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A DIVISION OF THE ROYAL AERONAUTICAL SOCIETY

AeSSA Newsletter August 2016

A MESSAGE FROM THE PRESIDENT OF AESSA

Members of the AeSSa and all other aerospace friends –

In our August newsletter, we introduce the webmaster of the AeSSA and IASSA website. Iain McFadyen, the man behind the scenes, does a fantastic job as one of our most valued AeSSA volunteers. This article forms part of our series on #AerospacePeople: Movers and Shakers in the South African aerospace domain.

Our outreach activities received an enthusiastic response from Patrick White, one of the winners of the AeSSA's Paper Plane competition at the career day held in conjunction with the Wonderboom Adrenaline Show.

The forthcoming International Aerospace Symposium of South Africa looms ever larger on the calendar. In this newsletter, we introduce two more keynote speakers, Dr Alex Cenko, an expert on store separation, and Willem Marais, CEO of AVIC-International Flight Training Academy (AIFA). A Young Professionals Forum is planned for 19 October 2016 and our programme includes a social event hosted by SANSA Space Operations. Please visit www.iassa.org.za where updates and developments are posted regularly.

The theme of IASSA2016 is "Aerospace: 150 Years of progress". In keeping with this theme, the newsletter contains a report on the AeSSA lecture held in July on the Rooivalk helicopter. We also include a brief article on a recent aerospace project that demonstrates the potential for clean technologies: Solar Impulse 2.

A summary of the Farnborough International Airshow and a link to the newsletter of the Royal Aeronautical Society Australian Division Inc complete our line-up for this month.

We welcome your input to and comments on our newsletter; please send them to admin@aessa.org.za

Regards

Glen Snedden

#AerospacePeople

A series of interviews with movers and shakers in the South African aerospace domain.

AeSSA webmaster Iain McFadyen fuses aeronautics insights with Joomla!'s technology



Webmaster Iain McFadyen provides an indispensable service to the aerospace community in South Africa. Most recently, he migrated the websites of both the Aeronautical Society of South Africa (AeSSA) and the International Aerospace Symposium of South Africa (IASSA) to the latest version of Joomla! (an award-winning content management system [CMS]), thereby ensuring that members and interested parties have reliable access to relevant and up-to-date information on stable sites.

He became involved in website design and administration when he was tasked by the AeSSA board in 2004 to design and implement a site for the association. Initially, he used basic HTML, PHP, Java and CSS programming, and kept up with manipulation of images down to pixel level, for the site's overall design and appearance. The site was later redesigned in 2009 using the Joomla! CMS. He notes, "Although far more sophisticated and versatile than basic HTML programming, Joomla! still requires considerable insight into its application. As the program is shareware, the initial migration involved endless trawling of blog posts to seek out solutions to application errors as they arose. The recent migration of the IASSA site amounted to redesigning the site from scratch with similar blog trawling for solutions to application problems."

Iain's interest and background in aeronautics are essential to his ability to create a communication mechanism for a very specific target audience. His first awareness of aerospace can be traced back to his early years. He says, "My childhood home lay close to, and directly below the approach flight-path of Rand Airport and with such regular exposure to low-flying aircraft and much hanging around the light planes on the apron at the airport, I guess it was inevitable that I should develop a passion for things aeronautical."

As a schoolboy, he read avidly any book he could lay hands on about the pioneers of aviation. "Mostly British men such as A V Roe, Geoffrey de Havilland, Frank Whittle and R J Mitchell, were my childhood heroes."

His first flight, at the age of 12, was in a Lockheed Lodestar, flown daily to and from Welkom by a friend's pilot father, who gave him a turn on the joystick. This experience inspired a strong interest in the mechanics of flight and aircraft engineering in general, which amounted to everything from basic aerofoil shapes through to propulsion and flight control.

Iain pursued this interest through his mechanical engineering studies at Natal University (now the University of KwaZulu-Natal). After the former National Institute for Defence Research (NIDR) at the CSIR, he was sent to Cranfield University in the UK for post-graduate study in aeronautical

engineering, with an emphasis on aircraft design. “The faculty had its own flying laboratory and included piloting lessons in a light aircraft as part of my study,” he says.

After graduation he returned to the CSIR’s NIDR where he specialised in airframe design and analysis (both static and dynamic). This field, along with other aerospace interests, was the focus of his subsequent career at Kentron/Denel Dynamics, which spanned some 40 years. Apart from these specialist activities, he was engaged in project and technical management in aircraft stores carriage and release clearance campaigns, missile weapon system definition studies, product design, technology development projects and mentorship.

Iain still keeps up on global aerospace developments through the monthly RAeS Aerospace magazine and regular on-line browsing of aircraft developments. He says, “Modern aircraft have become so complex and multi-disciplinary that it is difficult to single out particular outstanding individuals in this domain, although entrepreneurs such as Elon Musk and Richard Branson do spring to mind.”

He says the role of AeSSA is highly relevant in South Africa. “As the only learned society representing South Africa’s aerospace engineers and technicians, AeSSA’s presence at universities is vital, not only in its oversight of aeronautical course material, but also in actively encouraging and supporting students in this field. Equally important is AeSSA’s role as the aeronautical engineering sector’s representative within the Engineering Council of South Africa (ECSA), the statutory council responsible for overseeing and maintaining regulatory and educational standards in all South African engineering disciplines.” As a division of the Royal Aero Society (RAeS), a body that remains highly relevant to the world’s aerospace industry, AeSSA is in a position to leverage its association with the RAeS in promoting the interests of the local aerospace industry.

To achieve this goal, Iain believes that in addition to maintaining its website, the AeSSA should exploit a range of social media to a greater extent to convey messages and information to its target audience, in particular, the younger generation.

OUTREACH

Winner of AeSSA paper plane competition takes to the skies

Patrick White, one of the two winners at the AeSSA’s competition during the Wonderboom Andrenaline Show career day on 9 June 2016, received a prize to remember. Recently, he got to fly with David Toma and visit the [Airplane Factory](#).

Using one of the templates provided by the AeSSA team, Patrick designed a plane that outflown his competitors.

David and Patrick took off from Wonderboom airport and landed at Tedderfield Airfield, where the Airplane Factory is based. David accompanied him on a factory tour of this factory, where the designers and manufacturers of the Sling range of aircraft are based.

Patrick says, “Thank you to David and Flitecare Operations for the competition and prizes. I am very grateful for the opportunity and will always cherish the experience.

He recounts his experience, “I was very anxious and nervous on the day of the arranged flight, being my first experience in an airplane but David very quickly reassured me that that I was safe.



Competition winner Patrick White takes his first flight with David Toma.

“My first look inside the cockpit with all the dials, gauges, switches and controls was overwhelming, but once David explained what some of these were for, they seemed pretty simple.

“Being in the air was an experience I’ll never forget, especially the part when David allowed me to take control of the centre stick while flying over where we live. I was surprised at how sensitive centre stick was when I had to pull it toward me to gain altitude.

“The airplane factory was very interesting, I was really amazed that a wing has so many parts and that the engines are so huge and seem so complicated. The airplane parts looked like the parts used in Meccano, all small and simple. Put together, they make up airplane. Very impressive!

“I am even more interested in aeronautics today than before the flight and factory visit. I find the mechanics very interesting and would really love some more experience in this industry.

Thank you to all involved for a wonderfully unforgettable experience.”

Edward White, Patrick’s father, says, “He was still smiling from ear to ear when we discussed the flight and factory visit, and this weeks after the event.

“Patrick will be turning 16 next year and we have intentions of approaching the maintenance workshops at Wonderboom Airport to see if we can arrange for Patrick to spend time in the hangars, work with the mechanics and technicians and gain further exposure to the industry.

“I reckon there are probably many youngsters out there who would really appreciate a scholar programme that would allow for this type of exposure before having to leave school and make the ‘grown up’ decisions without really knowing what they are getting themselves into. Such scholar programmes with exposure to any field would be beneficial to our youth and I believe there should be more available.

“Thank you for the competition and prize, a wonderful idea; please continue doing so. Many youngsters would have a once-in-a-lifetime experience of flight because of this initiative.

“David, a very special thank you to you for the arrangements, being a great pilot (there and back safe and sound), for making Patrick feel comfortable.”

David says, “I am glad to see such passion can still be found among the youth as they are the future of the aerospace industry.”

For more information on the AeSSA Outreach programmes, please email [Khutšo Chabangu](#) and [David Toma](#).

ANNOUNCEMENTS



Alex Cenko to deliver keynote address at IASSA2016

Dr Alex Cenko will deliver a keynote address at IASSA2016 under the title, “Mistakes made in five decades of store separation”.

Alex has more than 50 years of experience in the application of computational fluid dynamics (CFD), and wind tunnel and flight testing techniques in the area of aircraft/store integration. He has worked for Boeing, Grumman, and the Naval Air Systems Command (NAVAIR).

He was also the Navy representative to the Technical Cooperative Program (TTCP WPN-2) in defence technology, Store Separation Technical Area Manager for the Institute for HPC Applications to Air Armament (IHAAA), and Visiting Professor at the US Naval Academy.

Alex is an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) During the past year, he was part of the NATO lecture series on Store Separation (SCI-277) in Rome, Ankara and the US.

AIFA CEO Willem Marais to deliver keynote address

Willem Marais joined the South African Air Force (SAAF) in January 1981 and initially qualified as a Navigator on transport aircraft. Over a career of 22 years in the SA Air Force, he completed a total of 5 000 flying hours on four different types of transport and maritime aircraft.

During 1991 he completed a three-year Management qualification through the University of South Africa, specialising in financial and personnel management. During 1996 he completed the Aero Systems Test flying course at RAF Cranfield.

During the last three years of his SAAF career, he was responsible for SAAF’s long-term capital acquisition planning.

Willem is a qualified commercial pilot and flight instructor (SACAA) and also holds a UAE GCAA ATP licence and instructors rating. In 2000 he started his own aviation training organisation (Central Flying Academy – Grand Central airport) which was sold to a UK -listed company in 2005.



In 2007 Willem was appointed Head of Training for Dubai Aerospace Enterprise Flight Academy in the United Arab Emirates. He returned to South Africa in 2010 to accept the position as CEO of AVIC-International Flight Training Academy (AIFA).

Willem is married to Lizette and has two children: Wilco (24 years) and Cecilia (21 years).



Young Professionals Forum ahead of IASSA 2016

A full-day Young Professionals Forum takes place on 19 October 2016 at the Knowledge Commons, CSIR. The forum aims to provide a discussion and networking platform for young professionals (35 years of age and younger) who are working in the aerospace industry. The outcome of the forum will be shared with IASSA delegates in the format of a keynote address, feedback session and panel discussion, as part of the IASSA programme on 21 October 2016

The CSIR's Elizna Miles (above) is taking the lead on the organisation of the forum. For more details, please contact her at emiles@csir.co.za

Visit to SANSA Space Operations as part of IASSA2016

Participants at this year's International Aerospace Symposium of South Africa are cordially invited to sign up for the afternoon and evening visit to SANSA Space Operations on 20 October 2016. The visit includes an introduction and tour of this unique facility, and an early evening braai hosted jointly by SANSA Space Operation and AeSSA.

As SANSA Space Operations is some 86 kilometres from the CSIR International Convention Centre, the IASSA Organising Committee will make bus transport available to delegates. While more details on departure locations and times are to be shared in due course, make sure that your place is booked on the bus!

Please visit www.iassa.org.za to register and confirm your attendance.

Aerospace: 150 Years of Progress

Over 100 members and invited guests attended the AeSSA lecture held on Wednesday, 20 July 2016, at the CSIR Knowledge Commons. Addressing the topic, the Rooivalk Helicopter, the two speakers, Helmoed Heitman, "a South African defence analyst, author, historian and citizen soldier", and Lt Col Danie Bellingan, Officer Commanding 16 Squadron, gave well-researched presentations to an appreciative audience.

The topic of South Africa's flagship helicopter



Dr Glen Snedden welcomes members and guests to the Rooivalk helicopter lecture.

project was chosen after discussion within the AeSSA Council; the CSIR's Maj Gen (ret) Des Barker and Erik Wegman were instrumental in securing the two speakers for the lecture.

Heitman's talk focused on how the Rooivalk has proven itself ideally suited for close air support in African combat conditions, in addition to being a technological, industrial and economic success story for South Africa. He noted that Rooivalk might not have been a commercial success in its own right but the spinoffs for the SA economy had more than paid off its development. "The same can be said for many of the defence projects," he noted. Heitman stated that an upgrade programme to Rooivalk could and should be done locally.

Bellingan gave a first-hand account of Rooivalk actions in support of the United Nations (UN) operations in the Democratic Republic of the Congo (DRC). He pointed out that Rooivalk was a huge operational asset to the South African National Defence Force and ANDF and UN forces in the Eastern DRC. He said, "It is hugely capable, more so than the Russian equipment. The South African Air Force tactics which have been adapted from local and international experience have yielded some 27 odd operational successes in the field." Rooivalk was not only used for attacking rebel camps but for protecting convoys and performing reconnaissance. Its night operations capability proved to be a massive asset to operations in the DRC.



Glen thanks Col. Bellingan for his talk on Rooivalk actions in the DRC in support of the UN operations.

AeSSA President Dr Glen Snedden says, "It was a hugely popular evening. The talks received a very positive response all round." Watch the space for the announcement of the next AeSSA lecture.

Solar Impulse 2: an airplane that flew around the world without fuel



The first round-the-world solar flight in history came to an end when Swiss pilot Bertrand Piccard made the final landing of Solar Impulse 2 in Abu Dhabi, United Arab Emirates, on 26 July 2016. This first circumnavigation of the globe with no fuel involving two Swiss pilots, Bertrand (left) and André Borschberg (right), and a multi-disciplinary team, partners and sponsors, commenced on 9 March 2015 in Abu Dhabi and involved a multi-stage journey of approximately 42 000 km. The significance of this achievement lies in the manner in which the team overcame myriad unknown

technical, human and operational challenges to prove that clean technologies can achieve impossible goals.

What is Solar Impulse? The name is used for the Swiss long-range experimental solar-powered aircraft project which started 13 years ago. The privately financed project is led by Swiss engineer and businessman Borschberg and Swiss psychiatrist and aeronaut Piccard. The name was also conferred on its two operational aircraft, Solar Impulse 1 and Solar Impulse 2.

The Solar Impulse aircraft are single-seat monoplanes powered by photovoltaic cells and are capable of taking off under their own power.



Solar Impulse 2 on the airfield of Tulsa International Airport, May 2016. Visual courtesy of Solar Impulse.

The prototype, Solar Impulse 1, was designed to remain airborne up to 36 hours. The second aircraft, Solar Impulse 2, was completed in 2014, and carries more solar cells and more powerful motors, among other improvements. During daylight, the solar panels charge the plane's batteries, which make up a quarter of the craft's 2 300 kg weight. The pilot also climbs to 8 500 m during the day and glides down to approximately 1 500 m at night, to conserve power.

Solar Impulse 2 specifications

Crew: 1

Length: 22.4 m

Wingspan: 71.9 m (wider than a Boeing 747)

Height: 6.37 m

Wing area: 17 248 photovoltaic solar cells on the top of the wings, fuselage and tailplane covering a total area of 269.5 m² (rated at 66 kW peak)

Powerplant: 4 x electric motors, 4 x 41 kWh lithium-ion batteries (633 kg), providing 13 kW (17.4 hp) each

Propeller diameter: 4 m

Take-off speed: 36 km/h

Solar Impulse 2 performance

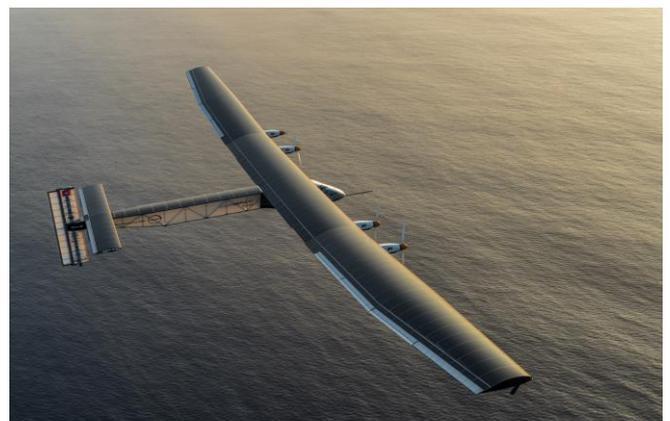
Maximum speed: 140 km/h

Cruise speed: 90 km/h; 60 km/h at night to save power

Service ceiling: 8 500 m with a maximum altitude of 12 000 metres

The epic adventure set three record-breaking solo flights, that of Borschberg from Nagoya to Hawaii, and later by Piccard from Hawaii to San Francisco and New York to Seville.

In keeping with the strong advocacy to halve global energy consumption, save natural resources and improve quality of life by utilising renewable energy, each stop on the journey was optimised by the Solar Impulse 2 team for sharing, engagement and education on the value and potential of clean technology.



Solar Impulse 2 on a maintenance flight over Hawaii, March 2016. Visual courtesy of Solar Impulse.

It seems that the sky remains the limit for the Solar Impulse team. During the final flight before the completion of their circumnavigation of the globe, Borschberg and Piccard announced the creation of an International Committee of Clean Technologies. This non-governmental organisation will promote green energy and sustainable technologies.

The Solar Impulse team's next project, together with sponsors Solvay and ABB, is to develop an unmanned solar-powered aircraft. This solar aircraft will fly continuously at high altitudes to carry out some of the work currently performed by satellites. It will also be used for applications that cannot currently be performed by satellites, such as communication, measurements and observations for agriculture and infrastructure planning and other purposes. Borschberg anticipates the first prototype flying in 2019.

The closing remarks go to Mike Scott, who wrote in *Forbes* magazine: "If we can fly around the world using only the power of the sun and the optimisation of energy efficiency technologies, the potential of clean technologies in other applications is immense."

All visuals courtesy of Solar Impulse.

RAeS News

Farnborough International Airshow 2016: read all about it

The Farnborough International Airshow took place during July 2016. Its trade exhibition and public airshow attracted aerospace and defence industries and aerospace enthusiasts alike. The Royal Aeronautical Society's Aerospace Insight Blog carries a series of articles on the event, written by Tom Robinson and Bill Read. Please click on the links below to read their comprehensive coverage of the event.

Day Zero <http://aerosociety.com/News/Insight-Blog/4524/Farnborough-Air-Show-2016-Day-Zero>

11 July Day One <http://aerosociety.com/News/Insight-Blog/4525/Farnborough-Air-Show-2016-Day-One>

12 July Day Two <http://aerosociety.com/News/Insight-Blog/4526/Farnborough-Air-Show-2016-Day-Two>

13 July Day Three <http://aerosociety.com/News/Insight-Blog/4527/Farnborough-Air-Show-2016-Day-Three>

14 July Day Four and Summary <http://aerosociety.com/News/Insight-Blog/4530/Farnborough-Air-Show-2016-Day-Four-and-Summary>

15 July Futures Day <http://aerosociety.com/News/Insight-Blog/4555/Space-inspiration>

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