ROYAL AERONAUTICAL SOCIETY
AUSTRALIAN DIVISION
SYDNEY BRANCH

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NEWSLETTER

Title: **'The key to successful engineering design and manufacturing – unlocking 50 years of Aerospace wisdom to solve future problems'**

Speaker: **Dr Leonard John Hart-Smith FTSE**
Former Boeing Company
Senior Technical Fellow

Date: **Thursday, 19th March, 2020**

Time: **18:00 for 18:30 hours (sharp)**

Venue: **Mechanical Engineering Theatre**
Mechanical Engineering Building, University of Sydney

Hosted by the Joint Board for Aerospace Engineering of Engineers Australia and the Royal Aeronautical Society Australian Division
Refreshments will be available prior to the commencement of the meeting. Attendance will attract 1.5 CPD hour

ENGINEERS AUSTRALIA

STOP PRESS STOP PRESS STOP PRESS STOP PRESS

Due to the Covid-19 virus Professor Ian Poll has withdrawn his offer to be our speaker for the IESP 2020. Fortunately, at this late stage, Dr Leonard (John) Hart-Smith has agreed to accept our invitation to be the IESP 2020 - he is an Australian who has worked with Boeing for many years on aero-structures and is greatly respected by his peers. If you had previously registered for Prof Ian Poll your registration will be carried forward.

Profile: Born and educated in Australia, culminating in a PhD and Higher Doctorate in Engineering from Monash University, in 1968 Dr (John) Hart-Smith took a position at the Douglas Aircraft Company in Long Beach, California, fulfilling a boyhood dream to design and build aircraft. Forty years later, he retired from The Boeing Company, as a Senior Technical Fellow, the highest level in the Technical Career Path, being well known at most of the world's aerospace companies. He was best known as an expert on adhesively bonded joints and strength prediction for composites, having lectured on these topics at many universities and factories around the world, and developed related computer codes. But he is now best known for his famous paper on the out-sourced profits associated with excessive out-sourcing of work. He consulted on some fascinating projects, particularly solving production problems on bonded and composite structures that other experts had been unable to solve. He has regularly presented his research results and what he learned at lectures in Australia and around the world. His own research and observations from countless hours in many aircraft factories were complemented by discussions with some of the best of the old-time experts, passing on what they thought were the most important lessons from their own careers. Sadly, this wisdom is almost never documented. Dr Hart-Smith has consciously tried to document what he learned. This lecture tour is a part of that effort.

Synopsis: There is reluctance in industry to document past experiences. Sometimes to save embarrassment from failures and sometimes to avoid helping the competition by explaining successes. When developing new technologies computers can provide answers quickly; however,

the underlying limitations of a programme/model can be dangerous when applied incorrectly. To be of value, they must be supplemented by engineers who have been better trained in the fundamentals, who can think for themselves: to make black-box computers their servants instead of being reduced to being their slaves. In an environment focussed on stock price and schedule, progress is impeded when past mistakes are ignored. If repeated, these can lead to undesired outcomes. From unnecessary manufacturing costs through to program delays: Things that could easily be avoided had there been better access to what was already known, but likely only available as undocumented tribal knowledge. In this presentation, Dr Hart-Smith will share his experience in solving production problems for numerous organisations around the world. This is a rare opportunity to gain an insight to his extensive learning from working in aircraft factories worldwide and engaging some of the most experienced experts in the world on all aspects of aircraft structures, all eager to pass on their wisdom to anyone who could comprehend it. Two of his solutions led to very low-cost production of structures with zero defects during the entire production run. One of his novel design ideas saved $500,000 on each C-17. The most important lessons learned, illustrated by specific cases, will be presented in the hope that others can benefit from them in the future.

Agenda: **18:00** Registration and refreshments
18:30 Welcome by Mr David Cox FRAeS, Chair of the Sydney Branch
18:35 Presentation by **Dr John Hart-Smith FTSE**
19:30 Q&A **19:35** Supper

This evening is proudly Sponsored by

Australian Society for Defence Engineering

Australian Society for Defence Engineering (ASDE) is a technical society established by Engineers Australia in order to provide a forum to engage with various engineering fields and contribute to the practice of Defence engineering.

AEROSPACE AUSTRALIA LIMITED

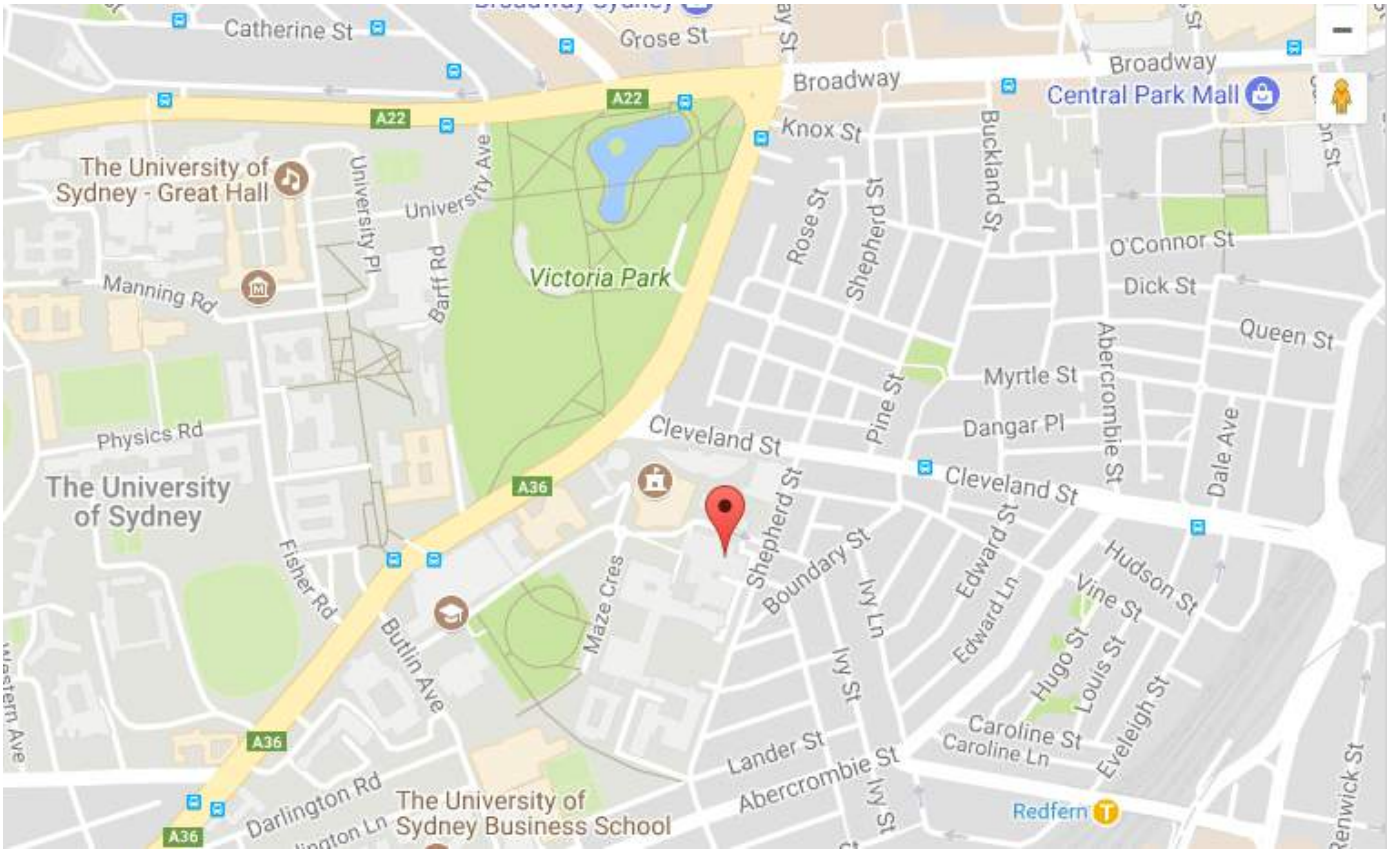
Aerospace Maritime and Defence Foundation of Australia Limited is a not-for-profit corporation limited by guarantee and established to promote the development of aviation and Australian industrial, manufacturing and information/communications technology resources in the fields of aviation, aerospace, maritime and defence.

RSVP: Registration for the evening **is required** by clicking on/copying and pasting into your URL this link: **https://www.engineersaustralia.org.au/Focus** Your registration will be confirmed by email with an attached ticket. **Please print the ticket and present the ticket at the door.**

Lecture registration includes:
• Attendance at the Event and Q & A session
• Networking opportunities at the welcome tea and coffee
• Following the presentation, light supper (pizzas) will be provided to give the speaker and attendees the opportunity to mingle and to continue discussions.

Public Transport: The closest train station is Redfern station, which is a 10 minute walk away from the venue. From Railway Square near central station most 42X bus (e.g. 422, 426…) and the M30 will take you to the University of Sydney (on City Road) – but check with the bus driver before boarding. Please allow time to travel by public transport, including waiting time, and time to walk to the venue. Please refer for further details: http://www.sydneybuses.info/routes/timetables-route-maps

Parking: is available in the Shepherd Street multi-story car park, located on the corner of Cleveland St and Shepherd St. The rate is $2 per hour (up to $6 maximum) but note that only gold coins are accepted in some machines. Parking is also available in University of Sydney On-Campus Parking for $2 per hour (up to $6 maximum). Additionally, free parking is available in surrounding streets. Please observe parking restrictions and allow time to drive to the University of Sydney, park, and walk to the venue. Venue map copy and paste address into your browser: http://sydney.edu.au/maps/campuses/?area=CAMDAR Scroll down the 'Building Bar' on the left hand side to: Mechanical Engineering Building J07 and click



Koala-spotting drones prove a flying success: First published 2 March 2019 In the Nature journal Scientific Reports, the researchers detail the technique that involves an algorithm for locating the koalas using drones that can detect heat signatures. The technique has great potential to improve management of koala populations and other threatened species as well as being used to detect invasive species. Dr Grant Hamilton, from QUT's School of Earth, Environmental and Biological Sciences, who co-authored the study, said the researchers were able to correlate the detection of koalas from the air, using ground surveys of tracked radio-collared koalas in Petrie, Queensland. The system uses infrared imaging to detect the heat signals of the koala despite the canopy coverage of the eucalyptus trees. "Nobody else has really managed to get good results anywhere in the world in a habitat this complex and in these kinds of numbers," Dr Hamilton said. To maximise the effectiveness of the technique, the researchers carried out their aerial sweeps of the area in the early morning during colder months, when difference between the body heat of the koalas and the background was likely to be greatest. After the flight, the data was put through an algorithm that was designed to identify the heat signatures of the koalas compared to other animals in the area. "On average, an expert koala spotter is going to get about 70 per cent of koalas in a particular area," Dr Hamilton said. "We, on average, get around 86 per cent. That's a substantial increase in accuracy that we need to help protect threatened species. But Dr Hamilton said the high accuracy rate of the drone detection did not mean other means of determining koal a population, such as by human spotters or dogs, were no longer necessary. "What we do know now is that this is a really powerful tool within the toolbox," he said. Following the success of the study, Dr Hamilton said the researchers were looking to expand the area where they had studied koala populations and would use the drone system in other parts of Brisbane, south-east Queensland and northern New South Wales.

Drone and heat mapping technology in action

11-16 February Singapore Airshow – Fly Above Expectations – Part1: Over the course of the week, the 7th edition of Singapore Airshow 2020 welcomed close to 30,000 trade visitors from more than 110 countries and over 20,000 public visitors at the Changi Exhibition Centre from 11 – 16 February 2020.

During the two public days 15–16 February, visitors enjoyed a total of four display performances from three countries that included the Republic of Singapore Air Force's aerial display team consisting of an F-15SG fighter jet and two AH-64D attack helicopters, China's People's Liberation Army Air Force aerobatics team Ba Yi, the United States Marine Corps' F-35B Joint Strike Fighter, and the United States Pacific Air Forces' F-22 Raptor. The United States Air Force's B-52 Stratofortress also performed a flyover on 15 February.

"Despite current global concerns surrounding COVID-19, we were encouraged with solid support from over 930 participating countries from more than 45 countries. The presence of over 90% of participating companies at Singapore Airshow 2020 is a clear testimony of the platform's strategic relevance in the global aviation and defence ecosystem," said Mr Leck Chet Lam, Managing Director, Experia Events Pte Ltd, organiser of Singapore Airshow. As one of its precautionary measures to ensure well-being and safety of all attendees, Singapore Airshow 2020 had scaled down sale of public day tickets by more than half. "The public's interest and presence was a vote of confidence in the precautionary measures that were implemented to safeguard their well-being and safety. We were glad to close Singapore Airshow 2020 on an optimistic note and will continue to stand in solidarity with all our stakeholders in the aviation and defence industries as we weather this challenging period. I am confident we will emerge even stronger and continue to deliver a more robust Singapore Airshow 2022 that facilitates the transformation and growth of Asia's aviation and defence industries," added Mr Leck. The 8th edition of Singapore Airshow 2022 will be from 15 – 20 February 2022, at the Changi Exhibition Centre. For further details refer: **about-singapore-airshow**

From country NSW to NASA via University of Sydney: Many of our longer-term members would remember Benjamin attending our presentations and visitations, and thanks to him and others like him, getting the first astronauts to Mars is becoming a possibility. Ben was born in 1992 in Middlesbrough, England, to Tasmanian parents on a temporary work assignment. At high school in Wollongong, he became absorbed by maths and science. "I really loved that there were these tools to help you understand how the world worked." To that end, he took Sydney University's Aeronautical (Space) Engineering degree, winning the University Medal in 2013.

"I loved *Star Wars* as a kid. The more I learnt about the aerospace industry, about aircraft, about spacecraft, about rockets, about satellites, the more interested I got." Fate arrived in the form of Greg Chamitoff, a Canadian-born lecturer who returned to Sydney University after being a NASA astronaut. Ben had some interesting projects including some research he was involved in on the space station. That was with these robots called SPHERES, inspired by *Star Wars*. In the very first movie Luke Skywalker is on the Millennium Falcon training with his lightsaber and an orb floating around shooting little laser pulses at him. Basically, that is what inspired SPHERES. They're soccer ball-size robots that float around the space station and move like satellites, and they are test beds for different types of robotic algorithms. Ben initially started doing some research in the last year of his undergrad, helping to design the brains of these robots to be able to safely navigate around obstacles. Greg Chamitoff supervised Morrell's PhD (*"Enhancing 3D Autonomous Navigation Through Obstacle Fields: Homogeneous Localisation and Mapping, with Obstacle-Aware Trajectory Optimisation"*).

Ben is a champion networker – joining societies and institutes, attending overseas conferences at his own strained expense, meeting as many people in the field as he could, and voraciously reading, learning and developing skills. The harder he worked, more "lucky" breaks came his way. In 2015, another astronaut, Sandy Magnus, invited Morrell to a dinner where he sat near – and greatly impressed – a deputy director of the NASA Jet Propulsion Laboratory, where he now works.

Is a two-way manned flight to Mars technologically possible? Ben says yes as an individual, not on behalf of his employer. It will need vast amounts of money and resources, drive and good momentum … maybe not from one country by themselves but in co-ordination from many countries.

Is he surprised that he may have a role? Yes. It's an incredible opportunity and he wants to make the most of being at NASA … and to help make connections with the Australian space industry, which is growing a lot now. Ben's immediate challenge is the DARPA Subterranean Challenge, the third Grand Challenge sponsored by US Defense. The first one spawned the autonomous driving industry. Each team must use their robots to meet a series of underground challenges. In the process, they'll finesse technology that can operate in the complete unknown.
Hopefully the next time Ben is in Sydney we can arrange for him to give us a presentation. Courtesy: AFR Magazine's March edition, including the MACHINE supplement, February 28.

Erickson Air Crane may go Autonomous: Helicopter manufacturer Erickson Incorporated has signed a development agreement to integrate its S-64 Air Crane helicopter with Sikorsky's MATRIX autonomous flight control software, creating the possibility of producing an optionally piloted version of the well-known firefighting helicopter.

Replacing the helicopter's original controls with fly-by-wire digital controls would mean the helicopter's flight control system could accept inputs from other sensors through the MATRIX system, to either lighten the workload of a manned crew under difficult conditions, or even operate autonomously to fight fires at night or in other highly challenging conditions.
Erickson also recently announced development of a new "S-64F+" version of the helicopter, which will incorporate new engines, composite main rotor blades and a more powerful water cannon. There are 45 S-64s flying around the world, including 20 operated by Erickson on firefighting or heavy lift missions. (Kestrel Aviation manages the five Erickson Air Crane S-64s operating on firefighting duties in Australia.)

100 years - the Spirit of Australia: "The story of Qantas is the story of modern Australia – past, present and future. It's a remarkable and unlikely tale of how a humble air mail operation in outback Queensland became a national carrier flying over 50 million passengers a year. It's a story of service – through peace, war, natural disaster and national celebration. It's a story of innovation – from a 31-stop, 12 day flight to London, to operating the world's first non-stop flights between Australia and Europe. But most of all, it's a story shared by all Australians. Thanks for joining us in Qantas' Centenary year as we celebrate that story and look towards creating new stories for future generations to tell." Alan Joyce, Chief Executive Officer and Managing Director, Qantas Airways Limited. Refer for further details: **gantas.com/au/en/100-years-of-the-spirit-of-australia**

2019 Annual General Meeting

Royal Aeronautical Society Australian Division Sydney Branch Inc

Date: **Wednesday 27th May 2020** Time: **Commencing 18:00 hours - sharp**

Venue: **Mechanical Engineering Theatre, Mechanical Engineering Bldg, Uni of Sydney**

Venue map (copy and paste address into your browser): http://sydney.edu.au/maps/campuses/?area=CAMDAR
Scroll down the 'Building Bar' on the left hand side to: Mechanical Engineering Building J07 and click.
Refreshments will be available **prior** to the commencement of the meeting.

2019 AGM Agenda

PRESENT: Members to sign attendance book.
APOLOGIES:
PREVIOUS MINUTES: Minutes of the 2018 AGM, discussion and motion to accept.
BUSINESS ARISING: Discussion and motion to accept.
CHAIRMAN'S REPORT: Presentation of the 2019 Annual Report, discussion and motion to accept.
TREASURER'S REPORT: Presentation of 2019 Financial Statement. (Audited report will be sent with the June, 2020 Newsletter) discussion and motion to accept.

ANNUAL ELECTIONS: The Hon Secretary to report on Nominations received for the classes of Committee by the due date Tuesday 5th May 2020 and, should there have been more Nominations received than positions available for any of the classes, the result of elections.

APPOINTMENT OF HONORARY AUDITOR: Mr Stephen Howard, Harrison and Howard.

GENERAL BUSINESS: Any business raised and accepted by the Chairman.

CLOSE OF AGM: Thank you for attending the AGM and the Committee looks forward to your continued support.

2020 Committee Nomination Form: Should you wish to nominate for the 2020 Committee, please complete the Nomination Form below and follow the instructions.

2020 Committee Nomination Form: **Send to:** The Honorary Secretary, RAeS Aust Division Sydney Branch Inc, 88 Trafalgar Street, Annandale, NSW 2038 or Email: sydneybranch@raes.org.au (please ensure that Nomination Forms have been correctly signed)

The 2019th Sydney Branch Annual General Meeting is to be held on Wednesday 27th May 2020, at 18:00 hours, in the **Mechanical Engineering Theatre, Mechanical Engineering Building, University of Sydney**. In accordance with the Branch Rules of the Sydney Branch of the Royal Aeronautical Society Inc passed at the AGM held 7 March, 2018, nominations for the Committee are called and shall be made in writing and signed by one member of the Branch and countersigned by the Nominee. The Committee consists of one Chairman, and 3 Student Representatives, who hold their positions for 12 months, and 10 Ordinary Committee Members (in total 14 people). The 10 Ordinary Committee Members will have a term of 2 years. As stated in the Sydney Branch Rules approved 7 March, 2018, half of the 10 successful candidates elected at the 2018 AGM will hold office for one year whilst the remaining five will hold office for 2 years. The 2019 Committee determined that the five Ordinary Committee Members who will hold their positions for a 1 year term will be: David Adkins MRAeS, Timothy King, Jeffrey Lock Affiliate, Peter Marosszeky FRAeS, and a vacant position (not filled at the 2018 AGM). Nominations are therefore called for the aforementioned 5 Ordinary Committee Members, Chairman, and 3 Student Representatives.

Please forward completed Nomination Forms to the Branch Honorary Secretary at the address above by Tuesday 5th May 2020 which is at least twenty one (21) days prior to the 2019 Annual General Meeting.

I .....*(Nominator's Full Name)*

of .....*(Nominator's Address)*

nominate .....(*Nominee's Full name)*

of .....*(Nominee's Address)*

as an: Ordinary Committee Member / Student Representative / Chairman *(delete 2 of these classes as appropriate)* for the Sydney Branch of the Royal Aeronautical Society Australian Division for the Year 2020.

Signed:.....Date:.....Member Number:.....*(Nominator)*

Signed: .....Date: .....Member Number:.....*(Nominee)*

Tel contact: .....*(Nominee)* *email:* .....*(Nominee)*

NOTE: PLEASE USE ONE FORM FOR EACH NOMINATION

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Office Use Only: Nomination received by the Sydney Branch Hon Sec:.....*(Initials)*.....*(Date)*

Closed Member Only Group on Facebook: Sydney branch is live video streaming our monthly branch lectures. Watch lectures live or later, at the "RAeS - Sydney Branch - Members Only" group within Facebook. Please note that this service is only available to financial members of the Royal Aeronautical Society.

Past Newsletters are now stored on our website: Members are advised that all Sydney Branch Newsletters since February 2012 are now stored on our website. To access this information enter our web address (www.raes.org.au) into your browser, click 'About' then 'Sydney Branch' and scroll this page to the heading 'Sydney Branch Newsletters'. Newsletters are arranged by month within each year heading.

Society Merchandise for Sale: Sydney Branch has a selection of Society Merchandise for sale at its regular monthly meetings. Items include Society Ties, Tee Shirts, Caps, Pins, Lapel Badges, Silver Kestrel Brooches, and Mugs.

Our Sales Director, Mr David Adkins, accepts cash, cheques, and credit cards through PayPal.

Aerospace Websites: www.57rescuecanada.com : Follow Capt. Karl Kjarsgaard's adventures to recover Halifax bomber LW170 which is resting beneath 5000ft of water off the Irish coast;
www.adastron.com/707/updates/updates.htm : Diary of Boeing 707-138B XBA formally Qantas EBA.
www.airshow.com.au www.atsb.gov.au
www.aviationmuseum.com.au-Temora Aviation Museum;
http://boxkite2014.org/book/book.htm - The Boxkite project.
https://en.wikipedia.org/wiki/Rolls-Royce_Trent;
hars.org.au Historical Aircraft Restoration Society
https://herox.com/SpacePoop The Space Poop Challenge
www.powerhousemuseum.com/whatson
https://qfom.com.au/ Qantas Founders Museum, Longreach, Qld
http://www.singaporeairshow.com/
https://www.youtube.com/watch?v=JGjmRRTThdk How TIME created their new cover image with 958 drones
http://www.rbogash.com/B-52/B-52_Disassembly.html How to move a B-52 without flying it – The Final Disassembly and Transport Update for the move scheduled 3/6/2018 - with the wings split and the fuselage in final stages of prep before hitting the freeway.
https://airandspace.si.edu/collection-objects/assembly-bio-harness-armstrong-apollo-11

Diary: **Wed 1 April: Dr Behrooz Barzegar,** recently retired from Airbus. He will discuss his Integration and Architectural roles in Airbus entitled **'Aerodynamic Design of Commercial Aircraft - Airbus A380 and the future'** including the Beluga XL. Further details to be advised.

2-3 May: Wings over Illawarra – The Sydney Airshow - Immerse yourself in history as you wander through rare displays of vintage and classic aircraft including the fully-restored Super Constellation and record breaking Qantas 747 along with some beautifully restored WW2 fighters. In 2020 your entry ticket will once again include access to the Historical Aircraft Restortion Society aircraft that are open for inspection. To thank the supporters of the Wings Over Illawarra event this year, WoI are offering tickets for the 2020 event at half price - but be quick, they're only available for a limited time. For further information please refer: https://www.wingsoverillawarra.com.au/

4-7 May: AUVSI XPONENTIAL 2020 – Find Your Edge – being held at the Boston Convention and Exhibition Center, Boston. XPONENTIAL 2020 is the global stage for everything unmanned - from state-of-the-art propulsion technology, sensors, energy storage and UAS mitigation solutions to what's coming over the horizon in AI, 5G, edge computing and more. As the largest, most significant event for the unmanned systems industry, you'll find your edge as

you explore the latest technology innovations, develop new perspectives as you hear from industry luminaries, and cultivate creativity at special networking events where you will meet some of the most influential leaders in the unmanned and autonomous space. Further details: www.xponential.org/xponential2020

16-18 June: ROTORTECH 2020 will be held 16-18 June at the Royal International Convention Centre, Brisbane. Registration is now open for the essential rotary-wing and unmanned systems industry event. Free-to-attend for accredited trade visitors. Accreditation is based on an involvement in rotary-wing, unmanned systems or affiliated industries in business, government agency, academic, maintenance, owners/operators, response and related sectors. Refer further details: https://www.rotortech.com.au/visit/registration.asp

Friday 14 - Sunday 16 August: Celebration of the Qantas Centenary Fly In - The weekend is designed for general aviators and enthusiasts alike to fly to Longreach, celebrate the centenary of Qantas and explore the many wonders of our outback town. For more information about the Fly In Weekend, please click the link below to the Media Release about tickets being on sale for the Fly In Weekend: centenary-fly-in-tickets-on-sale To book directly for the Fly In Weekend: tour/qantas-centenary-fly-in-weekend For more information about the Museum's Centenary Events: QFM-Qantas-Centenary-Program-of-Events.pdf For personal contact: *Nicole Kuttner, Communications Manager, Qantas Founders Museum & Qantas Foundation Memorial, P.O. Box 737, Longreach, Q. 4730 T: (07) 4658 3737 F: (07) 4658 0707 M: 0428583787*

15-23 August: 43rd Scientific Assembly of the Committee on Space Research (COSPAR) and Associated Events - COSPAR 2020 will be held in Sydney. Host Organization: Australian Academy of Science; Scientific Program Chair: Prof. Iver Cairns, University of Sydney, School of Physics. Abstract Deadline: **mid-February 2020,** The theme of the COSPAR 2020 Assembly is *Connecting Space Research for Global Impact*. More information can be found at www.cospar2020.org

Wednesday, 30 September: 62nd Sir Charles Kingsford Smith Lecture to be delivered by Mr Alan Joyce AC FRAeS, Chief Executive Officer and Managing Director, Qantas Airways Limited. Venue: The Refectory, Holme Building, Science Road, The University of Sydney – commencing 18:00 hours. Further details to be advised. Please **'Save the Date'**.

23-28 February 2021: The Australian International Airshow will comprise industry-only trade exposition days from Tuesday 23 February to Friday 26 February, with public airshow and entertainment days from Friday 26 February to Sunday 28 February. AIRSHOW 2021 CEO Ian Honnery said the RAAF Centenary milestone, together with the 2020 Centenary of the formation of Qantas, means organisers are planning for an event that will eclipse Airshow records. For further details refer: www.airshow.com.au

March 31, 2021: Marks the Royal Australian Air Force 100 years as an independent service. For further details refer: airforce.gov.au/our-mission/air-force-2021

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