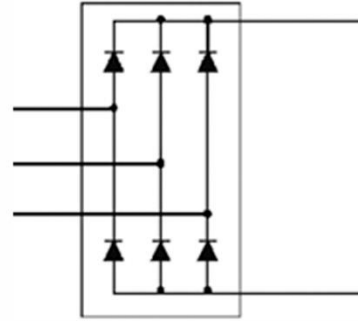


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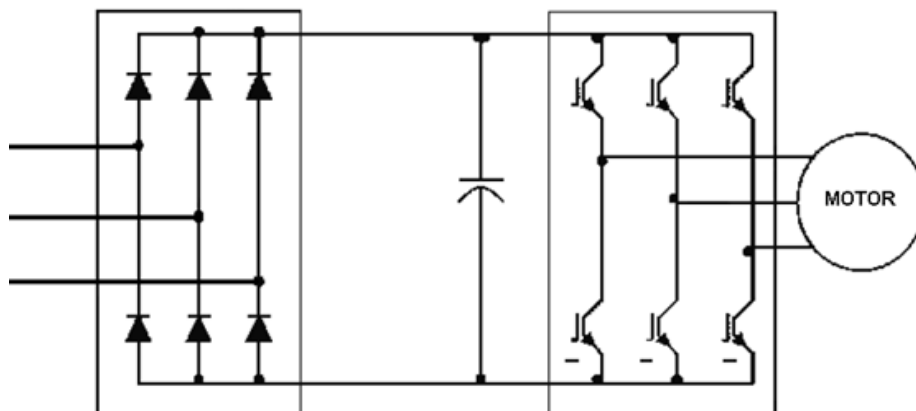
Sinusoidal Filter

DİDEM ERGUN SEZER



SINUSOIDAL FILTER

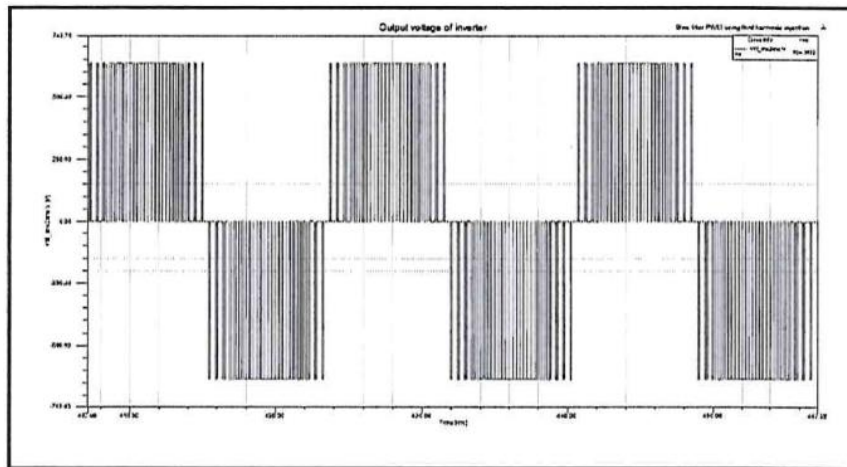
The most common application in the industry is driving asynchronous motors with variable frequency drives. PWM inverter-based variable frequency drives are widely used due to their high energy efficiency, motion accuracy, high starting torque, and low starting current..



At the input stage of the variable frequency drive, a DC voltage is obtained using a 6-pulse diode rectifier circuit. The inverter circuit, which consists of semiconductor switches, operates based on pulse width modulation. These semiconductor switches switch at specific frequencies and pulse patterns to achieve the desired output voltage at the required intensity and frequency. The PWM principle aims to generate a sinusoidal voltage at the fundamental frequency by maintaining a constant switching frequency and adjusting the width of the inverter output voltage pulses.

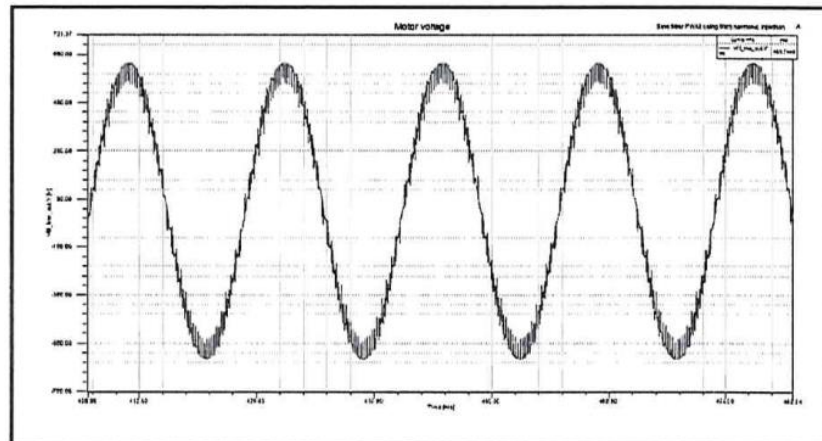
The sinusoidal wave produced by the switching of PWM inverters is not a pure 50Hz waveform. Asynchronous motors are designed and manufactured to operate with a three-phase sinusoidal wave form.

aThe voltage waveform at the output of the variable frequency drive deviates significantly from a sinusoidal shape:



In long cable applications, asynchronous motor variable frequency drives cannot be used. Field experiences have shown that for speed control applications with a distance of 50m or more, using a sinusoidal filter between the variable frequency drive and the motor can approximate the waveform to a pure sinusoidal one.

This allows asynchronous motor variable frequency drives to be utilized over long cable distances.



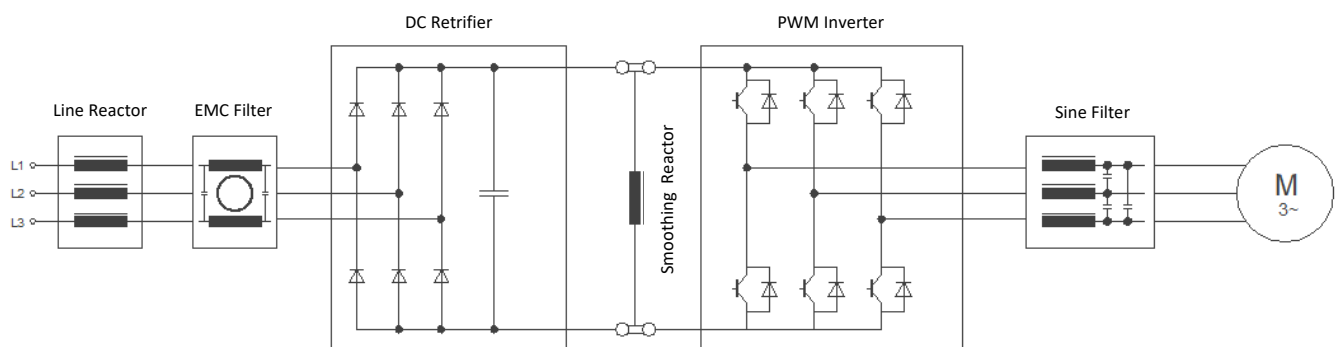
The three-phase sinusoidal filter includes a three-phase reactor and a three-phase capacitor. This filter is designed to absorb high-frequency currents and approximate the current waveform to a sinusoidal shape, ultimately extending the service life of the asynchronous motor fed with this type of waveform.



The sinusoidal filter offers several benefits:

- Enables motor operation over long supply lines
- Allows the use of unshielded cables
- Reduces du/dt value
- Increases motor efficiency
- Reduces motor noise and extends the insulation life of the motor
- Prevents the motor from overheating

Ideal Type of Connection :



Didem Ergun Sezer
Ergun Elektrik A.Ş.