**Topology Selection**

In this project, we aim to develop a low cost, and compact converter in order to make our design desirable by potential customers. To do that, we have made our topology selection carefully by considering the wieldy usage and reliability of the circuit, and the cost restriction. On the other hand, we work hard for designing efficient and useful converter with this limited budget. For us, there was three different options as a topology that is used on the design.

* Three-phase Thyristor Rectifier
* PWM Rectifier
* Diode rectifier + Buck converter

At the beginning, we discussed about using thyristor diode rectifier in order to rectify the AC signal and regulate it. But in this case, we should consider the firing the gates of all the thyristor diodes in the rectifier. Therefore, we would be dealing with the firing loss, also it would make the circuit complicated instead of our simplicity desire. Also, we want to design a non-bulky hardware to be able to converge to the high class manufacturer. At the end, the thyristor rectifier did not correspond our requirements and it would not satisfy our engineering desires.

Then we considered the PWM rectifier as a topology for our project. In PWM rectifier, the important thing is the switching. Therefore, there will obviously high switching losses besides the conduction losses. Also, we should consider the harmonics of the pulses, there should be filter design in order to suppress the higher harmonics. Thus, we did not wan to make our design complicated and we pass through the PWM rectifier option.

As a last and best option for us, we have considered the diode rectifier and buck converter in order to control our 3-phase voltage lines. At first, this option includes the main topics of EE463 lecture, so it will be a good practical application of learning outcomes in the lecture. Also, diode rectifier gives chance to rectify the AC waveforms with minimum amount of conduction and switching losses, we will calculate the losses in the next step of the project. Also, in our design we wanted to keep simple the application and working system. With this simplicity, we can adjust our design in variable current and voltage values as much as they stay in our components’ electrical limitations, current, voltage, slew rate etc.

As a result, we have chosen the diode rectifier and buck converter in our project in order to rectify three-phase waveforms. This topology satisfy our principles in terms of being low budget design, compatible with variable voltage and current values, and easy to control.