Lighter than Air Systems
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Module No # 01
Lecture No # 01
Introduction to Course Content

We start the course on lighter than air systems which incidentally is the first delivery of this course ever. I will plan in this course for a very long time in fact the course notes for this course were ready in 2010 and it took 4 years for it to actually materialize. So let us first look at a basic description of what this course is about? And what we intend to cover? There will 6 capsule in this course the first capsule which we will start today is only about introduction to lighter than air system and followed by some historical prospective.

The reason for this is that there are many lessons to be learned from history and also there are some lessons which we should forget. Because historical facts stick in mind and it is difficult for those facts to be removed one has to reinforce them okay. The second capsule would be on principles of aerostatics. This is the prime difference between the lighter than air systems and the other aerospace systems about which you may have got some exposure and that is how the course will start departing from the other aerospace engineering courses.

Because our principal lifting force happens when the platform or the vehicle is stationary we then look at technological issues regarding airships.

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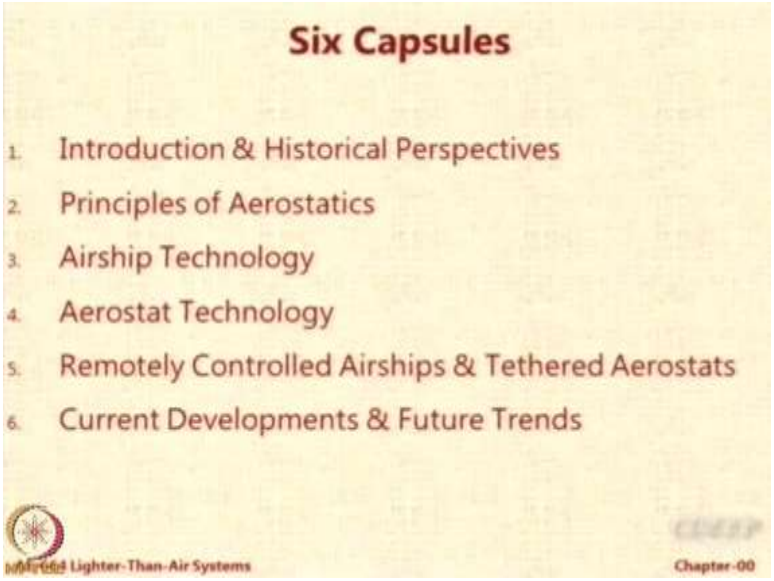

We will move to aerostats we look at the aerostat technology and various components. And then over the last 12 years or so, in IIT Bombay we have been doing a lot of work on design and development of lighter than air systems. And by the way this word will be abbreviated into LTA from now on. Because it is a very mouthful word so lighter than air basically is LTA. So, we have done lot of work on developing, deploying, testing several LTA systems.

So we will showcase that work to you and then finally we end the course by looking at what is happening globally and what trends are emerging for the future okay. So these are the 6 capsules which I have broadly thought we will be able to cover.

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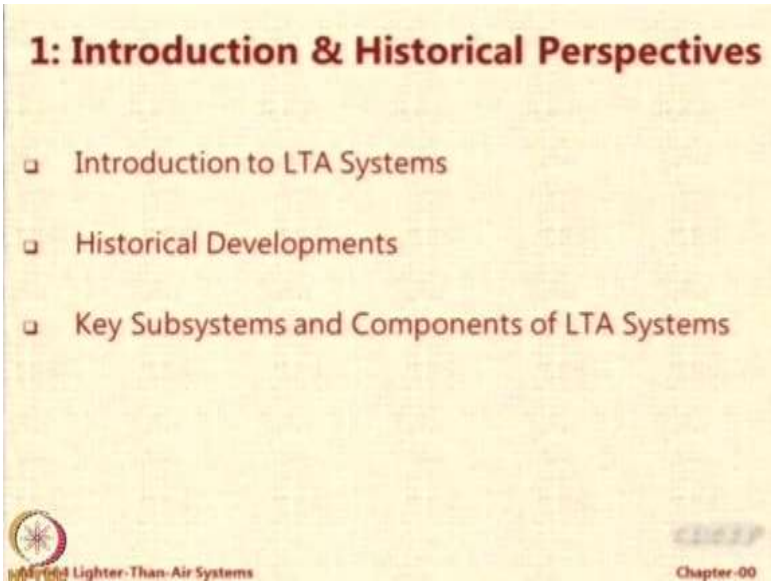

The first capsule will have 3 main elements we will talk about the introduction we will talk about historical developments. And then to make you familiar with LTA systems we will look at the key systems and subsystems or key components of LTA systems.

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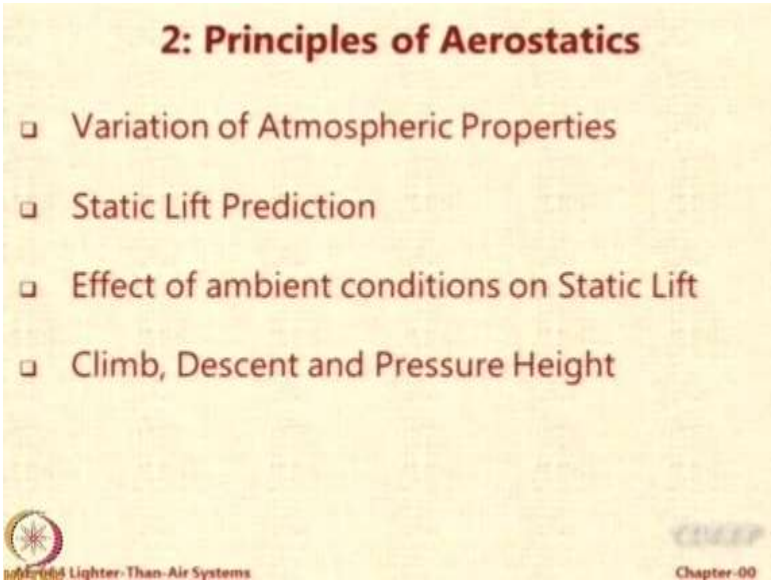

The next capsule will be on the basic lift generation system which is aerostatics so we look at atmospheric properties. They effect a lot in our system we look at methods for a estimating static lift and how the ambient conditions like pressure, temperature, humidity exposure to hot conditions or cold conditions for a long time. How do they affect the lift generation it is important because atmospheric properties play a major role in the ability of LTA systems.

And then we look at some concepts and methods to estimate the performance of these systems during climb descent and we also look at the concept of pressure height. Moving on to airship technology we start by looking at how we can design or size a typical airship given the operating requirements.

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Little bit of aerodynamics and stability not too much little bit of aerodynamic and stability to get a hang of what is happening and how it is estimated? We will then move on to ground handling systems and mooring systems which are very special requirements in LTA systems. In the past we have done some case studies on airship operations and design and finally we look at the design and development of airships.

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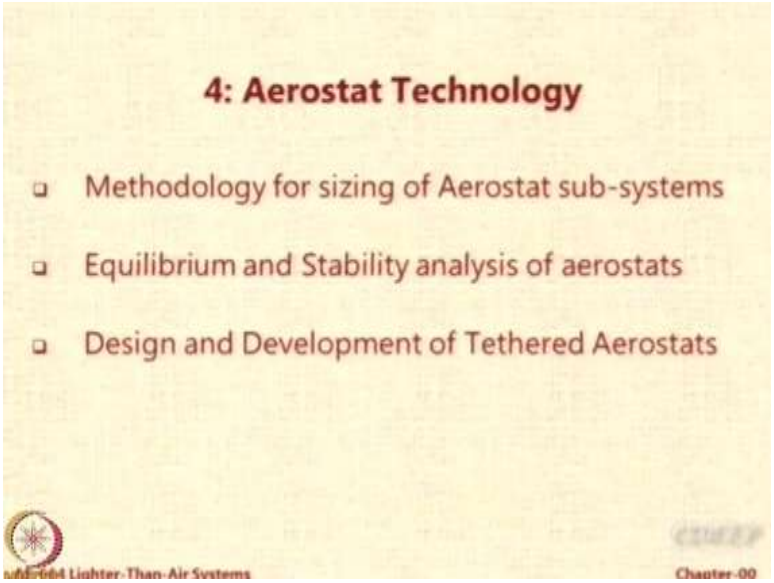

The next capsule would be on aerostat technology in which once again we look at methodology. But now we focus on aerostats being a system that is suspended in air with a cable or tether we need to also look at which is equilibrium positioning as well as its stability. And then as I

mentioned we showcase what we have done and also look at how other people have designed larger aerostats.

And this will be the last capsule which will inform us about some modern trends in this subject stratospheric airships are being talked about in a very big way all over the world. And this will be one of the important focuses in our discussion on current and future developments okay.

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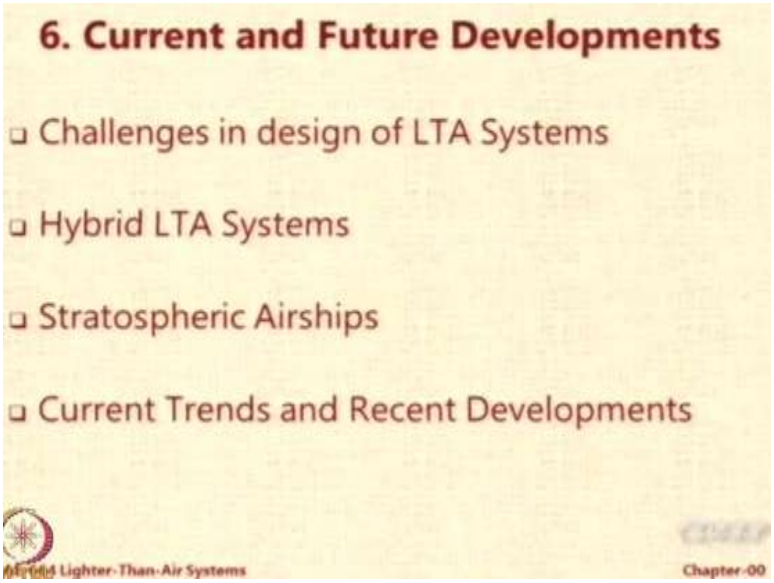

So some of you who have moved in a few minutes ago I welcome you to this course I will just quickly recap on what we have discussed so far. This is the first offering of this course ever and although it has been planned for quite few years it is just that in this semester I got a chance to offer it. So it is a new course and the course will evolve as we proceed okay.

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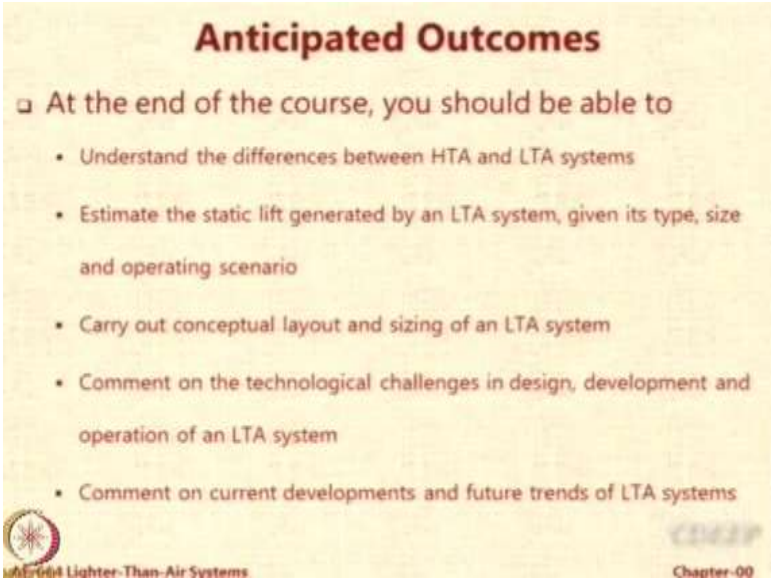

Now with every course one definitely needs to know what are the expected, or anticipated outcomes. What should you do able to do after attending this course and following all that is covered in this course. So the first thing that I would like you to be able to do is to understand the basic difference between the lighter than air or LTA systems and the heavier than air or HTA systems about which we have some basic and prior knowledge.

This is actually very straight forward but quite understood in many circles after that given a particular operating scenario or particular requirements and also a particular type of LTA systems. You should be able to do estimation of static lift generated. You should be able to carry out conceptual layout and sizing of the LTA systems using some standard formulae's and procedures which have been made available in literature.

And in textbooks you should able to comment on the challenges that are there in the design development and operations of these systems. And you should also be able to comment on what is happening globally and also what is expected to come in the near future. So these are the objectives of this particular course and if you are able to do these things at the end of the course it would have met its purpose okay.