

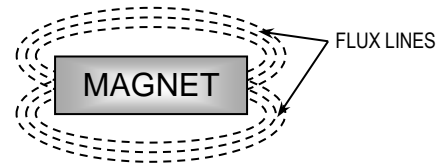


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File # FTB-003	Title: Why Does 50Hz Make Such a Difference?	
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In customer transformer specifications, it is frequently assumed that the transformer will operate at 60Hz, and Ensign Corp often must ask if the customer also requires 50Hz operation. This is more than simply our version of, "Do you want fries with that?" Whether to include or exclude 50Hz impacts the transformer's performance as well as its cost. Sometimes it also determines the degree of safety the transformer can provide. Here's why.

Back in high school physics class we observed the circular patterns, called "magnetic Flux lines", made by sprinkling iron filings over a magnet. An energized transformer is an electromagnet and therefore creates similar magnetic flux line patterns.



When dealing with flux lines and transformers, two laws of physics are particularly significant: 1) each magnetic material has a limit on how many flux lines it can handle, and 2) the lower the operating frequency the more flux lines that are generated. Operating a transformer at 50Hz generates 20% more flux lines than at 60Hz. As the number of flux lines approaches the magnetic material's limit, the heat in both the magnetic core and the internal coil wires increases, and under certain circumstances, unpredictably so. This can result in a transformer that exceeds safe temperature levels. Therefore, a transformer designed to run at 50Hz will simply run cooler at 60Hz. But one designed only for 60Hz may overheat at 50Hz.

In order to accommodate 50Hz operation, the transformer must employ a magnetic core material that can handle the added flux lines. Such materials are readily available, but they are significantly more costly than the "normal" core materials. Using high-grade core materials when they are not required results in transformers that are over-designed & non-competitively priced.

So, if a transformer will ever see 50Hz (for the European, South American, UK, or Japanese markets, for example), the capability to do so must be designed in from the beginning. But if it will not see 50Hz, there is no sense in adding the unnecessary cost.