

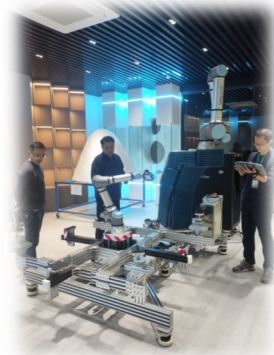


Radome Test Rig Deployment at HAECO Composites Jinjiang

In February 2025, ASRC staff members Fu Pengfei, Nicolas Detalle, and Anita Xin visited HAECO Composites in Jinjiang to conduct the installation and training for the deployment of the Radome Assessment and Transmission Test System (RATTS) project outcome. The solution offers a new and novel means of assessing the post repair performance of an aircraft Radome (radar dome) – that's the nose of the aircraft that protects the weather radar during flight.

The test rig has a very small footprint in comparison to the conventional radar test range or large anechoic chamber, being only 4 square meters as opposed to up to 100 meters long throw. uses a communication testing Vector Network Analyser which has a very low radar radiation output in the order of microwatts. Which enables

results that have a very high degree of granularity. The conventional test gives values for transmission at 45 points. The RATTS rig can replicate that in addition to displaying a 3D heat map constructed from over 1,000 points allowing repair engineers the ability to diagnose the exact areas for repair and review. The installation and training were completed within a three week period, marking another valuable collaboration with our partner HAECO.

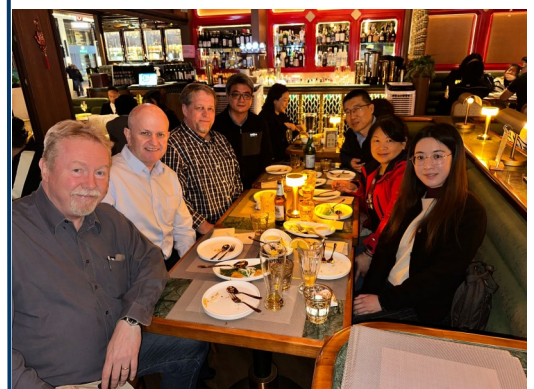


## In this big issue

- Radome Test at HAECO Jinjiang **P.1**
- Boeing members visiting ASRC **P.1**
- Sustainability Corner **P.2**
- Project Descriptions **P.2**
- Membership benefits of the ASRC **P.3**
- ASRC Equipment--Weld Pool Camera **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**

## Boeing Members Visiting ASRC

From February 17 to 20, 2025, the Aviation Services Research Centre (the Centre) was pleased to welcome members from Boeing, including Dr Peter Li, Vice President of Boeing Research & Technology – China, Mr Arne Lewis and Dr Helen Lee, Technical Fellow, and Mr Wu Luo, Manager of Manufacturing Technology Integration. The Board of Governors Meeting and the Technical Advisory Committee Meeting were also held during the same week, providing an excellent platform for all ASRC industrial members to discuss the Centre's strategic and technological developments respectively.



## Sustainability Corner

### The hidden power of Algae

With rising concerns over air pollution and industrial emissions, innovative solutions are required to ensure a cleaner and sustainable future. One such breakthrough is the use of algae for gas treatment, an eco-friendly alternative to conventional methods. This is currently being researched under the project L-PRESS at the ASRC with the help of a local Hong Kong startup company.

Algae have a remarkable ability to absorb harmful gases while producing oxygen and biomass as a valuable by-product. This natural process offers a sustainable and cost-effective method to treat various gases. Of course, CO<sub>2</sub> will be absorbed during photosynthesis, but also organic compounds such as propylene, isobutylene, pentane and butane.

Unlike chemical scrubbers or carbon-based filters, which require high energy and generate waste, algae-based systems utilize photosynthesis to capture and neutralize pollutants. This process reduces greenhouse gas emissions, requires minimal energy input (a light source), and enhances carbon sequestration. Traditional gas treatment methods rely on combustion, absorption, or adsorption. These approaches often involve toxic solvents and significant energy use. In contrast, algae-based systems provide a self-sustaining and scalable solution.

We are actively evaluating the efficiency of algae in absorbing VOC gases and designing an upscaled system tailored to industrial needs. By integrating this technology into existing infrastructure, we want to help industries achieving regulatory compliance while reducing their environmental footprint. Let's innovate for a cleaner tomorrow!



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 commenced a project to develop a better way to record this data. We will investigate novel methods of damage detection and geolocation of the data using 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 a Hydrogenation — Dehydrogenation ball milling processes. With powder analysis and conducted prior to the additive manufacturing of test specimens for further analysis, comparison, 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 subsequent treatments will be undertaken. Alternative maskants and masking techniques will be explored, new maskant should be 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 deliverables in this project could be applied in adhesive and sealant dispensing.

### Aircraft Coating and Paint Analysis (ACPA)

This 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 causes of the coating degradation. Furthermore, AI will also be used to determine paint-mixing formulation for repairing aesthetic damage to the exterior and interior of the aircraft.

### Laser Paint Removal EcoSocialSustainability (L-PRESS)

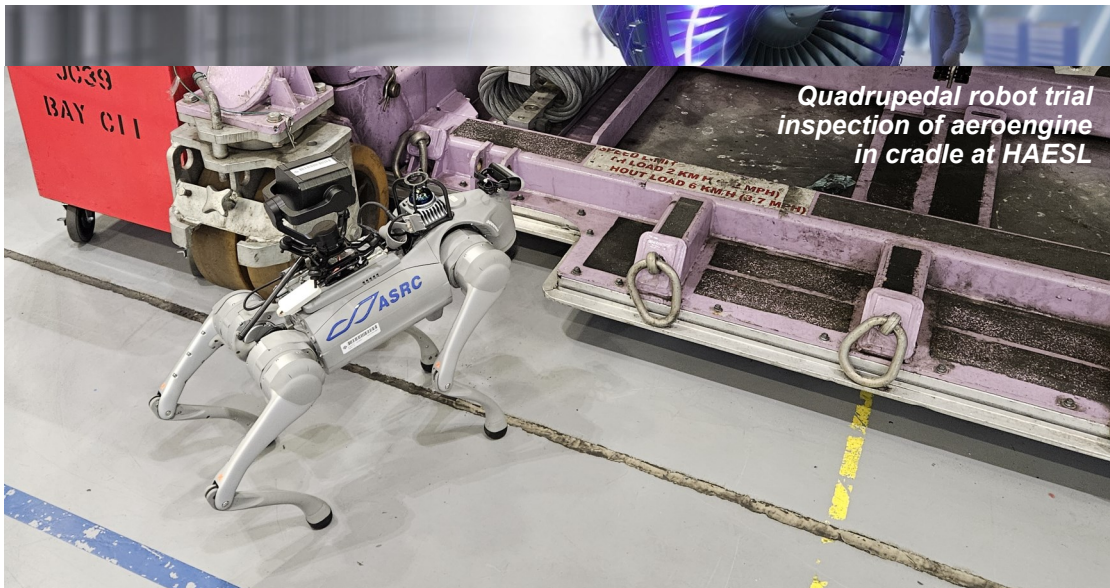
Laser paint removal emits gases, smells and fumes, which can be reduced if we understand the chemical mechanisms. This project aims to identify the nature of the volatile elements and reduce them. For this, the ASRC uses a LIBS (Laser Induced Breakdown Spectroscopy), a multi-gas monitor sensor and an X-Ray spectrometer. The ASRC is simulating shrouds to capture all gases efficiently and is developing a model representing the physical and thermal effects on the materials. The outcome of this model is the optimized fluence value (i.e. laser energy) at which pyrolysis is avoided. This allows to tune the laser exactly for the paints which need to be removed. Towards the end of this project, our model will be confirmed by testing and expanded to different types of paints and substrate materials.

### 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 non-destructive inspection (NDI) techniques will be applied to ensure consistent welding quality, so that damaged components can be rescued, and scrap reduced. The advantages of the Wire Arc Additive Manufacturing (WAAM) processes include high material utilization and deposition efficiency, low production cost, and versatile application.

The ASRC has career opportunities for Postdoctoral Fellows, Research Associates, and Research Assistants on several projects. The appointment period is twelve to twenty-four months, with a highly competitive remuneration package. For more information regarding the duties, programme acceptance criteria and application requirements, please visit the [ASRC Careers Page](#).





Quadrupedal robot trial inspection of aerengine in cradle at HAESL

## Membership Benefits of the ASRC

Organisations that join the ASRC as members have a primary involvement in Aviation MRO or Aerospace Manu-  
 facture, 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, Executive Director [robert.voyle@polyu.edu.hk](mailto:robert.voyle@polyu.edu.hk), or take a look at our website [www.asrc.hk](http://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.

## Aviation Classics - Convair 990 - Coronado

Designed and built in the swinging sixties, the Convair 990 "Coronado" or "Astrojet" was surely an iconic swept wing 60s classic. Built on the specification to fly coast to coast in the USA it never quite came up to expectations but did hold a number of speed records. It was famously greedy on fuel and left a trail of black exhaust on take-offs. Its fuel consumption was around three times that of a modern 737 (which can hold more passengers). The aircraft had a wonderful shape and its swept wing was enhanced by two large blisters—anti shock bodies on each wing to increase the critical Mach by reducing transonic drag. These added to the 'streamlined' look of the aircraft that was no doubt an inspiration for automotive designers and stylists in the 60s as well.



Some of these aircraft were used by NASA, one being the first airborne eclipse observatory and another being used until 1994 as a test bed for the space shuttle landing gear. Galileo, the observatory is on static display in the Mojave air and space port.



Some of these aircraft were used by NASA, one being the first airborne eclipse observatory and another being used until 1994 as a test bed for the space shuttle landing gear. Galileo, the observatory is on static display in the Mojave air and space port.

## Asian Airline Profile



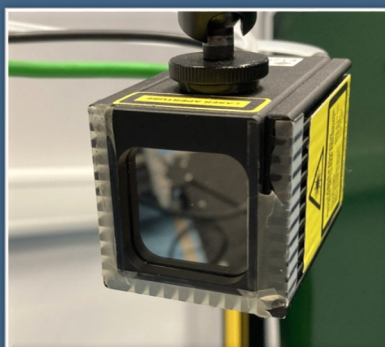
Singapore Airlines is the flag carrier of Singapore with its hub located at Changi Airport. The airline is notable for highlighting the Singapore Girl as its central figure in the corporate branding segment and not significantly changing its livery throughout its history.

SIA operates a modern fleet of 159 aircraft, including Airbus A350-900s, Boeing 737-800s, Boeing 737 MAX 8s, Boeing 747-400s, Boeing 777-300s, Boeing 777 Freighters, and Boeing 787-10s. The airline serves over 70 destinations across six continents, connecting passengers to major cities worldwide.

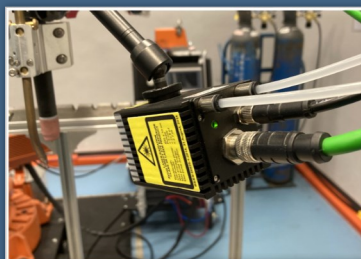
Renowned for its exceptional service, Singapore Airlines has consistently been ranked as a 5-star airline by Skytrax and was named the World's Best Airline in 2023. As a member of the Star Alliance, it offers seamless connectivity and a premium travel experience.

## ASRC Equipment Update - Weld Pool Camera

The team on the iWAAM project have taken delivery of a Weld Pool Camera which uses single wavelength laser light at 645nm to illuminate the welding process. The lens is protected by a 'notch' filter which passes only the 645nm wavelength that illuminates the field. This means that the very bright and dangerous visible and UV radiation is blocked and the camera can 'see' the welding in real time.



Being able to observe and record the welding from the TIG welder in real time with no additional equipment is a tremendous benefit for the development of the optimization of the process. The team have also used image processing and deep learning to identify features of the process to optimize the feed of the Titanium wire and the current of the arc.





Aziz ARSHAD



SUO Haoyuan

## Staff Profiles:

### Mr ARSHAD and Dr SUO

Aziz Arshad is a Research Associate, and Haoyuan Suo is a Postdoctoral Fellow. Aziz holds a Master's degree in Aviation Engineering (Aeronautical Engineering) from PolyU and currently supports the project on "Intelligent Wire Arc-Welding Additive Manufacturing in the Aerospace Industry." With a strong academic background in mechanical and aerospace engineering, Aziz is also a quick learner of the welding processes at ASRC, which helps facilitate the research project and expand his technical knowledge.

Suo earned his PhD from Northwestern Polytechnical University, specializing in the degradation of composite and hybrid structures under harsh environments. He published several articles and participated in various research projects on manufacturing engineering of aerospace during his studies. He is currently contributing to the "Aviation Coating and Paint Analysis" project, where he applies his research expertise. Both Aziz and Suo are great assets to the Centre.

## Activities/ Visits

### JAN

- ➔ Visit by CRRC Corporation Limited
- ➔ Visit by Technology and Engineering Centre for Space Utilization
- ➔ Visit by Kangwei Tongchuang Group Co., Ltd with ISE
- ➔ Visit by Peking University Third Hospital

### FEB

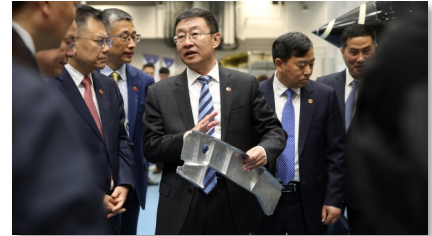
- ➔ Visit by Fujian Youth Federation
- ➔ Visit by United Front Work Department of Jiangsu Provincial Committee
- ➔ Visit by Huazhong University of Science and Technology
- ➔ Visit by Boeing
- ➔ Visit by Hong Kong Airlines
- ➔ Visit by Shaoxing Municipal People's Government
- ➔ Radome test Rig Installation and Training at HAECO Jinjiang

### MAR

- ➔ Visit by China Tower
- ➔ Visit by Shanghai-Hong Kong Technology Transfer Network (SHK-TTN)
- ➔ Visit by Youth Sports Federation with PolyU Council Chairman
- ➔ Visit by CITIC Group
- ➔ Attended Jumpstarter HK with ZeroAvia
- ➔ Attended ITES Shenzhen



CRRC Corporation Limited



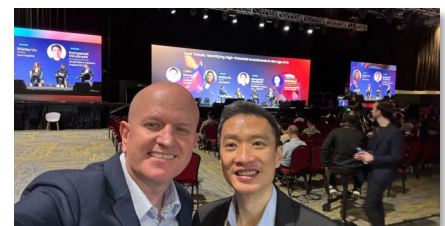
CITIC Group



Hong Kong Airlines



Youth Sports Federation



Jumpstarter HK with ZeroAvia

ASRC News Issue #24 January 2025 — March 2025

Aviation Services Research Centre  
Block X  
Hong Kong Polytechnic University  
11 Yuk Choi Rd, Hung Hom  
Kowloon, Hong Kong  
T: (852) 2766 7599  
F: (852) 3011 3348

[www.asrc.hk](http://www.asrc.hk)



### 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!

