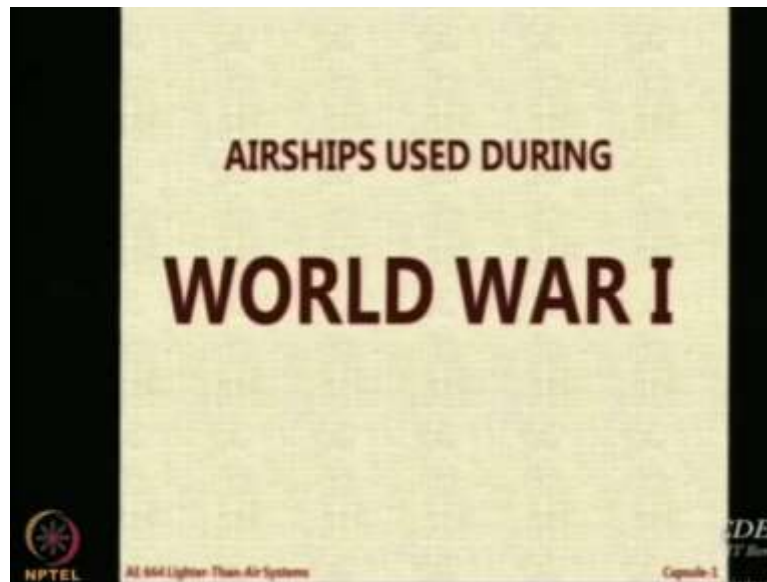


Lighter-than-Air Systems
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Lecture -12
Historical Developments of LTA Systems, Part-III

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So let us see what was done in the First World War using airships.

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So this is the map again, now we will use the same map because not many changes took place. The; changes to place actually after Second World War. So we will continue to use the same map till that time just for the ease, but the difference is that now the Russian empire has become Soviet Russia, so that will be the only change that we will see. So the first people to use ships for war again in the World War 1, were the Italians, they used against Turkey.

Then we heard about bombings in London by the Germans. In fact, there was a unanimous feeling that the best bombers of a city would be airships. Because they could fly very slowly they could carry large payloads flying slowly is for precision bombing. Getting there is difficult but once you get there, the ability to fly slowly is very good because it includes the precision during bombing.

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So they also used for scouting looking around where the enemy has built all its important things. Let us say fuel reserves or strategic factory, etc. So and also for practical boundaries go there and drop bomb whenever and wherever you see the need necessity without any great planning or great target in mind. However, there is a serious problem. Many airships were shot down because by this time some military aircraft also came into being.

And most airships were using hydrogen. So all you need to do is there is a huge target in front of you, you have to aim and hit some igniting system onto the envelope and that is it, it will burn

itself. So many airships were lost by the Germans and the British to fire from the enemy aircraft. So therefore it was decided that we should not use airships for offensive purposes like this. Before this technology could be developed, so what has done is airships were flown;

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And they were supported in their flight by the aircraft. So there will be one big airship with armament with many small military aircraft supporting it. They will not allow the enemy aircraft to come near the airship. So you have a big group going, then you could do airships. But if by chance you have supporting aircraft and not able to handle any one fellow sneaks through and does some damage boom then it is gone.

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So therefore many people said that you know is not worthwhile to use airships, but so much was the terror in London because of the bombing of the city by the Germans.

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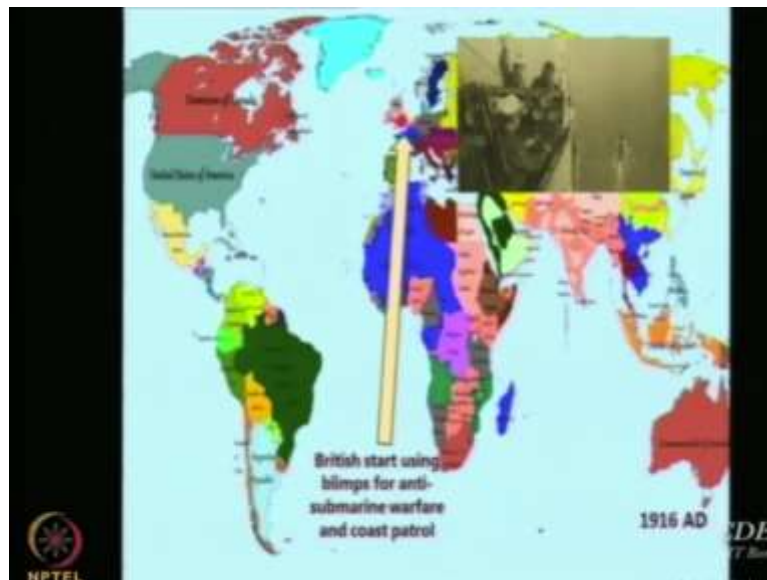
That they were ads like this which said, you know, you can see some burning airships during combat. So it is far better to face bullets than to be killed at home buy a bomb. And this bomb is from the Zeppelin. There were many air raids and airships do not began its applicability was mostly limited to escorting ships. So you can see there is the ship below which is being escorted by an airship and it will be used to give early warning to the ship about any impending attack.

You can use them as offensive weapon also for damaging ships. Because a ship is actually completely defenseless when it is floating in the water against an airship it has no chance of being protected. So you can use it for protection as well as you can use it for offense and interestingly some people came up with brilliant idea of having aircraft mounted on air ships. So you attach small aircraft on airships and you fly in the ocean and to protect the ship.

And if you see some enemy aircraft coming you can launch the aircraft from the airship it will go and bomb the aircraft and then maybe land somewhere because docking onto the airship was very difficult. People attempted it, but they said it is very difficult to dock back to the airship but one can take off with the aircraft attached to the airship and then release it and launch it. So this is the other thing which I want you to search and put on the Moodle page.

What was the technology available for docking of aircraft onto airships and what kind of technical challenges were faced in docking and you know reattachment of, was it possible for example for an aircraft to come and attach itself back to the airship were there any instances of that type. I am not very familiar myself about this. What I know is and I have seen pictures of aircraft which have been attached to the airship and then it goes for offensive mission. So British started using blimps for anti-submarine warfare and coast patrol.

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Even today we are recommending airships for anti submarine warfare because of the extreme high endurance which is needed when you want to locate submarines.

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All right then do not forget that the aircraft technology is also picking up in the meantime. From 1903 is now 15 years since the aircraft has come into being. So, first strategic bombing airships were found to be absolutely useless. Therefore, the plane has replaced it and from this point onwards, you will not find in history much use of airships as strategic bombers or even bombers. So the offensive rule of airships was taken away by aircraft.

Because of much higher maneuverability as well as much higher safety that you have in operating aircraft in an offensive environment.

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World war is over there is a treaty signed in Versailles. So after that airships are being used only for civilian purposes because the war is over. So the US now realized the importance of airships because they saw the damage caused by the Germans to the British and the Allied forces. So they said let us start building this technology in our country. So they start if added by extensive airship construction program and what they simply did was.

What will normally be when you start something is you look at an existing design and you simply copy it. There is nothing wrong in that. You may not be able to improve it but at least you will be able to do it and if someone denies you the technology the only option you have is to first make something similar or same and then you can go for improvements and you can go for announcements.

This is a beautiful picture of an airship called USS Akron in upper Manhattan. And then the big names in the Airship technology are the Zeppelins. They had LZ1 and LZ 2 earlier and the few more of them.

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Graf zeppelin is an airship which was named in honor of its inventor and that airship was actually LZ1, so 127th airship LZ 127.

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LZ 127 Graf Zeppelin	
▢ Operational Life:	1928 to 1937
▢ Usage:	590 flights covering > 1.6 million km
▢ Crew:	40
▢ Capacity:	20 passengers
▢ Length:	236.53 m (776 ft)
▢ Diameter:	30.48 m (100 ft)
▢ Volume:	105,000 m ³ (3,707,550 ft ³)
▢ Useful lift:	60,000 kg (132,000 lb)
▢ Powerplant:	5 × IC engines, each 410 kW (550 hp)
▢ Maximum speed:	128 km/h (80 mph)

That was designed in 1925. And it was operated from 1928 to 1937. So close to 9 years it flew till it met a disastrous end. But notice that in these 9 years, it has done safely no incident, no accident. Around 600 flights and it has covered 1.6 million kilometers or more. Interestingly it needed a crew of 40 people 36 officers and 4 supporters for a crew of only for a passenger, only 20, so very large on manpower requirements.

And what do you think was the main job of these 40 people? Why do we need 40 people? Why should an airship need 40 people to operate, what are they doing? They are not serving food on board or drinks on board controlling the, pilot, co-pilot may be one more person for navigation. So, most of these people are on the ground. They are not in the air these are the ground handling people.

So when this airship comes into land it is a buoyant vehicle. The tendency of it will be to bubble as the wind hits it so they were going to hold it on the ground. And that is even today one of the serious limitations of airships that the ground handling staff needed in the conventional airship is very large compared to an aircraft. So now you see that the maximum speed has increased from 17 miles per hour to 18 miles per hour.

We have five IC engines generating around 5450 horsepower each. And we have the length as 236 meters now. So from 420 feet it has become, 776 feet much larger almost double in size. But it can

lift 60000 kilograms. Now this 60000 kilogram is not payload it is the net lifting force available or the gross lifting force available. And if you subtract from this the weight of the self only then you get the payload which was 20 passengers and maybe whatever their cargo that they carry.

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So here is a great beautiful picture of this airship flying in Rio de Janeiro. For those of you know about Rio this is a very beautiful place called as sugar Low Mountain, this is the Copacabana beach. So it is a very beautiful place, I have been there recently so when I saw this picture I could not resist putting it here just for my own memories and then when I went to Rio I actually met an airship expert who said, even recently also we have had airship flying over Rio.

Not 1930s, I was not even born at that time. He did a PhD he was the first I mean, he is the first PhD in the recent times to work on airships. And his name is Sergio Gomez and right now he is an investment banker he works for a bank in Brazil, but his work is mostly to do with looking at the merits tech economical evaluation of various projects. So he did is PhD from Cranfield University in 1960.

In which he did wind tunnel testing and the first flight dynamics model of airships in modern times. Many people say that Sergio was in that time when the airship technology was being revived.

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This is Graf Zeppelin, the airship about which we spoke. So; notice that such a large airship that people sit only in this portion, this is the gondola. So let us see if we can get some idea about this particular airship.

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So there are some, this is some historical video showing you the aerial view shot from an aircraft or another airship I do not know of the Graf Zeppelin flying. Now this airship is flying in Schiphol in Amsterdam or it is coming in at Amsterdam the Schiphol airport for landing. You can see a small plane on the left side. Maybe that was one of the sources of the aerial video. But this is a very old historical video.

You can see at 11:20 people are waiting excitedly for this airship to come and land. They fly very gracefully So they brought some parcel this is mail postage which has been dropped by the airship and then this is being carried into the postal van on the ground. The fashion of that time the kind of beautiful dresses, ladies are wearing. All of them were wearing gown type dressing. There is no audio in this clip.

It just have an aerial video shot of, there you see a parachute have been launched and that parachute was carrying the mail, did you observe that. That was a parachute which was dropped with a mail. So when you want to drop mail at a particular city, you drop it with a small parachute. So it is when the flag is fluttering it is very windy, but still the vehicle is majestically making its maneuver

to approach for perhaps to approach for landing at an airport. We have many more videos to see, so probably I will just save some time.

(Video End Time: 15:22)