



Variable Frequency Drives

An Online Continuing Education Course for Engineers

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Variable Frequency Drives

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1. Introduction

In today's industrial and commercial world, variable frequency drives (also known as **VFDs**, **Frequency Drives**, **AC motor controllers**, and **Inverters**) are becoming a more and more important method of speed control. They are used for all but the most demanding speed control applications. Large rolling mills are among the few places where DC motors and controls are still used. One of the reasons for this is that AC motors and their associated controls are much more reliable than the DC motors and the associated controls that, to a large extent, they have replaced. According to the Rockwell Automation website, they make VFDs to control ¼ to 30,000 horsepower. I put the comma in there for readability. The website really says 30,000.

Let's give a brief history of VFDs. They had a rather limited application in the early days of the day. When higher power transistors were made, and many more applications (MTBF) were still a problem. In their basic operation. Small inverter characteristics. In the 1990s, digital inverter devices were also developed. It is possible for inverters to be used much more versatile device. In many applications, they are reliable. For many applications, they are turned on, and operated without any additional effort is needed to program an inverter to the application.

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The motors that are usually controlled by VFDs are **induction motors**. A three-phase induction motor is one of the simplest power conversion devices ever made. It has one moving part. Of course, if the motor has ball bearings, and we call ball bearings moving parts, then an induction motor with ball bearings does have more than one moving part. In any case, they are very simple and hence very reliable. They have a winding on the stator or part that stands still and a winding on the rotor, or the part that turns. When voltage is applied to the stator, a voltage is induced (Hence – induction motor) in the stator coil. This causes a current to flow in both the stator and