Design and Simulation of DC-DC converters using open source tools

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Lecture – 01
System Overview

Good morning to all of you, in this video capsule we shall see a bird's eye view of the DC-DC converter system.

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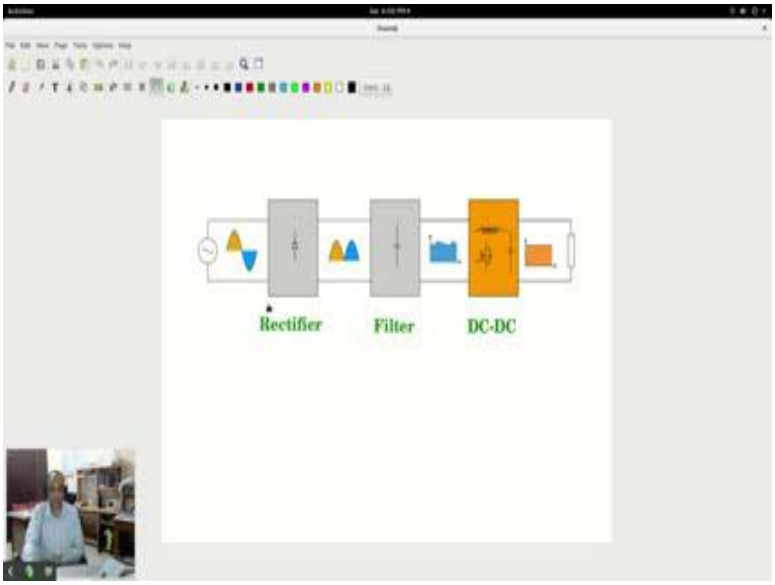

Consider a load such as this. This load is supposed to get only a DC voltage. The DC voltage can give by a DC source such as this. The DC source that we have used is a battery, however the battery and the load maybe incompatible. For example, the battery maybe a 12 volt battery or 24 volt battery or 48 volt battery and the load maybe a 5 volt load. In such a case the battery cannot be directly connected to the load which expects of high volt.

We need to have a power interface between chord and DC-DC converter and this was the focus of optic and this is what we are supposed to do and design. However, in most cases the input may not be a battery, the input maybe the AC grid itself. If it is the AC grid then

the input wave shape will be an alternating by the erectional voltage wave shapes 230 volts rms.

Now, this is not directly compatible to the DC-DC converter input. Therefore, we need to do a further power conversion for this particular wave shape that is we rectify it using a rectifier and make the wave shape into a unidirectional wave shape. This unidirectional wave shape is highly varying and the system further not compatible directly to the given to the input of the DC-DC converter. So, we use another interface called the filter. The job of the filter is to transform this highly varying unidirectional voltage into a low ripple unregulated voltage. This low ripple unregulated voltage is fed to the input of DC-DC converter. This gets transformed into a high quality DC output which can be fed to the particular application of the load which expects (Refer Time: 02:46).

If you look at the rectifier, rectifier is nothing but a simple diode. It may be a half bridge rectifier or a full bridge rectifier, but we shall discuss the most popular rectifier which is used in most of our day to day which is the full bridge rectifier. This would be followed by a filter which could be L C filter or induct or capacitor filter or just C filter. Here again we shall discuss the C filter which is the one which is most widely used in most of the products.

In the case of the DC-DC converters the main components in it or the master (Refer Time: 03:36) some parts of the conductor switch there will be capacitors and there will be inductors. So, all these major components will be together in specific topologies to achieve specific outputs which we will discuss later on in this course.

The objective of this particular course is the DC-DC converter design. However, in the initial stages or initial process we shall discuss the rectifier and filter because we need to obtain DC output. The DC output at this point so that can be fed to the input of the DC-DC converter from the source, the wall outlet source which is a 230 volt AC voltage.

So, the initial discussion this week will focus on the rectifier and filter design.