

Comparison of Topologies

❖ 1-phase Thyristor Rectifier

- Output ripple is above suitable range. Hence it requires large passive elements such as capacitor and inductor compared to other topologies.

❖ 3-phase Thyristor Rectifier

- Firing angle trigger circuit is very complicated circuit with a lot of circuit elements. For example, one way to create 6 pulses with 60° phase shift is using transformer. Hence if 3-phase thyristor rectifier is selected there will be another important issue which requires much time and effort. Synchronizing with source side signal is required for trigger circuit.
- On the other hand, firing angle trigger circuit can be bought but it is very expensive. For example, the one which is used in Power Electronics Laboratory, namely RT 380T, is about 200€ which is not affordable.
- If another trigger topology which can be affordable is found 3-phase thyristor rectifier can be used because it just requires a 6 thyristor. Passive filter possibly may not require as load is inductive.

❖ 3-phase Diode Rectifier + Buck Converter

- Buck converter can be operate on high frequencies hence passive elements of buck converter can be at small size and it may not cause any problem about size or cost.
- Gate driver of buck converter is very simple compared to thyristor gate driver topologies. A simple microcontroller can generate required PWM signal for switching element of buck converter.
- Synchronizing with source side signal is not required. An Arduino a potentiometer is enough for generating and controlling PWM of the switching element of buck converter.

Finally, it is decided that 3-phase diode rectifier with a buck converter is going to be used in this project.