Lighter-Than-Air Systems
Prof. Rajkumar S. Pant
Department of Aerospace Engineering
Indian Institute of Technology - Bombay

Lecture - 88
Transportation Problems Faced by Remote Regions

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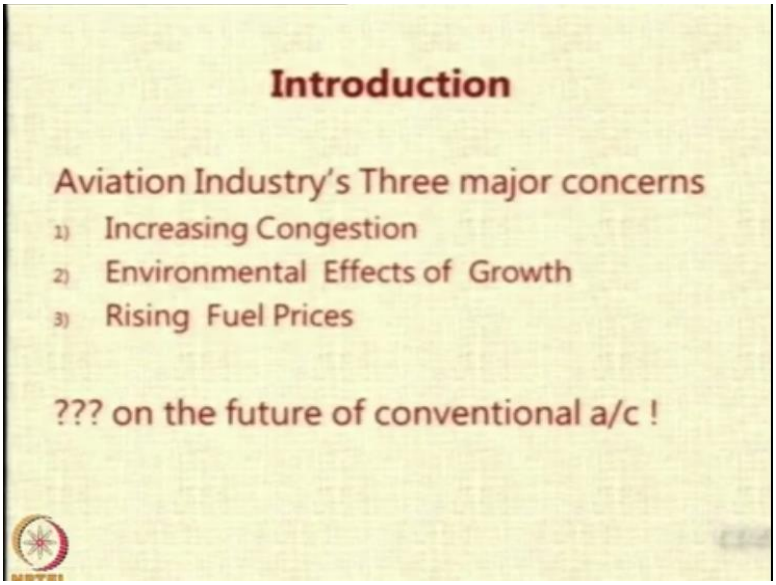

Today, the aviation industry is basically facing 3 major concerns. Could someone help me in identifying these 3 concerns? What are the 3 major concerns of the aviation industry today? Ground infrastructure, then fuel and so one problem that we are facing is increasing congestion. At all airports slowly the growth of air traffic is causing congestion. It is not easy to build new airports or to provide the new infrastructure.

Secondly, there are severely negative environmental effects of the growth in air transport in terms of the fuel consumption and emissions. Thirdly is that the whole cost of providing air transport is increasing because the fuel prices are not remaining stagnant. There are ups and downs and fuel prices, but in general they are executing an upward trend that is because the availability of fossil fuels is limited.

So to handle these 3 concerns, there is a big question mark on the future of conventional aircraft and their operation. There is a huge question mark.

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Now, let us look at remote regions and what are the problems faced by them. First thing is that if it is a remote region, it is remote because either it is a hilly area where it is difficult to build and maintain roads and rail or it is an island. So, to build the road or rail will require construction of a huge bridge. Both of these are not advisable. Air travel is a solution, but it comes with a huge price tag. It is not easy to start air services.

One of the main problems is that a conventional air transportation system requires setting up of infrastructure and that infrastructure is quite large both numerically in magnitude of the investments needed and also the area or the land required to be earmarked for this particular activity is quite large. Secondly, it is a remote area, so we assume that the number of people living there are not very large and hence the number of people who are available to travel will also be less.

So, you have lesser and lesser number of people staying because of remoteness and hence provision of air transportation becomes more and more costlier. And secondly let us say we build an airport somehow, the airport will be utilized very less because the transportation demand is less. So one possible solution to handle this particular problem is wherever possible, I do not say everywhere. Wherever possible one can think of using airships because as you know there are certain advantages and also some disadvantages.

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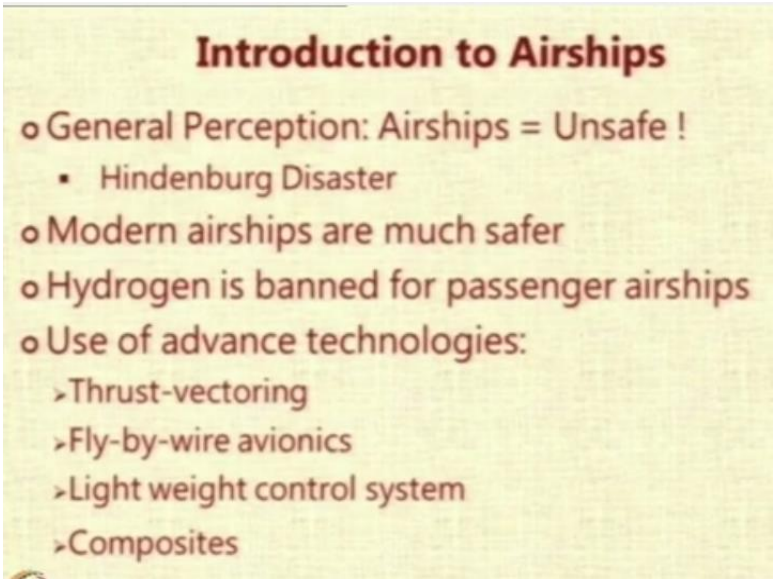

Now this is something with everybody is through because this is something that you are already aware. The general perception of airships is that they are unsafe because of the famous Hindenburg disaster. Modern airships are actually much safer. You have not heard of any recent airship disaster for example. One main reason for that is the raw gas hydrogen which is highly combustible is now banned for use on manned airships.

For remotely controlled airships you can still use it, but for manned airships it is a strict no no from regulatory bodies. Secondly technologies in structures, propulsion, controls, fabrication, testing are all advancing. So, as they are applied to the airship technology, it becomes more and more meaningful. For example, you can use thrust vectoring as a means to overcome the need for acquiring large vertical force.

You can use fly-by-wire avionics to provide very good control on the dynamic behavior of the airship. And you can also invest your technology in providing lightweight control system that can meet the requirements. Then composites are coming in a very big way in airship construction nowadays to take advantage of their weight.

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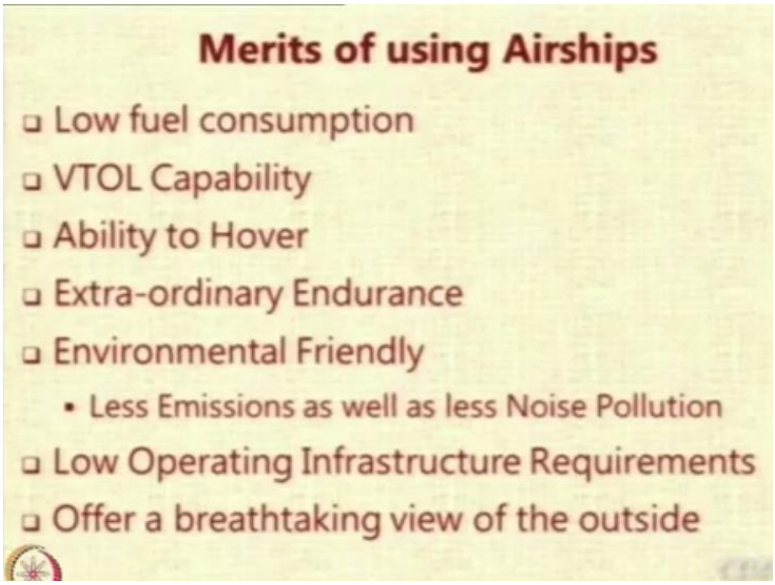

So let us very quickly look at what would be the merits of using airships? One of the main selling points is that the fuel consumption is much lower compared to conventional aircraft. Then they have a capability of vertical takeoff and landing. So, they do not require lengthy infrastructure. They are able to hover at a place without incurring too much operating costs unlike helicopters which can do it, but consume a massive amount of fuel.

And the endurance is extraordinary many, many, many hours as compared to a few hours by conventional modes. Then airships are environment friendly. First of all, the noise is also less because they use smaller power plant. The speeds are low, therefore the aerodynamic noise is not as large. The propulsive systems are also less noisy unlike jets which give very high screeching sound plus they also have less emissions or lower emissions.

Another important point is expenditure on the infrastructure that you need to start operations of airships is low as compared to that for starting to operate conventional aircraft or helicopters. And as we have seen in our videos as well as some pictures, journey becomes a pleasure when you fly swith airships because you have extremely good view of the surroundings, so tourists would like it.

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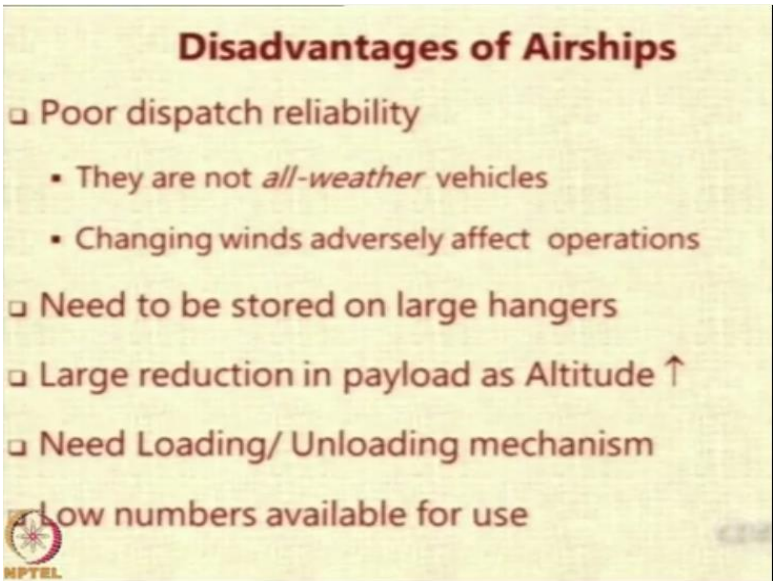

However, there are some disadvantages or limitations which we are also aware. First of all, you cannot use them in all weather, therefore you will not have good dispatch reliability. So, this cannot be considered as the main or the regular mode of transportation. In fact, airship should be touted as a mode of transportation only when weather and operating conditions permit because a reliable transportation system should be preferably all weather or I should say most weather.

Airships can fly only in good weather, so the traffic can be operated only in very small windows. Then, when you cannot fly them or you do not want to fly them you have to store them and they are large in size, they will need a huge hangar. So, this will lead infrastructure investment. But building a hangar is one thing and providing airport infrastructure, runways, taxiways, etc., is a totally different thing.

So you will need a big hangar, but a big hangar is basically a kind of a warehouse, you have to only weather protect the ship from the atmosphere. So no need to provide any grid infrastructure inside. However, the moment you start operating airships at higher altitudes as we have seen, the inflation faction is going to increase. Therefore, the ballonet occupancy really very large and the payload that they can carry will be reduced.

So they are not essentially good for high altitude transportation, but that is where the technical challenge lies in designing a system that can overcome these limitations. Secondly because of being a buoyant system, they need some care while loading unloading because an aircraft is

heavy. It is on the ground on its own, by gravity it stays and it does not know when you land or when you get out or get in.

In an airship as you see there is a lot of moving in the wind because of the buoyant system, so you have to have some provision there. Another problem is that suppose some of you say that okay airships are great and I have an application in mind let us start an airline operating with airships. You will find that the number of airships available today in the world to carry passengers is so limited that it becomes extremely expensive with today's condition.

It is like people say that hydrogen fuel cars are very expensive today or electrical cars are very expensive today because the technology is still developing. Assume a condition when fuel prices are 10 times more than today because of extremely scarce availability and that will happen in very near future, and technology of hydrogen fuel cars has improved there are many fueling stations available.

At that time the number of cars available, the serviceability will be much better. So since it is a new technology, very few numbers are practically available. So today if you start this business, it is going to be a very niche business.