Speech by Mr Heng Swee Keat, Deputy Prime Minister of Singapore, Minister for Finance and Chairman of the National Research Foundation, at the Launch of Phase 2 of the Rolls-Royce@NTU Corporate Lab on Thursday, 18 July 2019, at Nanyang Executive Centre

Professor Subra Suresh, President, Nanyang Technological University

Dr Bicky Bhangu, President, Rolls-Royce South-East Asia, Pacific and South Korea

Ms Chan Lai Fung, Permanent Secretary (National Research & Development) and Chairman A*STAR

Ladies and Gentlemen

Introduction

1. Thank you for inviting me to launch the second phase of the Rolls-Royce@NTU Corporate Lab. Let me start by congratulating Rolls-Royce and NTU for the successful completion of Phase 1 of this Corp Lab.

   a. This Corp Lab has been a crucible for the development of new technologies for the next generation of aircraft engines.

   b. Over the years, this Corp Lab has involved a team of more than 300 top-level researchers and technical experts. We have seen how Rolls-Royce engineers and NTU faculty worked closely together to jointly develop new solutions for the aviation industry.

2. The partnership between Rolls-Royce and NTU started way back in 2005.

   a. Nearly a decade after their first research collaboration, Rolls-Royce and NTU raised their partnership to the next level with the creation of this Corp Lab.
b. Five years on, I am glad to hear from both Subra and Bicky that this Corp Lab has brought great value to both NTU and Rolls-Royce. They have thus decided to bring their research alliance to a new level with Phase 2 of this Corp Lab.

3. I am heartened that despite the uncertain and volatile economic outlook, there continues to be strong investments in research and innovation.

   a. The 88 million dollars in joint research investment by NTU, Rolls-Royce, and the Government for Phase 2 of this Corp Lab is an example of our commitment to focus on building for the long term.

   b. This will enable us to make the most of the opportunities around us, even as we tackle the short term challenges posed by the current economic climate.

New Growth Opportunities in Aviation

4. The launch of Phase 2 of the Rolls-Royce@NTU Corp Lab is set in the larger context of a global growth in aviation.

   a. The global demand for air services is rising rapidly. With the cost of air travel decreasing in many markets and a growing middle class, air passenger numbers have grown significantly.

   b. According to the International Air Transport Association, air traffic volumes are expected to double to 8.2 billion passengers in 20 years. And more than half of this growth will be in the Asia-Pacific region.

   c. To meet the growth in demand and to replace existing airplanes, Boeing projected that 44,000 new airplanes will be needed over the next 20 years.
5. The growth in global demand for air services is a welcome indication of the overall health of the industry. This will open up new opportunities for the aviation sector, but the challenge is to accommodate this growth sustainably and minimize the environmental impact of aviation.

   a. Despite emission reductions from more fuel-efficient and less polluting aircraft engines, the rapid growth of air travel has led to a rise in pollution caused by air travel.

   b. ICAO estimates that air transport is currently responsible for 2 percent of the global carbon dioxide emissions.

   c. Bicky highlighted in his speech that there is an urgent need to develop low-carbon-mobility and propulsion solutions to combat global warming.

   d. The industry is now looking at reducing the net emission levels of aviation by 50% in 2050, compared to 2005 levels. This is an ambitious target, one that can only be achieved through the development, integration and adoption of new technologies.

6. In addition, airlines around the world are also under pressure on multiple fronts – with volatile fuel prices and a shift in demand to low-cost airfares. Airlines that are able to maximise aircraft uptime will have a strong competitive edge.

   a. Both in terms of optimising their most important assets – their aircraft, and also in delivering a smooth travel experience for their passengers.

   b. Technology and innovation will be critical to improving aircraft uptime – ranging from predictive maintenance, to improving the turnaround time in preparing an aircraft for its next flight, to reducing the troubleshooting time when a fault is detected.
Corporate Labs in Universities

7. I mentioned earlier that a large fleet of new aircraft will be needed in the coming years to cater to the growth in air travel and to replace older aircraft. This provides the global aviation sector with an opportunity to fundamentally change air travel, by designing and building new aircraft that are much more environmentally sustainable and with better uptime.

8. However, an aircraft is an extremely complicated machine to design, build and maintain. One of the most sophisticated parts of an aircraft is its engines.

   a. Bicky described how the wide chord fan blades used in Rolls-Royce engines are manufactured using more than 80 special processes. And this is just for the fan blade alone.

   b. One can imagine the amount of research and innovation required to design and build the overall engine and each component part. And the design will have to optimise for performance, cost, sustainability, reliability and safety.

9. A collaborative approach to research and innovation is necessary to address such complex challenges. And this applies beyond just aircraft engines.

   a. The most important collaboration is between academic researchers and companies. Commercial research has in fact shifted over the last few years.

      i. More companies are now using open-sourced innovation and working with the best researchers around the world, rather than relying on just in-house research.

      ii. Academics are now more keen to partner with industry.

   b. This has led to better and faster translation of basic research into innovative solutions.
10. This is why NRF started corporate labs in 2013 to spur stronger partnerships between companies and our universities.

   a. Through these corporate labs, industry players can tap on the scientific and technological capabilities at our universities to develop new products and services. At the same time, universities can help to develop solutions for problems faced by industry.

   b. Our researchers, Masters and PhD students get to work alongside companies and gain valuable industry experience. This prepares them for future employment in high value-added sectors.

11. I am encouraged that we now have 14 corporate labs, with more than 800 million dollars in joint investment. So far, our corporate labs have trained more than 1,000 researchers, building a strong pipeline of talent to support our tech-intensive companies.

12. Among the 14 corporate labs, we have

   i. The SembCorp-NUS Corporate Lab, which is looking at new sustainable solutions in the areas of energy, water and converting waste to resource.

   ii. The ST Electronics-SUTD Cyber Security Lab, which was set up to develop new commercial solutions for the growing cybersecurity market.

   iii. And the SMRT-NTU Smart Urban Rail Corporate Lab, which is working on new solutions to enhance our rail reliability.

13. I recently visited the Keppel-NUS Corporate Lab - they explained to me how their innovations have enhanced Keppel’s capability to build ships and platforms that can even operate in the harsh conditions of the Arctic. The ability of Keppel - which is based in the tropics – to deliver solutions for the Arctic would not have been possible without sustained investment in innovation, including their Corp Lab.
14. Besides our Singapore companies, multi-national companies have also invested in corporate labs. Among them are Hewlett Packard, Applied Materials, and – of course – Rolls-Royce.

15. The Rolls-Royce@NTU Corp Lab is especially significant in two ways.

   a. For Singapore, this is the first corporate lab set-up between a company and our university. The success of this Lab has encouraged other companies to come on board.

   b. For Rolls-Royce, this is the largest of your 29 University Technology Centres. This is an affirmation of the potential for quality research to be done in NTU, and the ability of our researchers to work with industry to translate discoveries into real-world solutions.

   c. The combined investment made in this Corp Lab over both phases exceeds 160 million dollars. And this Lab has trained more than 40 PhD students.

   d. Both Subra and Bicky have covered the long list of accomplishments that this Corp Lab has made, and they have set out the Lab’s future plans.

   e. By all measures, the Rolls-Royce@NTU Corp Lab has done well, and I hope you keep up the good work.

16. Rolls-Royce is a valuable partner to Singapore in more ways than one.

   a. Besides this Corp Lab, Rolls-Royce has also partnered A*STAR and the Singapore Aero Engine Services in a joint lab with a combined investment of 60 million dollars to develop smart manufacturing technologies. Last Friday, they announced a further investment of 8 million dollars to develop technologies to repair high-value engine components.
b. In addition to research collaboration, Rolls-Royce also has a state-of-the-art manufacturing facility in the Seletar Aerospace Park, which assembles up to 250 engines and produces more than 8,600 fan blades annually.

c. Rolls-Royce is the largest player in Singapore’s aviation industry, employing more than 2,500 people here and accounting for over 15% of the industry’s output of 10 billion dollars.

17. Singapore has been able to grow our aviation industry by partnering companies, like Rolls-Royce, to set up innovation capabilities as well as Manufacturing, Repair and Overhaul (MRO) capacity in Singapore. I am confident that Rolls-Royce will continue to grow and deepen its presence in Singapore, and I encourage other companies to do likewise.

Conclusion

18. To conclude, these 14 corporate labs have led to better and faster translation of basic research to innovative solutions. I am encouraged by how our companies and universities are stepping up. I look forward to seeing more. Once again, let me extend my heartiest congratulations to Rolls-Royce, NTU and all of you here who are involved in the Corp Lab.

19. I am confident that you will build on the good work in Phase 1 and achieve greater success in the next phase of the Corp Lab. I look forward to new innovations from this Lab that will shape the future of aviation.

20. Thank you.