



HKAIA Annual Dinner 2024

MRO Asia Pacific 2024

In September, ASRC's Chief Executive Officer visited Singapore to participate in MRO Asia Pacific 2024, an annual event that serves as a vital platform for ASRC staff to connect with partners, friends, and potential collaborators. The event brought together numerous leaders and innovators from reputable brands in the aviation and aerospace industry, fostering a dynamic environment for networking and collaboration within the commercial air transport maintenance, repair, and overhaul (MRO) sector. Throughout the event, exhibitors hosted a variety of professional workshops, lectures, and demonstrations that highlighted the latest technologies and regulatory updates in MRO services. Attendees had the opportunity to attend presentations of industry leaders including our esteemed partners HAECO, MTU, and Lufthansa Technik, and view showcases of cutting-edge products and services from industry experts. Over the course of two full days, ASRC staff engaged with a diverse array of talented professionals, discussing current operations and addressing the challenges facing the aviation maintenance sector. This invaluable exchange of knowledge and experience further strengthens ASRC's commitment to innovation and excellence in the MRO industry.



In this big issue

- MRO Asia Pacific 2024 **P.1**
- HKAIA Annual Dinner **P.1**
- Sustainability Corner - ASRC Policy **P.2**
- Project Descriptions **P.2**
- Membership benefits of the ASRC **P.3**
- ASRC Equipment — The LIBS probe **P.3**
- Aviation Classics **P.3**
- Asian Airline Profile **P.3**
- Staff Profile **P.4**
- Activities this period **P.4**
- Social Media Notes **P.4**



To stay updated on the latest developments in the Hong Kong aviation industry and to maintain connections with industry peers, ASRC has been a long-standing member of the Hong Kong Aviation Industry Association (HKAIA). On September 12, 2024, HKAIA hosted its annual dinner at the Hong Kong SkyCity Marriott Hotel. This event provided a platform for government officials, members of the Legislative Council, and aviation industry leaders and professionals to come together and celebrate the advancements and innovations that contribute to the ongoing prosperity of Hong Kong's aviation sector. ASRC representatives, Dr. Peter Li - Vice President of Boeing Research & Technology China, along with representatives from HAECO and HAESL, enjoyed an evening rich with discussions, relationship building and shared commitment to the future of aviation in Hong Kong.



The ASRC has released its new Sustainability Policy in August. Being an actor in this World where businesses impact the environment locally and beyond borders, Sustainability is becoming an integral part of our Business Principles. The ASRC endeavours to integrate sustainability principles into activities, project management and personal development to promote sustainability by first applying sustainability principles to our core operations. For example, we will consider sustainability from initial stages of product design by assessing the environmental, socio-economic impact of developed solutions.

From June this year, we have defined the ASRC Sustainability Action Plan (ASAP), which is continuously updated to keep tracking of the actions and to define new ones. Our first action has been to review the usage of our laboratories and offices to update the running times of the air conditioning system and to reduce the running time by 19%. Knowing that in Summer the A/C accounts for 68% of our total electricity consumption, this will bring substantial savings.



Every year in September, the ReThink takes place, which is Hong Kong's best-attended and most ambitious business event for sustainable development. For this edition, the ASRC joined with two members of staff. It was a good opportunity to get together with sustainability professionals across sectors, to find more about the coming regulation changes, and to get in touch with suppliers for equipment which could contribute to the ASRC's sustainability journey.



Mr Nicolas Detalle is a PRF in the Data, Materials and Instrumentation Stream of the ASRC



Project Descriptions ITC-ITF / ASRC Member Funded Open Source Project

Aerostructure Digital Twin (AeDiT)

Recording and displaying the history of maintenance on an aircraft is presently very much a paper legacy process. However there is a push within the MRO industry to implement a platform based software system to record, display and communicate maintenance activities on the airframe. The ASRC have recently commenced a project to develop a better way to record this data. We will investigate novel methods of damage detection such as terahertz imaging, active thermography, ultrasound, enhanced visual methods and hyperspectral scanning with a drone. The data will be recorded and displayed on a 3D model of the aircraft. Once completed, the CAD model will be used to accurately record a maintenance activity with the option of sharing the data with the OEM should stress analysis be required when considering the repair.

Recycling Metal Chips into AM Feedstock (ReCAM)

During the manufacture of aerostructure or aeroengine monolithic parts a large amount of machined chips is produced, with as much as 95% of the raw material being removed to create the final part. The chips are typically recycled to produce other components of lower value and specification. The RecAM project aims to develop alternative methods of recycling chips into fine precision powders consisting of Aluminium Alloy, Titanium Alloy, and Inconel to be used in additive manufacturing processes such as SLM, DED and Cold Spray. Powder will be produced from recycled chips using Atomisation, Induction Melting, and Hydrogenation—Dehydrogenation ball milling processes. With powder analysis and comparison conducted prior to the additive manufacturing of test specimens from these powders for further analysis and destructive testing.

Advanced Masking Techniques on Aero Components (AMTAC)

The goal of this project is to develop some advanced masking techniques for aerospace components. A study on the reliability of various maskants against chemical attack from those treatments will be undertaken. Alternative maskants and masking techniques will be explored, new maskant should be more resilient to chemical attack and require shorter application time. Automatic masking system will be developed and tested to ensure consistent quality, especially when the masking is applied on irregular surfaces. NDIs will identify any masking flaws and verify the thickness of maskants. It aims to reduce the chemical attack to the component surfaces and hence to eliminate any rework required. The project can be applied in adhesive and sealant dispensing.

Aircraft Coating and Paint Analysis (ACPA)

The project will use various sensors to assess the integrity and quality of the paint and coating on the airframe such as multispectral, terahertz and ultrasound imaging in addition to thermal and optical cameras. It will also use machine learning to assess the level of degradation and even the likely cause of the problem. AI will also be used to determine a generic formulation for the mixing of paint for repairing aesthetic damage to the exterior and interior of the aircraft.

Laser Paint Removal EcoSocialSustainability (L-PRESS)

Gases, smells and fumes, which are by-products of laser removal of paints, can be reduced if we know which elements are emitted and how to capture them. This project aims to identify the nature of the volatile elements so that the laser tuned exactly for the paints which need to be removed. For this, the ASRC uses a LIBS (Laser Induced Breakdown Spectroscopy) device and a multi-gas monitor sensor. An additional XRF spectrometer is on order. The compositions of coating and substrates are being analysed using a Scanning Electron Microscope at the PolyU's Materials Research Centre. After successful installation of a more powerful 5.5kW vacuuming and filtering system, a prototype of a cyclonic particles separator is being developed. The current research focuses on the emission of gases. Measurements of Volatile Organic Compounds are ongoing.

Intelligent Wire Arc Welding Additive Manufacturing (iWAAM)

Welding is used as additive manufacturing (AM) process in MRO and its subsequent machining process depends on component damage's geometry. This project's objective is to design and develop an intelligent arc-welding additive manufacturing system for engine components. AM techniques and advanced automated nondestructive inspection (NDI) techniques will be applied to ensure consistent welding quality, so that damaged components can be rescued, and scrap reduced. Advanced thermal imaging will give real time pictures of the weld pool. The advantages of the Wire Arc Additive Manufacturing (WAAM) processes include high material utilization and deposition efficiency, low production cost, and versatile equipment.

The ASRC is hiring Postdoctoral Fellows and Research Assistants. The appointment period is twelve to twenty-four months. A highly competitive remuneration package will be offered.

More information about the duties and qualification on our [ASRC Career page](#)





New ASRC staff group photo

Aviation Classics - the White Knight

One of the first shots at a commercial passenger oriented space programme involved launching a rocket ship from a conventional jet aircraft at a high altitude for a short sub-orbital flight. Whilst this was not a new idea and had been trialed by the US and NASA with the X-15 in the '60s, this was the first attempt to use this idea for commercial purposes. The dropship that was launched from the White Knight was called 'Space Ship 1' and after successful sub-orbital flights was retired from service. The White Knight then went on to assist in the X-37 NASA space plane programme and conducted 6 missions to drop the X-37A for successful test of unpowered landings.



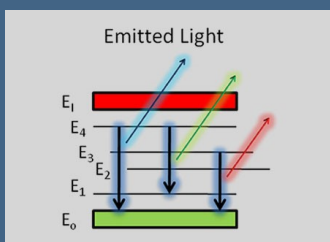
It was succeeded by the 'White Knight 2' which acted as the mother ship for the Virgin Galactic Space ship 2, the first of which was named VSS Enterprise. The craft broke up on decent and resulted in the death of one crew. Its successor was the VSS Unity which operated until June of this year. White Knight 1 was owned by Paul Alen of Microsoft fame and the VSS's were operated by Richard Branson. It would seem that the commercial passenger space game is only for the very rich as we can see today with Elon Musk and Jeff Bezos' successful orbital and sub-orbital flights.



ASRC Equipment Update - The LIBS probe

The ASRC recently took possession of a Hitachi 'Vulcan' LIBS sensor as part of a materials characterization project.

LIBS works by using a short duration pulsed YAG laser to ablate a small area of the sample turning the material into a plasma. The plasma relaxes and emits characteristic emission lines dependent on the elements present in the plasma. These emission lines (spectra) are compared to a database of element emissions and the elements identified — thereafter an AI type program identifies the likely alloy present or if no alloying elements are present displays the bulk material type.



The system has been tested in ASRC on a range of pure materials and alloys with good agreement to the suppliers specification. This tool will be a most welcome addition to the range of materials characterization equipment in the ASRC.

Membership Benefits of the ASRC

Organisations that join the ASRC as members have a primary involvement in Aviation MRO or Aerospace Manufacture, or whom could benefit from the application of the technologies developed from fields of research in support of these areas where they may be commonality, such as energy, marine, and other forms of transportation.

If you feel you are in one of these categories and would like more information on the benefits and details on how to join or cooperate with the ASRC, please contact us via Mr Robert Voyle, CEO

robert.voyle@polyu.edu.hk, or take a look at our website www.asrc.hk.

There are different levels of membership and working relationships that have varying levels of access to research at the ASRC. Almost certainly there is a membership level or collaborative opportunity that is a good match for your organisation.

Asian Airline Profile



ANA airline was formed by the merger of Far East Airlines and Japan Helicopter and Aeroplane Transports Company, then changed the name to ALL NIPPON AIRWAYS Co., Ltd. (ANA).

This airline offers both domestic and international destinations. It joined as a Star Alliance member in 1999. The Boeing 727-100 was the first jet aircraft introduced by ANA. This model served the Tokyo-Osaka route in 1965 and able to reduce forty-five minutes flight time.

ANA received the highest airline evaluation, a 5-star rating, from SKYTRAX, the international airline-ranking organization based in the UK, for eleven consecutive years since 2013. SKYTRAX recommended its superior quality of service and enhance the overall passenger experience. This year, ANA was rewarded with World's Best Airport Services and Best Airline Staff Service in Asia.





Alex Chan



SK Chiu

Staff Profiles:

Mr Alex Chan and Mr SK Chiu

Alex and Mr Chiu are among the most valuable staff in the ASRC, as they have contributed their effort and shared their experience of over two decades in the PolyU with the ASRC.

Mr Chiu is one of the senior research fellows in ASRC, and was a tutor for student training on CNC machine for more than twenty years. He is a role-model and has good relationship with students. Mr Chiu has the most experience to handle and operate the Starrag Ecospeed F HT 1010 and the Starrag STC800, two machines with unique and unrivaled performance in South China.

Alex is in fact the first staff in to receive the honour of serving in the PolyU for forty-five years. He has coordinated and supported many events in PolyU such as the Human Rainbow and Walk for Millions. Alex is now a Project Associate at the ASRC and responsible for equipment purchasing and logistics.



Activities/ Visits

JUL

- Legislative Council Member
- Project Visit at HAESL
- HK Express
- ISE Mainland Chinese Students Summer Course
- Cathay Pacific Pilot Cadets
- The Hong Kong International Aviation Academy (HKIAA) - Civil Aviation University of China (CAUC) Students

AUG

- MPF Schemes Authority Delegation
- World Laureates Association & Changsheng (Langfang) Technology Co., Ltd
- AVIC China
- Beijing Astronautics Experiment Institute of Technology
- Prof Alexander Wai's mentees
- Southeast University

SEP

- Gulou District , Nanjing government officials
- MRO Asia Pacific 2024
- RETHINK Conference & Expo
- COMAC
- China Association for Science and Technology
- BOEING787 Fuselage Response Team



Legislative Council Member



COMAC



Meeting with Lufthansa Technik Representatives at MRO Asia Pacific 2024



BOEING 787 Fuselage Response Team—Eric Lee



MPF Schemes Authority Delegation

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The ASRC on Social Media

ASRC maintains six active social media accounts, namely 'Facebook', 'LinkedIn', 'Website', 'WeChat', 'YouTube' and 'Instagram'. These are updated regularly with project status, visits to the centre, as well as special events. These sites enable increased engagement with our clients, industry and our local community, and allow followers to keep up with our activities.

Check it out!

