



RATTs Team wins Gold Medal at 2025 International Exhibition of Inventions Geneva

In April 2025, the Aviation Services Research Centre (ASRC) proudly participated in the 50th International Exhibition of Inventions Geneva, the world's largest event dedicated exclusively to inventions.

Representing ASRC were team members Nicolas Detalle and Fu Pengfei, who showcased the Radome Assessment and Transmission Test System (RATTs) project. RATTs is an advanced technology designed to improve the testing of aircraft radomes, ensuring optimal radar performance and aviation safety. The project's innovation and impact earned ASRC a prestigious Gold Medal at the exhibition, highlighting its commitment to advancing aviation maintenance and repair technologies. This achievement reinforces ASRC's position as a leader in applied research and innovation within the aviation industry.

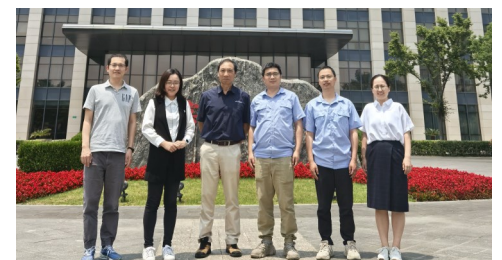
The International Exhibition of Inventions Geneva continues to be a vital platform for inventors worldwide, promoting creativity and technological progress. ASRC's success at this renowned event marks a significant milestone in its ongoing mission to develop cutting-edge solutions that enhance aircraft safety and efficiency.



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Ongoing Engagement: ASRC Visits COMAC



The Commercial Aircraft Corporation of China, Ltd. (COMAC) is a prominent Chinese aerospace company specializing in the research, development, and manufacturing of large passenger aircraft. In April and May, ASRC welcomed visits from representatives of COMAC's Customer Service Hong Kong Office, Shanghai Aircraft Flight Test Engineering Co., Ltd., and the Meteorological Research Center. Furthermore, on 3 June 2025, the team traveled to Shanghai to meet with COMAC and discuss potential collaborative projects. Through these ongoing interactions, we aim to unite regional industry and research strengths, fostering innovation and providing robust support for the growth of the large aircraft sector.

Sustainability Corner

Regulations shaping the future of Aircraft Maintenance

The aircraft maintenance sector is likely to face a wave of new sustainability regulations that will significantly impact operations in the coming years. These measures are expected to increase material costs initially but will drive long-term innovation in sustainable sourcing practices. The Clean Industrial Act will introduce comprehensive requirements for material traceability, particularly for rare earth elements. This legislation will mandate Digital Product Passports for batteries and electronics.

Beginning in 2026-2027, the Ecodesign for Sustainable Products Regulation will implement stricter standards. The rules will focus on enhancing recyclability and repairability, with specific requirements for steel, aluminum, and composite materials. Manufacturers will need to comply with new repairability scoring systems and meet stringent e-waste recycling targets, potentially requiring redesigns of existing components and procedures.

Upcoming waste regulations will transform how the industry handles end-of-life materials. The zero-landfill policy for industrial waste will require elimination of landfill disposal. Bans on exports of waste containing critical materials might necessitate investments in domestic recycling infrastructure. These changes will particularly affect the handling of specialized materials, pushing the industry toward more circular economy solutions.

While these regulations present operational challenges, they also create opportunities. Early adopters will be better positioned to meet these requirements while potentially gaining competitive advantages in an increasingly eco-conscious market.



Mr Nicolas Detalle
is a PRF in the
Data, Materials and
Instrumentation
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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 and a Hydrogenation — Dehydrogenation ball milling processes. With powder analysis conducted prior to the additive manufacture of test specimens for further analysis, comparison, and destructive testing.

Advanced Masking Techniques on Aero Components (AMTAC)

The goal 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. An 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 Manufacture (iWAAM)

Welding is used as an 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.

Aero-Engine Digital Record (AeDR)

Aeroengine overhaul requires detail documentation, as these complex machines comprise multiple systems and hundreds of components. Missing parts, anomalies in fluid and electrical systems, and incorrect placements must be identified, yet these inspections are time-consuming. An automatic video-screening system is proposed to streamline maintenance using drones, robots, or AGVs for scanning. Integrated AI system will improve image recognition for component verification and defect detection, while collision-avoidance sensors will enhance safety. The system will deliver three key capabilities: digitization of the engine via 3D scanning, component detection using deep learning to verify part presence and information, and defect identification to spot such as cracks and leaks. This innovation aims to enhance accuracy and efficiency in aeroengine MRO operations.

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](#).



ASRC NEW GROUP PHOTO

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, Executive Director 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.

Aviation Classics - The ATL-98 Carvair

Described by many as 'the ugliest aircraft ever built', the Carvair was developed by entrepreneur Freddy Laker's company with the express mission of flying cars via air, hence its peculiar name. It was initially a conversion from the DC-4 and could carry 5 cars and 22 passengers. The Carvair operated from the early 60s to the late 70s with at least one flying well after that in the USA. The plane was designed for unpressurised low altitude ferry routes such as across the English Channel (la Manche) although it was used across the world from New Zealand to the USA and Zaire. One aircraft appeared in the movie 'Gold-finger' when the evil nemesis of James Bond flew his Rolls Royce in such an aircraft. The Carvair went into operation long after the operation of the equally ugly Bristol Freighter which could carry only three cars.



Both were put out of use due to the increased size of cars and the cost of flying them around. Some stayed in operation carrying cargo including rocket components, medicines and on one occasion — a 3 tone whale (plus water).

Asian Airline Profile



EVA Air is a Taiwanese airline based at Taoyuan International Airport near Taipei. The company slogan is "Sharing the World, Flying Together".

The privately owned airline operates passenger and dedicated cargo services to over 40 international destinations in Asia, Australia, Europe & North America. Its network fully consists of international routes, with no domestic routes. As of April 2025, it operates a fleet of 85 aircraft, primarily comprising Boeing 777-300ERs, Boeing 787-9s and 787-10s, Airbus A330-300s, and Airbus A321-200s.

EVA Air is renowned for its high-quality service and was the first airline to introduce premium economy class in 1992. As a member of the Star Alliance, it offers extensive connectivity worldwide.

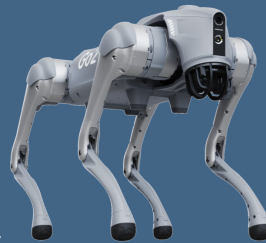


ASRC Equipment Update - Quadruped Robot

The team involved with automated engine inspection recently took delivery of a 'Unitree' Robotic Dog, named internally as Cerberus. The dog will be able to access low lying spaces for inspection of aeroengine components.

The dog is named Cerberus because like his mythical namesake he has a number of heads. Our Cerberus however has a different function for each of his heads.

He has a powerful zoom camera with 30x optical zoom, three lidar cameras and a forward looking thermal imaging camera. These are capable of pattern and feature recognition thanks to an AI and deep learning back end. This is in addition to built in navigation cameras. The Doggy will be used in addition for inspection of the underside of aircraft and of low lying area of engines on stands prior to delivery.





Aditya GUPTA



WU Yijia

Staff Profiles:

Dr GUPTA and Dr WU

Dr. Gupte is a Postdoctoral Research Associate at ASRC, specializing in hyperspectral imaging for identifying distinct damage signatures and the autonomous navigation of drones in GPS-denied environments for aircraft inspection. He is currently contributing to the AeDiT project. With a PhD in Aerospace Engineering from IIT Bombay and an Ongoing Masters in Educational Leadership from Harvard University, Dr. Gupte brings a strong interdisciplinary background spanning aerospace engineering, data science, and education technology.

Dr. Wu is a Postdoctoral Research Fellow at ASRC. He earned his PhD from Fudan University, specializing in electrical information and computer science. He originally trained in preventive medicine which sparked his interest in the intersection of neuroscience and technology. During his doctoral studies, he published several academic articles and participated in a range of research projects focus on artificial intelligence in neural science and brain science. He is currently contributing to the AeDiT project, where he applies his research expertise to develop innovative AI-driven solutions.

Activities/ Visits

APR

- ➔ Visit by COMAC's Customer Service Hong Kong Office
- ➔ Visit by Xiaohongshu/ Red Note
- ➔ Visit by Zhihu
- ➔ Attended the INNOEX 2025
- ➔ Attended PolyU's Flag-raising Ceremony

MAY

- ➔ Visit by Cathay Pacific
- ➔ Visit by COMAC Shanghai Aircraft Flight Test Engineering Co., Ltd
- ➔ Visit by Hong Kong AI & Data Laboratory Limited (HKAI Lab)
- ➔ Visit by Ministry of Culture, Tourism and Civil Aviation of Nepal
- ➔ Attended the UASE 2025 Exhibition
- ➔ Attended HAESL Annual Dinner

JUN

- ➔ Visit to COMAC Shanghai
- ➔ Visit by Prof. Stephen T Newman
- ➔ Visit by ARCG Technologies
- ➔ Attended Workshop of the Research Centre for Unmanned Autonomous Systems



Cathay Pacific



HKAI Lab



ASRC in PolyU's Flag-raising Ceremony



Prof. Stephen T Newman, emeritus at Uni of Bath



HAESL Annual Dinner

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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!

