Protecting your Motor - Overload Settings and Temperature Protection

At SME we are committed to assisting our clientele to improve their level of expertise and understanding of the protection for submersible motors.

It seems to us that most electricians set the current overload protection about 5% above the nameplate full load current, regardless of the current the motor is actually drawing when it is operating, which will not protect the motor if it is only loaded to 70% of the nameplate current.

After the first few days of operation, submersible pumps and motors, tend to settle down and draw the same current for days, months, years - until something changes. Sometimes the load will fluctuate a little with irrigation applications, or supply voltage variations, etc., but generally the current will not vary.

In our opinion to protect the motor and pump the owner/operator needs to know when something changes so they can investigate that change. Quite often the reason for the change can be found on the surface and fixed very easily. A recent example we know about was a diesel generator that had sped up and was generating at 55Hz instead of 50Hz.

SME recently supplied a 300Hp 4P 14" motor with a nameplate current of 431 amps and the actual duty point current was 320 amps. The site electrician decided to set the current overloads to trip the motor at about 430 amps, which they did, after there had been a catastrophic failure. The motor only ran for 20 hours, and the pump and motor were then out of action for 4 weeks while everyone involved argued about what had happened and then agreed to get the motor fixed, which involved rewinding and rebuilding. We are certain that if the overloads had been set to 330 amps they would have tripped and alerted the owner that there was a problem. There is a reasonable chance that the reason for the trip could have been identified and fixed. Failing that, the motor could have been operated and monitored very closely. If the current had kept rising it would have indicated that something was seriously wrong and the motor and pump could have been pulled before there was a catastrophic failure. This would have reduced the down time that the pump was out of service, and reduced the costs to everyone involved.

This motor was also fitted with 4 x PT100 temperature detectors which were not connected and therefore not protecting the motor.

All SME motors are supplied with 1 PT100 in the DE Windings as standard and all motors of 100Hp or more are fitted with 4 PT100s as standard and customers are free to order additional PT100s in smaller motors, if they want.

At SME we confidently believe that a combination of "Quick Trip" current overloads and PT100 temperature monitoring will give end users a lot of comfort that their motors are operating properly, and if something does change, alert the end user that there is a problem before it is catastrophic.

There are 2 recent examples that we are aware of, where temperature monitoring has more than paid for the additional cost of installation.

- A 60Hp 8” High Temperature oil filled motor was supplied to the Water Corporation of WA for a bore that has a big problem with Iron Bacteria growth. Typically the growth is about 10mm thick after 3 months of operation and most standard motors have to be pulled up and cleaned every 3 months to prevent them over heating. The new SME motor has 4 PT100s fitted and monitored and the Water Corporation can monitor the temperature in the motor, which has settled down at about 76 Deg.C. The motor has been operating for about 9 months and there is no plan to pull it up until a problem develops. In theory the winding temperature can be allowed to increase to 120 Deg.C. before we would consider that it is too hot. (The oil in this motor has been specially approved by the West Australian Health Department as safe to use in drinking water).

- A 250Hp 4 Pole 14” motor on an offshore oil platform, was fitted with 4 PT100s, which were all being monitored continuously. This motor was subjected to very high thrust loading, possibly as high as 7000 Kgs. Due to a misunderstanding during testing each of the valves in the system were closed one at a time while the motor was still running. Luckily the Thrust Bearing PT100 detected a rapid increase in temperature from 46 Deg.C. to 95 Deg.C. and shut the motor down before there was any catastrophic damage. It was decided to check the condition of the thrust bearing after this episode and it was found to be damaged and was replaced.

In summary we urge all our customers to try to ensure that the current overload protection is set just above the steady state current during operation, and to install PT100 monitoring equipment, which we can supply, and advise on at a very attractive cost.

12/5/04