TECHNICAL UPDATE # 003

## Torque, Power and Speed – basics of power sources

In this article I want to dispel some misunderstandings when it comes to a well-known engineering relationship between Power, torque and speed; viz

Torque (Nm) = 9550 x Power (kW) / Speed (rpm).

This formula defines the linear relationship that one may see with a certain AC electric motor with different pole configurations, such as 2, 4, 6 or 8 pole that modify the synchronous speed in line with the pole number. Thus while the line frequency of say 50Hz (Australia) produces a theoretical synchronous speed of 3000 rpm for a 2 pole motor that same sized motor with a 4 pole configuration would sync at half that speed or 1500 rpm and its torque would be doubled (as per the linear formula above). The same relationship occurs in USA (60Hz) but the respective speeds become (3600 and 1800 rpm)

Where I have seen folk come unstuck is when motors are controlled by a Variable Speed Drive (VSD or VFD) and recording the final output speed BUT applying that same formula. It is erroneous to double the torque in this situation if the speed is halved. The principle of the VSD is to REDUCE the power as the Speed is reduced and hence the Torque effectively remains CONSTANT.

A simple chart shows this as follows:
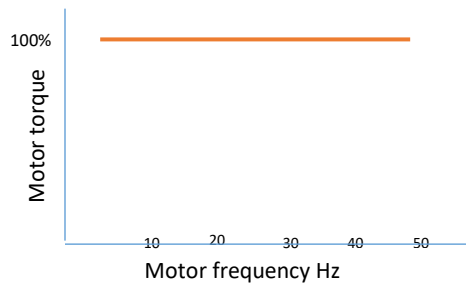
So when selecting a suitable coupling based on the motor torque it is vital to understand how the system is controlled (VSD, DOL etc) and operated.

Next time we will discuss other types of power sources.

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