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

Lecture -11
Historical Developments of LTA Systems, Part-II

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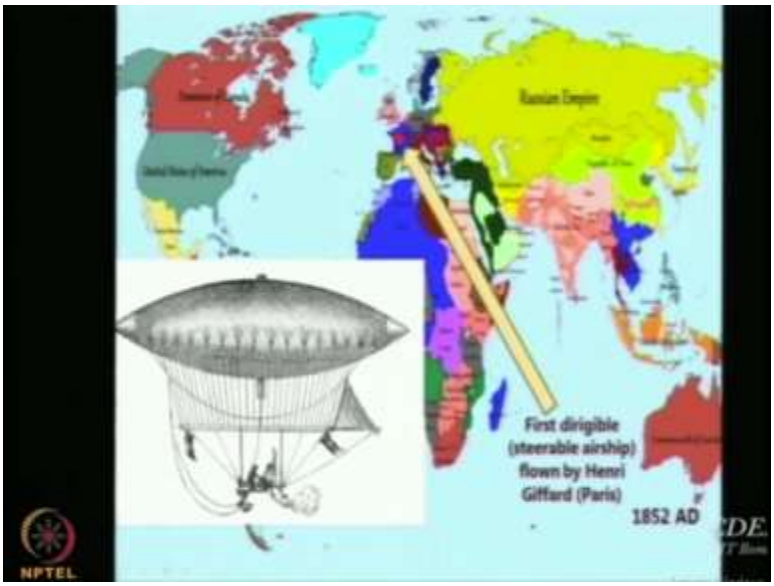

Coming back to history now in 1852 we have the first airship, flown by Henri Giffard and any kind of guesses what kind of engine he has used because we can see steam coming out. So, although IC engine was available but Giffard's first airship was basically a steam engine airship and it was in France. So Henry Giffard is considered to be the pioneer in airship technology. So it had a control system, which you can see there is a sail on the right hand side.

It had an envelope which contained the lighter than air than gas and a propulsion system. So the few things that you require are buoyant lift, which is through the balloon control system to fight the winds and go in the desired direction and the propulsive device to enable you to fight the wind. So, all three were present for the first time in Henri Giffards airship.

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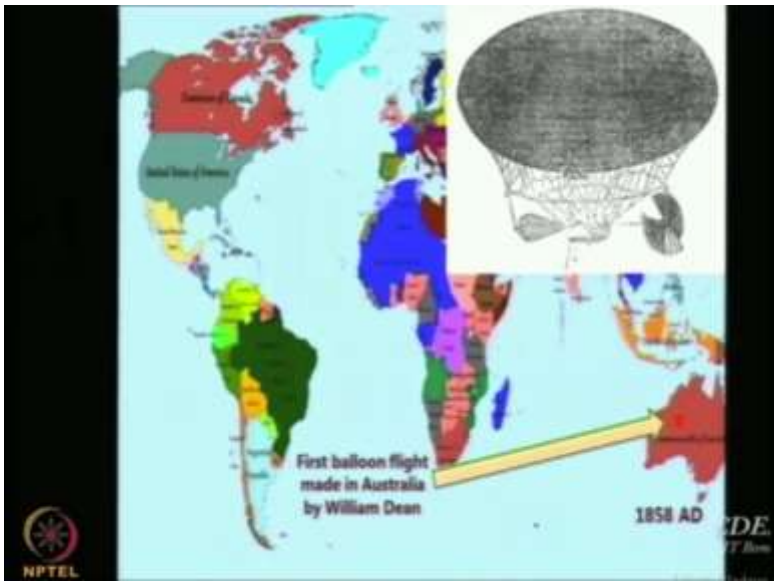

Then this technology travelled to Australia and there were other people who made balloon flights in Australia, but not the airship this is still balloon.

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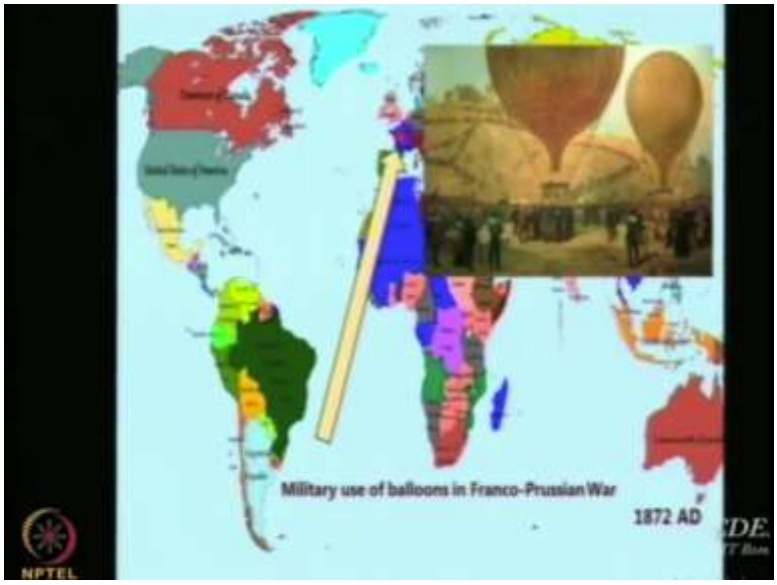

And then we saw the military use of balloons in the Franco-Prussian War, there was a between Persia and France and in that war for the first time in ancient times the Chinese did not use it for an offensive purpose. They used it for only indicating and marking where their troops are etcetera. But this is the first offensive use of the LTA systems in any war or military environment.

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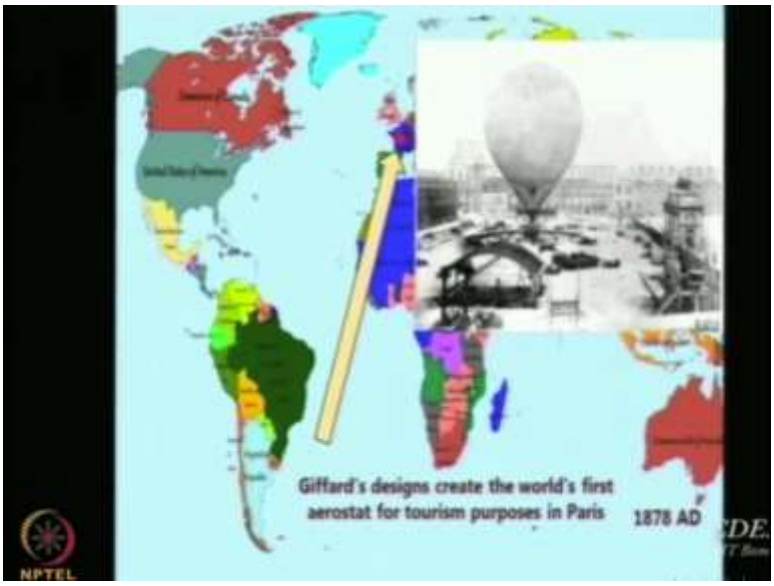

Moving on Henri Giffard who made the first airship kept on working further in this technology and he realised that this technology can be used for tourism because at that time people were struggling to get airborne. This is much before 1903 when Wright Brothers flew this is 1878. So the aerospace technology at that time was driven by developments in LTA systems. Aircraft were never to be seen, they were only being conceived and planned.

Maybe, there was guidelines set by this time, but no aircraft. But airships aerostat as you can see people are already planning to use aerostats for tourism purposes. That means they are sufficiently confident that they can carry tourists not adventurers, but tourists people like you and me common man they can be taken into an aerostat and flow around.

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And, this is the man Count Ferdinand August Graf von Zeppelin, the Von Graf is the German for Count. He is the person who should be credited for the massive increased in the technological levels of airships and it is one thing to invent something is the other to take to the commercial and professional level. So he is the person who has done this. He was a Count in Germany and his contribution to airship technology is very phenomenal.

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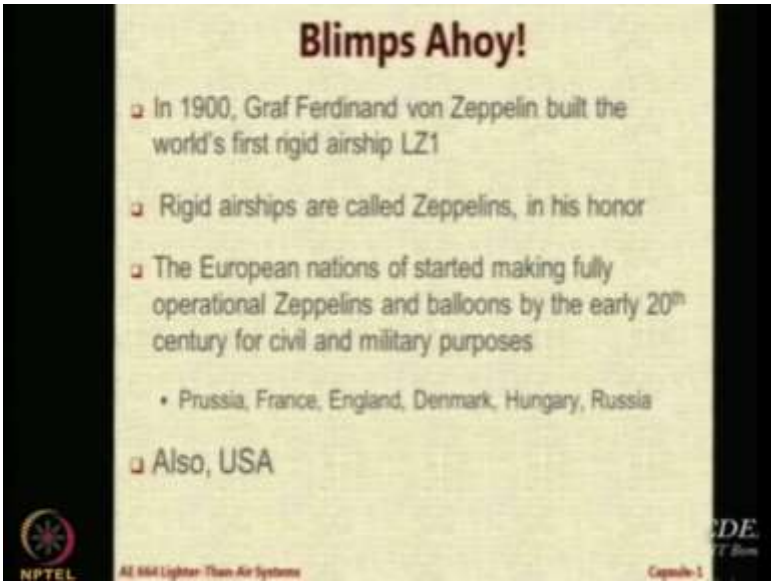

So as a mark of respect what we do is, so he built the first rigid airship in 1900, before Wright Brothers. The world's first rigid airship was built by Count Ferdinand August Graf von Zeppelin, it was called as the Luftschiff Zeppelin 1 or LZ 1. Luftschiff is the airship in German and Zeppelin

the name of the count. So much is the contribution of these gentlemen that all rigid airships are generally called as zeppelins.

It is like xerox, which has become a name for photocopying machines. So his name is Synonymously in rigid airships and airships at that time are mostly rigid because the technological developments in fabrics were not so advanced that they could think of having a load carrying number as well as a gas barrier, as well as something that can withstand the atmospheric conditions.

Of course they have these gas bags for balloon etcetera or aerostats, but for sustained flight over long distances they were not able to do it only using the air bag or only using the textiles fabric which can be done now. So therefore all airships at that time were generally rigid airships and the Europeans, you know there are many countries in Europe doing that time who were able to use this technology and who were able to give us airships.

And also the technology has also moved to USA. So USA were not the leader in this technology. They got it actually from the people who went Jean-Pierre Blanchard who went to the US he took the technology with him to the US.

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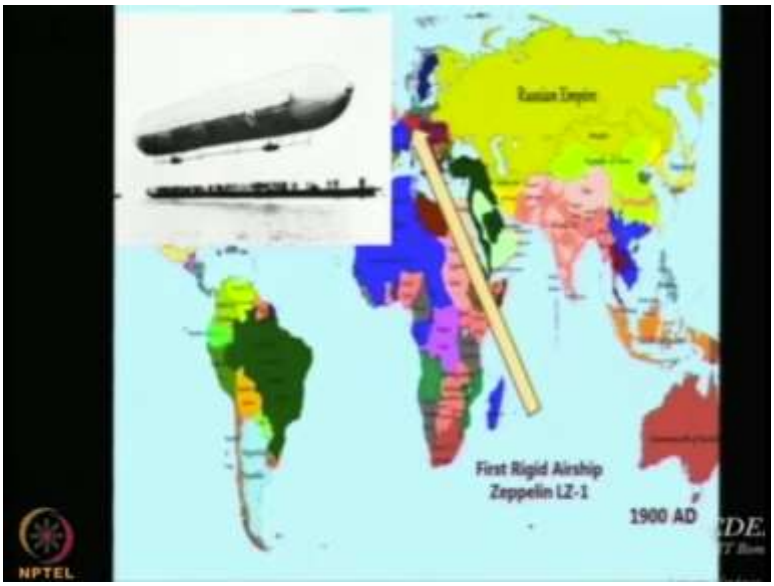

This is Graf zeppelins, first airship LZ1.

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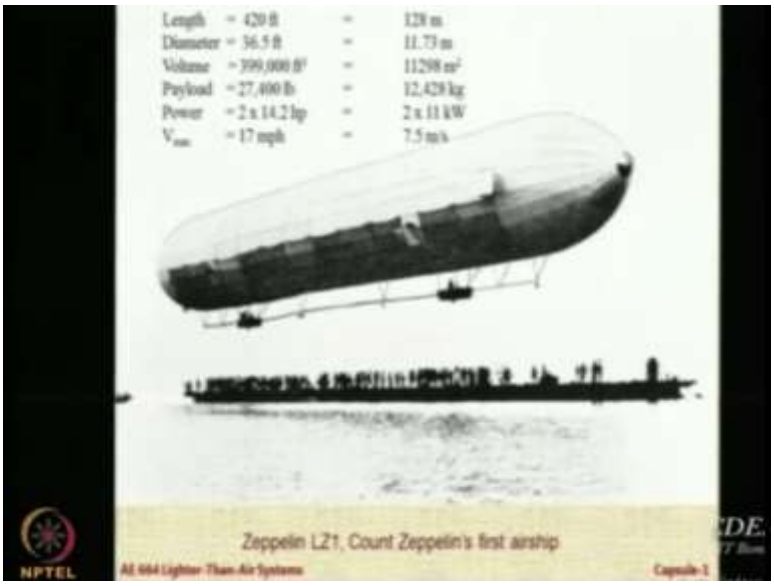

And I just want to share with you some information and some dimensions about this airship. So it is a, 420 feet or 128 meters long and 11.73 meters dia. So the length, diameter ratio is just slightly more than 11, more than 11 that is the L by D. The volume is, if you go in square feet is almost 1,000 square feet. We normally work in the SI units so it is 11,298 meter square, meter cube this is the mistake I just want to correct the mistake. The maximum speed is just 7.5 meters per second. So it is going to fight the winds but only to the extent of 7.5 meters per second.

If the oncoming wind is more than this it is just going to remain where it is slow moving vehicle but ability to travel large distances.

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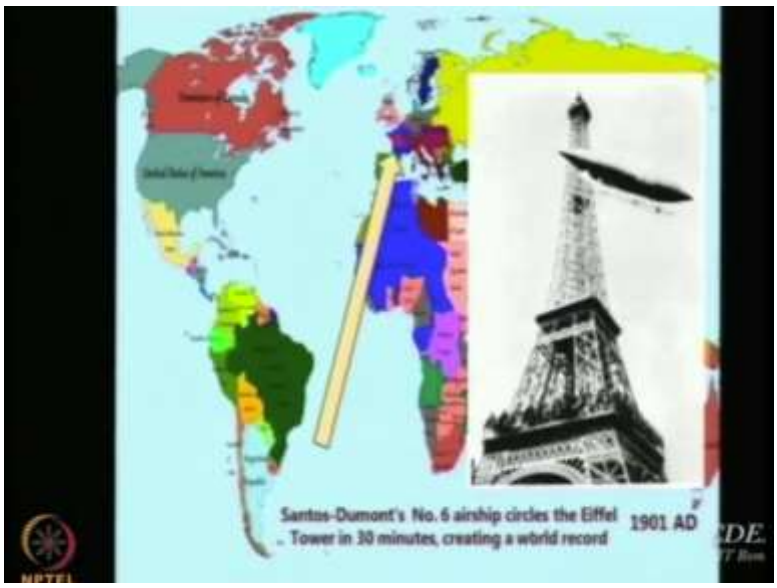

Now with this airships became more and more popular more and more capable and some person is a Brazilian and many Brazilians feel that he should be credited with the first airship because the claim that he was actually able to make an airship and fly before Henri Giffard. But probably there is no record or no documentation and that is why the claim is not that much acceptable in historical literature.

But that is a matter of historical debate interestingly, he was the person who showed that they are very capable and they are able to do things. Now at that point of time in 1901 when you say capable you have to look at the competition, which is only the automobile and the ships. So 7.5 meter per second is not a huge performance at least speed wise. But look at the time it is 1901. So here is a man who is able to fly around the Eiffel tower in 30 minutes using an airship.

And with this demonstration a lot of popularity of airship spread all over Europe. The internet is full of videos of people running and you know looking around where airships are and pointing towards them in the sky and showing excitement about that. So they became very common across Europe and USA and they were being used many many places in large numbers because this was the best thing available at that time.

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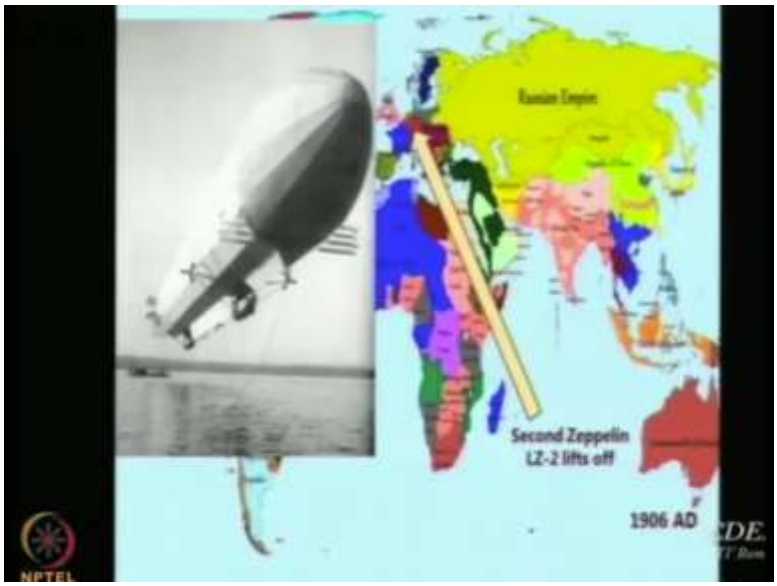

Russians will come later, now the Graf Zeppelin LZ1 was the upgrade or improved to make the another one. Now what is the upgradation? Upgradation is coming in terms of this, this particular

control system that you see here and the front as well as in the back. So, the second one lifts off in 1906.

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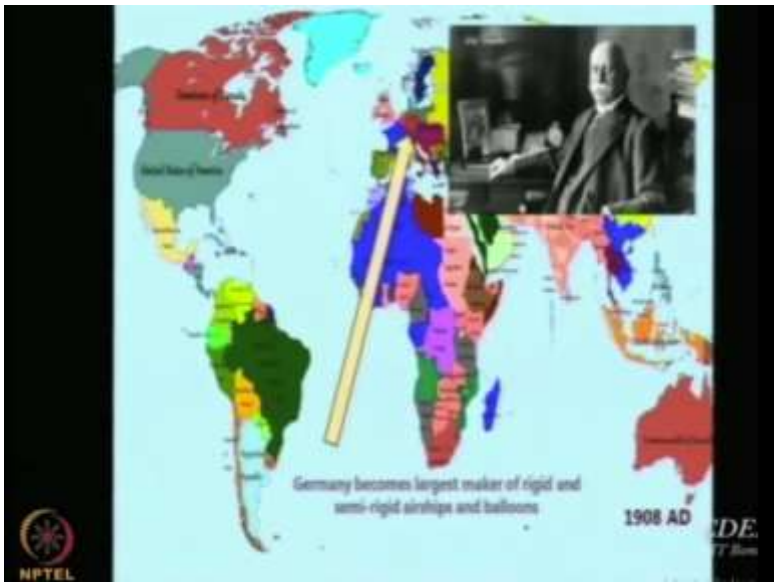

In between we have the Wright Brothers and the Germany became the largest maker of rigid and semi-rigid airships and balloons. So they realized that there is also some merit in making semi rigid. There is no need to make the whole thing completely rigid you could have a semi-rigid structure, which as you know, contains a framework inside with a flexible covering or flexible envelope.

In the rigid airship everything is rigid the gas bags are inside. But the structure the framework is rigid that covering is also rigid. All right, so then Italy is not lagging behind. Italy is also not succeeded in having their own airship and you can notice there a very interesting system to give you directional. So they have used new system, mounted behind the airship assuming that as airship goes forward the vertical looms will deflect and give you the direct side force.

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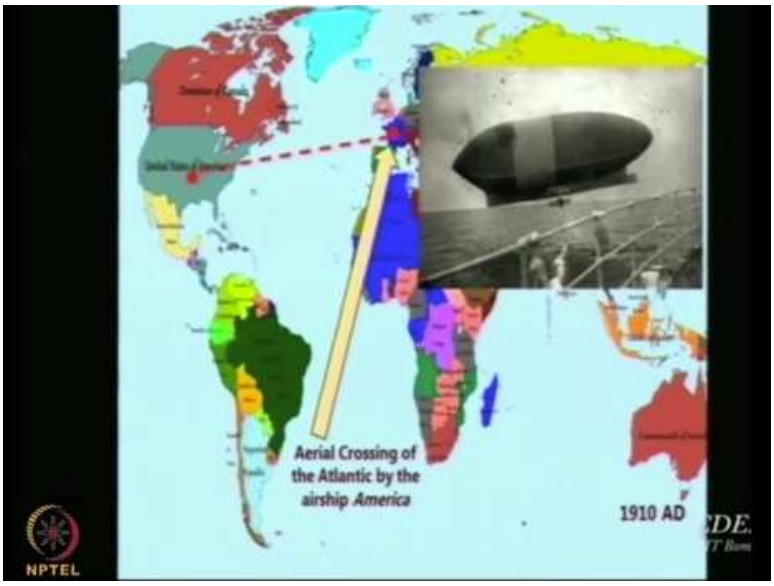

So then now we have the first situation in which you can have the crossing of the Atlantic that was the next challenge of people. That happened in 1910 when an airship flew across that atlantic. Now you can imagine how much time it took. The speeds would not be very high and you will be fighting the winds also at most when the winds in the ocean are quite high or can be quite high.

So I would request someone to find out about this particular flight. The first Atlantic crossing by an airship called America. We want to know more details what was the propulsive system what was the maximum speed. So, on the Moodle page you can give us some information about the particular airship.

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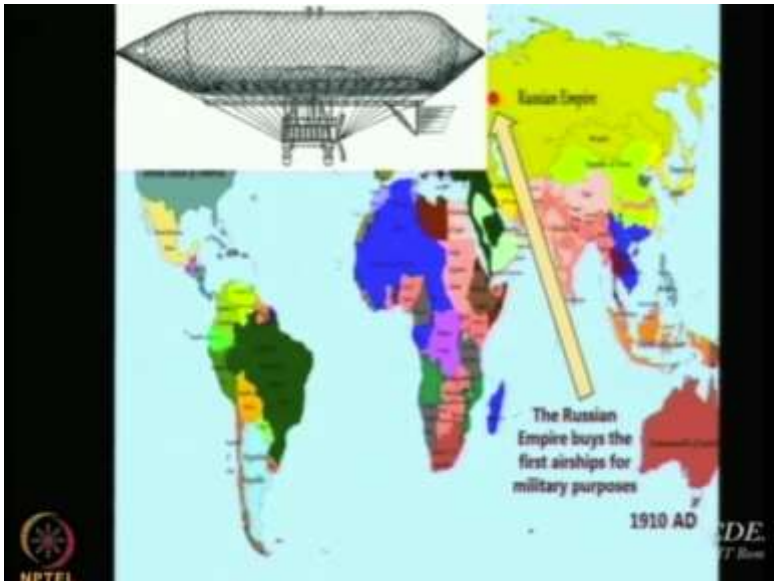

Russia is not lagging behind again and they also acquired airships from Europe for military purposes.

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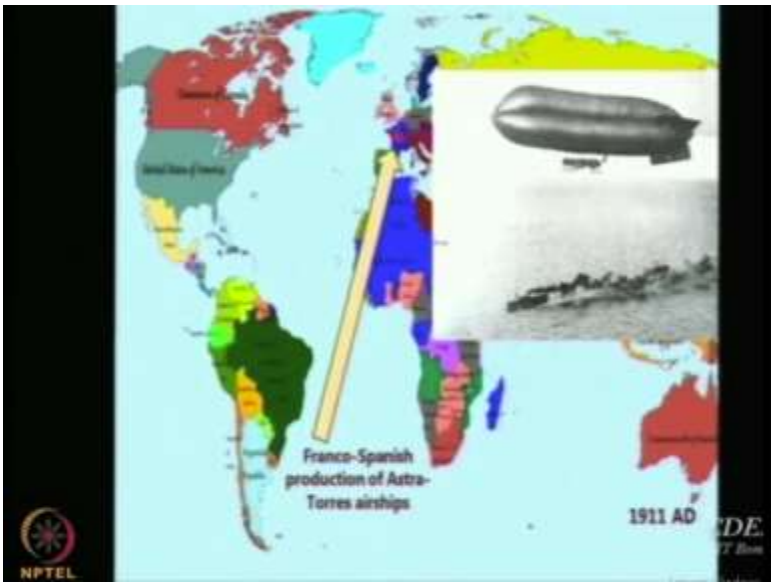

And then France and Spain they got together and there was a Franco-Spanish production of extra tourist airships. As you can see now some amount of aerodynamic shaping is coming into the design. But there is a complete delinking between the gondola or the passenger carrying dolly and the envelope. So we see that people are being suspended on through ropes below the envelope.

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You would see slowly as things to evolve. Let us see how many people, so however the world these are the people places where airship operators and manufacturers were available. In 1911,

they were so many places in the world where, so you can see that the concentration is in Europe. There are these five stars in Europe, there is one in Russia, one in US and one in Australia. This is where the top one is, the most of them in Germany, France, UK and Italy, Spain.

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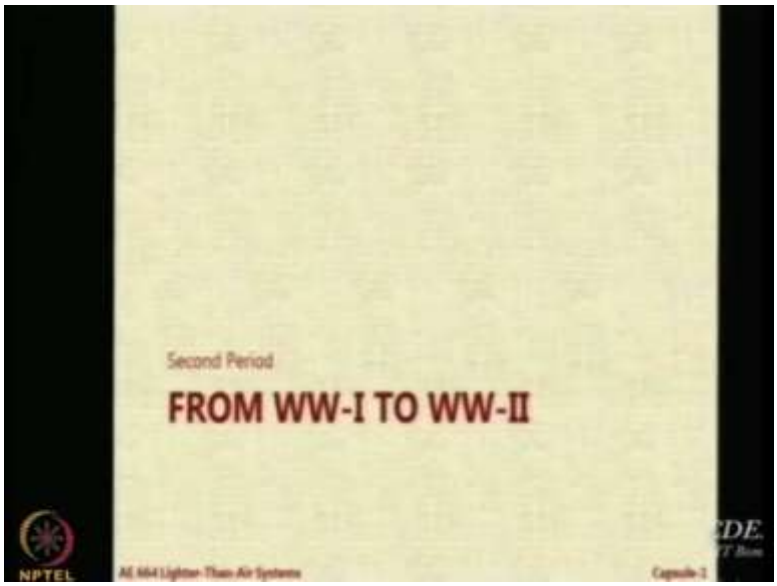

These are the places where, now that the first period, then we had the first world war.