

## **INTERACTIVE SESSION WITH PROF. R.K PANT**

On 19th June 2021, the students of Mushtifund Aryaans Higher Secondary School (MAHSS) had yet another opportunity to listen and interact with great engineers and scientists. We had the great privilege of having Professor R.K Pant, who is an expert on aerospace engineering.

Professor R. K Pant did his MTech from IIT Madras and Ph.D. from Cranfield University, UK, all in Aerospace Engineering. He has more than 30 years' experience in teaching and research in Aerospace Engineering at undergraduate and graduate level, especially in the area of Lighter-Than-Air systems, Aircraft Design, Air Transportation, and Optimization. He has also been a visiting Professor at School of Mechanical and Aerospace Engineering, Nanyang University of Technology, Singapore during 2015-2016.

What do you get when you cross a ship with an aircraft? Something akin to seaplanes, that's what you get. And the day's presentation was based on the same- "Seaplanes and Amphibians". He began his presentation by telling what really these aircrafts are.

1. Seaplanes are aircrafts that can take off from and land on water. For example, floatplanes and flying boats.
2. Amphibians, like the name itself suggests, operate both from land and water. They are equipped with wheels to alight on land, as well as being able to land on the water.

The first question that would arise in our minds is, "Why do we really need such types of aircrafts in the first place, considering that we already have aircrafts that can land and take off from land itself. Does it not fulfil our main requirements?"

According to Prof. Pant, it has in fact been quite an incentive by India to explore the opportunities within seaplanes due to the following reasons:

- With human advancements, there has been a lot of increase in the air traffic.
- There is a limited availability of land
- Heavy expenditure on infrastructure
- A vast coastline available to India which can be utilised efficiently. Sir also rightly pointed out that this itself should be quite an attraction for Goa!
- And lastly, the scope of improving connectivity. Many would agree that in today's times, we really can't afford to limit ourselves to only land

Next, he dived straight into the world of seaplanes and amphibians, starting off rightly with the all-important topic- the history pertaining to these aircrafts

The very first successful sea plane was "Le canard". Another interesting fact is that Graham Bell, who we have always correlated with the invention of the telephone, was in fact a major pioneer in aviation and has made significant contributions to the field!

*“We breathed an atmosphere of aviation from morning till night and almost from night to morning. Each felt the stimulation of the discussion with others, and each developed ideas of his own upon the subject of aviation, which were discussed by all.”*

*-Alexander Graham bell*

Some further advancements were:

1. Curtiss floatplane- it made up a family of early flying boats developed in the United States in the years leading up to World War I.
2. Hughes H4 hercule- it was intended as a transatlantic flight transport for use during World War II, but it was not completed in time to be used in the war.

In 1950, more advanced seaplanes and flying boats were created.

In 1980 some more models were put forward such as

1. Ekranoplan: These incredible vessels are ground effect vehicles that were built and used by the Soviet and Russian navies from 1987 until around the late 1990s.
2. Dornier Do 24 ATT: The Dornier Do 24 is a 1930s German three-engine flying boat designed for maritime patrol and search and rescue.

Coming to the most recent advancements

1. ICON A5- This one is interesting one. It is the world's latest and one of the most advanced seaplanes and it formed one of the highlights of our session as sir proceeded to show us a video of this aircraft in real life action! The reporters who were given the opportunity to be the passengers of the aircraft rightly described it as surreal, a winner airplane which flies like a dream. We can only imagine how one of a kind of an experience it would have been!

After a splendid journey through the history of these marvellous systems, he then told us why seaplanes are critical for India:

- India is a peninsula with seas around on three sides
- It has a tremendously long coastline
- There are 12 major ports and 200 plus minor ports in India
- There are multiple navigable waterways and waterbodies in big coastal cities

He further elaborated by giving us some real-life applications, like extensive opportunity for usage of amphibians in south India, usage of seaplanes for search and rescue missions in the Bombay High petroleum exploration area and many more.

We then moved onto the core topic of the day's presentation- technology of seaplanes.

Seaplanes are one of the earliest planes to be designed. They were very common during the early days of aviation. However, some limitations included the tremendous air drag.

Prof. Pant, with his remarkable expertise in the field, explained to us a variety of technical components that are used in the creation of these aircrafts. We were deliberated on the function of components like

- Fuselage used for buoyancy,
- A hull at the bottom of the fuselage

- Floats attached to fuselage using struts which can be a single float or twin floats  
the main difference between

A point to be noted here is that the main difference between flying boats and floatplanes is that there is no hull in the floatplane.

### **SEAPLANES IN INDIA**

Prime Minister Narendra Modi inaugurated India's first seaplane service in Gujarat on October 31, 2020. The service offers connectivity from the world's tallest statue, Statue of Unity, of India's first deputy Prime Minister Sardar Vallabhbhai Patel in Kevadia colony to Sabarmati riverfront in Ahmedabad.

The seaplane service in Gujarat is expected to provide impetus to the state's tourism and the Regional Connectivity Scheme called UDAN. In fact, PM Modi was himself the first passenger on the aircraft.

Even though the aircraft was cancelled as of now, sir believes that the exploration in this field itself is a good boost for India. It got many aircraft enthusiasts, like himself, excited for the possibilities it would open.

For Prof. Pant, India's initiatives in the field of aircraft were very inspirational and one of the main motivations behind telling us about these aircrafts

Next, we moved onto the second half of the presentation- Amphibian aircrafts.

An amphibious airplane is one of the most versatile traveling machines ever invented—it can take off and land on runways or on water, providing a range of options for explorers in any part of the world.

The amphibian aircraft that we mainly discussed was the Dornier Sea star CD2. This aircraft is one of the most advanced and latest among the amphibians.

The Sea star had been designed using an all-composite flying boat to overcome water corrosion and leakage. This feature of the aircraft was something that aircraft builders could only dream of in the early days of aviation! He also showed us a video of the aircraft where we saw it in its full glory, soaring, curveting and banking and then making a smooth landing on the water.

However, just like any other aircraft, seaplanes and amphibians also come along with their own set of disadvantages:

- They are highly inefficient as they need to have additional features
- There is a need for high maintenance. As these aircrafts are associated with landing on waters, another inalienable factor comes into picture- water, especially saline water- the biggest enemy of metals.
- However, the principal problem in the modern times has been opposition by environmental authorities.

Prof. Pant also made an interesting remark that “Even though external authorities may not be in support of the aircrafts; no passenger has ever complained about them!”

Sir then deliberated on the design requirements for these aircrafts. They require aerodynamic and hydrostatic stability, and they should be able to land without impact. There should not be foreign object debris and water ingestion along with a watertight hull. The aircraft should also be able to withstand structural loads. There are also infrastructure requirements like the need for identification of sites and need for connectivity by roadways.

With this, his presentation ended, giving opportunities to a question-and-answer session, where our students asked many excellent and thoughtful questions.

One of the important questions put forward was whether these aircrafts have negative consequences on the ecology, especially marine life. Prof. Pant presented his take on the topic. "In earlier days of aviation, these seaplanes were popular as there were no runways. However, seaplanes presented an interesting situation- not only did the aircraft makers have to battle plane problems but had to now deal with ship problems too! Earlier people were not really bothered about aquatic life. Rather, in the beginning of aviation people worried about possibility and performance. These days people are more sensitive towards the environment. They are worried about noise and emissions that can disturb ecological life. So yes, these aircrafts certainly have a major disadvantage when talking in terms of whether it is environmentally friendly."

Lastly, he also deliberated on the various foreign internship programmes and opportunities provided to students undertaking courses in institutions like the IITs. With this, the session came to an end.

With his immense experience in his field, indigenous ideas, practical wisdom, unbiased approach on various topics, Prof R.K. Pant sir will be a source of motivation for the students. We are immensely indebted to him for finding time for interacting with our students and in fact, being an integral part of our institution. We hope that we can attend more of his lectures in the future.

We are also grateful to our director and beloved teacher, VPD sir, for his sincere efforts in exposing us to such great and imminent personalities.

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