ISSUE
#20
January – March 2024

ASRC News

AVIATION SERVICES RESEARCH CENTRE

QUARTERLY NEWSLETTER OF THE AVIATION SERVICES RESEARCH CENTRE

ASRC Staff at the Singapore Airshow

In this big issue

Singapore Airshow and Aerospace Technology & Engineering Conference

Senior staff from the ASRC attended the airshow and related Aerospace conference in Singapore in February to reconnect with partners, friends, former colleagues and potential collaborators. The Airshow was back to full swing after a shaky start two years ago at the tail end of the pandemic. Boeing, Airbus and all the supply chain companies were in attendance along with new company COMAC. The airshow was a great success and ASRC staff interfaced with a large number of companies with a view to forging new relationships. Prior to the Airshow, the Aerospace Technology conference focused on Commercial and military aviation in the region with keynote speakers from government and military aviation. In all it was a most useful few days and staff managed to interface with old friends from Boeing and new friends from MTU and others. The show itself was hailed as a success with many business deals signed on the fringes of the displays. It's a most important function for staff to keep up to date with the latest developments in aviation, in the commercial, general, business and military fields.

Visit by Boeing

Over the week of 18 MAR 2024, staff from Boeing Seattle and Boeing China visited the Centre on a fact finding mission. This was augmented by having an 'in-person' Technical Advisory Committee (TAC) and an 'in-person' Board of Governors (BoG) Meeting. The Boeing staff including staff who had not visited the ASRC before went on visits to HAECO and HAESL to see how the ASRC interfaced with these companies.

BOEING, HAESL and ASRC Staff

Working closely with an OEM of Boeing's status and standing is a tremendous boost for the ASRC and enables us to have access to the requirements of future MRO organizations to allow us to tailor projects to meet future needs.

Video Shooting in the ASRC Workshop for promotion of Universities in Hong Kong

Aviation Classics - The Ilyushin Il-62

Although very much in the shadow of Boeing and others, Russia in the form of the CCCP did turn out some interesting commercial aircraft. None more so than the iconic Ilyushin Il-62.

This four-engined jet was the CCCP plane that could cross the Atlantic. A true intercontinental machine. Although the lines between military jets and commercial jets were blurred in many countries, none more so than in the CCP, the Il-62 was different and achieved a good level of success. It was the flag carrier for Russia, North Korea and other Soviet block countries. The aircraft was unfairly described as a copy of the British VC10, however this aircraft was designed for use with military forces whereas the Il-62 used only mechanical control and was conceived to operate only from commercial airports. The aircraft was at the time of its introduction the largest passenger aircraft flying. It operated from September 1967 and there are still limited numbers of aircraft flying today. Many were withdrawn from service in the wake of the 2008 recession and the introduction of more fuel efficient aircraft. The model was the government aircraft of many Eastern-block countries.

Cambridge University Sustainability Course studied by ASRC Staff

Our Health and Safety Officer, recently blessed with the additional responsibilities of Sustainability, is Mr Nicolas Detalle. He has this quarter embarked on a sustainability course in three parts conducted online by the University of Cambridge. Titled "*Leading Sustainability: High Impact Leadership*", the course focuses on how management decisions impact the organization in its Environmental and Social Governance.

UNIVERSITY OF CAMBRIDGE
INSTITUTE FOR SUSTAINABILITY LEADERSHIP

Despite the relatively small size of the ASRC this is a useful approach and will allow staff to bring this knowledge forward to assist the members in whatever way they can. The obvious benefits to the Centre are for us to improve our awareness of sustainability in our work weeks and in our project and project management. It is no longer an area that is 'nice to have' rather in the modern paradigm it is an essential part of the function of the organization.

Membership Benefits of the ASRC

Companies who join the ASRC as members should have a primary involvement in Aircraft MRO or aerospace manufacture or should benefit from involvement in technologies which may spin off from these fields of research and development.

If you feel you are in one of these categories and would like more information on benefits and details on how to join, have a look at the website at www.asrc.hk or contact our CEO, Mr Robert Voyle (robert.voyle@polyu.edu.hk).
In principle there are different levels of membership with different levels of access to research in the ASRC. Almost certainly there is a membership level that is a good match for your company.

Asian Airline Profile

THAI

Thai Airways is the flag carrier of the Kingdom of Thailand and has been I operation in its current form since 1961 when it was formed as a Joint Venture with SAS in Europe, it became state owned in 1977 when the Thai government bought out the 15% SAS share. It was the first Asia Pacific airline to fly directly into Heathrow, UK and was one of the most popular airlines for travel to Asia. Thai airways after merging with the other local carrier became one of the founding members of the Star Alliance group of airlines. The airline suffered under management changes following the political upheavals in Thailand in 2014 and had to restructure to manage its debt. It has now fully recovered and is under management that have airline backgrounds.
With A380's, B777s and single aisle aircraft it is a major player in aviation within Asia.

Sustainability Corner

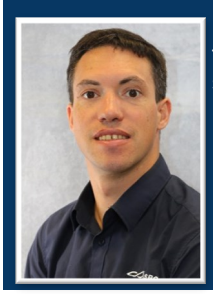
More has to be done than only SAF for aviation sustainability

The aviation sector is working on the adoption of Sustainable Aviation Fuel to sustain the long-term objective to reach 70% of all kerosene consumption by 2050. This is a major challenge, but it is not the only one. The aircraft MRO cannot just rely on the implementation of SAF, and must become more sustainable too, so all kind of operations are tackled.

Asia at large is expected to generate $404 billion of MRO demand in the coming decade, where the providers with stronger sustainability profiles are likely to capture more of this market. Carbon-offsetting will become more and more costly, hence MRO establishments have to embrace new technology that will assist to improve efficiency and reduce costs.

The ASRC is already acting for a more sustainable aviation sector. The ASRC is mentioned in the 2022 Sustainable Development Report of HAESL as a key partner through various research projects and products implemented. Automated systems delivered by the ASRC to HAESL improve the sustainability profile of the company by reducing repetitive tasks for the operators or the exposure to chemicals.

Regarding environmental impacts, the ASRC is currently working on a cleaner and environmental-friendly laser ablation process, but other processes will be targeted in the coming months. One area of interest is the labour intensive cabin refurbishment, which occur 4-5 times during the aircraft lifetime. For the components which are unserviceable, value extraction is still possible, and in general zero waste to landfill is the target. For other repairs of minor damages, more various repair solutions shall be available for application in-house instead of installing new parts coming from the other side of the planet.



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

Project Descriptions

ITC funded Open source projects underway in the ASRC

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.

Intelligent Wire Arc Welding Additive Manufacture (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 components can be rescued and scrap reduced. Advanced thermal imaging will give real time pictures of the weld pool.

Aircraft Coating and Paint Analysis

Degradation of aircraft coatings and paints can not only affect the aesthetic outlook of the airframe but also impact the smooth operation of the aircraft in terms of aerodynamics and lightning protection. Recent cases of paint degradation during the pandemic raise the issue of advanced assessment of airframe condition to allow for dynamic assessment of paint and coating condition.
The project will use number of innovative 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 repair of aesthetic damage to the exterior and even interior of the aircraft.

For these new government-funded projects, the ASRC is looking to hire 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: https://www.asrc.hk/career.html

Recycling Metal Chips into AM Feedstock (ReCAM)

Aerostructure and aeroengine manufacture produces a large amount of swarf and machined chips during production of monolithic parts. As much as 95% of a material is removed to create the part. This removed material is typically recycled into other components of lower value and tolerance. Our new project aims to test out alternative methods of recycling chips into fine precision powders to be used in additive manufacturing processes such as SLM, DED and Cold Spray.
Powder will be produced using conventional methods and material properties compared with powder produced from in house ball milling and Hydrogenating processes.

Laser Paint Removal EcoSocialSustainability (L-PRESS)

When carrying out ablation of paint or other organic materials using high power YAG lasers, there is an unavoidable amount of gas and ablated particles which are released in the environment. Although laser ablation is much more efficient than current paint removal processes by sanding or with chemicals, the fumes and gases emitted during this process can range from bothersome to hazardous.
This project intends to identify, in real time, the nature of the ablated components, so that the laser parameters can be tuned in-process and the emitted gasses are reduced at the source. The second deliverable of this project is to capture the volatiles efficiently so that they can be brought to a treatment area.

Cyrus K F LUI

Staff Profiles:

Cyrus LUI

The general maintenance of our IT infrastructure and computer support falls into the hands of Mr Cyrus LUI. Cyrus is an old hand of the PolyU having spent many years in the Industrial Centre (IC) prior to joining the ASRC in 2018. Cyrus has recently been awarded a long service award for continuous service of 15 years.

Cyrus joined the IC in 2009 with a major in Information Systems and obtained a Master's degree in Technology Management in 2016.

In addition to his tasks in maintaining the IT infrastructure within the ASRC, Cyrus is also an active team member of the DMI stream and contributes extensively in the database and IT areas on our projects. At present he is fully on the AeDiT project and is developing an interactive database system for aircraft damage, which will also serve the purpose of preparing for AI analysis of the collected data. Cyrus is a great asset to the DMI stream and the Centre.

Activities/ visits

09 JAN Visit to MTU in Zhuhai

11 JAN Suzhou Wuyue Aviation Company

15 JAN Khein Roster

27 JAN American Woman's Association

30 JAN Chongqing University

06 FEB Lufthansa Technic

19 FEB Singapore Airshow Visit

21 FEB SATEC 2024 - Singapore

23 FEB Cheoy Lee Shipyards

24 FEB COMAC

05 MAR Schaeffler Company

11 MAR Laixi City, Shandong

12 MAR Lam Tai Fai College

12 MAR Boeing Staff Visit and BoG

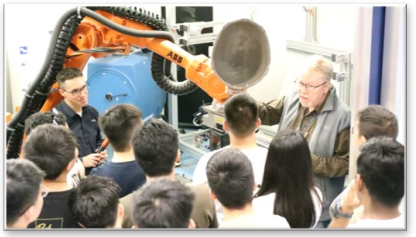
14 MAR COMAC Engineering

26 MAR Cathay Pacific Pilot Cadets

27 MAR MTU Zhuhai

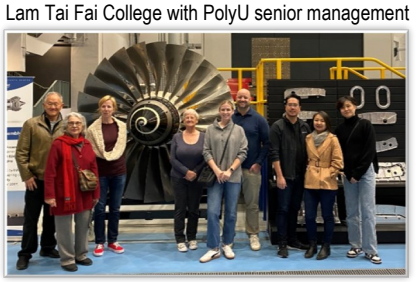
COMAC visit to PolyU

A400M at the Singapore Air Show



Cathay Pilot Cadets

Lam Tai Fai College with PolyU senior management



American Women's Association

The ASRC on Social Media

ASRC maintains four active social media accounts, namely 'Facebook', 'LinkedIn', 'YouTube' and 'Instagram'. These are updated from time to time after visits and special events in the centre. As we bounce back from the past couple of years these sites have started to update more often to allow followers to keep up with our activities. Check it out.

ASRC
INNOVATIVE MRO & MANUFACTURING TECHNOLOGIES

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