found in <https://2019.isabe.org/>

**Pericles Pilidis FRaES**

UK National Representative for ISABE