



Case Study - The One Curious Case of Induction motor

Hello Friends,

Today I am going to present a Case of **Induction Motor**, which might be rare in Industries. Hence want to share the experience, so that the problem we faced must not be faced by others or can be avoided.

In my last cement plant, there was a Fan called **Dilution Air Fan** in which there was a Motor of **225 KW, 415 Volt, & 744 RPM**. There were 2 such Fans in each of the 2 units of Kiln, making it total of 4 Nos Fan and hence 4 Nos motor with 1 Nos spare (in Store) between all the four. After 5 years of running of plant, we thought to replace the running motor with spare motor, available in store since last 4 -5 years and take the current motor for Over-Hauling during a planned shutdown of 4 days.

So, we checked the spare motor completely in workshop, taken Winding Resistance, IR Value and Trial of Motor in No Load condition and Checked Current and Vibration in No- Load. Everything was as smooth as Butter. Everything was within permissible limits.

And we replaced it with current Motor and checked all the Alignment readings after being installed, Alignment readings were perfect.

But when Motor was coupled with Fan and checked with VFD for Trial, we run the fan for 1 hour in 40 - 50% load conditions and everything was normal. Due to certain work being carried out by mechanical, we could not take the speed to more than 50%.

Now firing of plant started after 2 days and after 12 hours requirement of Dilution Air fan arises. Now, When the Fan goes to Full speed with 100% Damper open, there was heavy vibration in Fan and Motor both.

The Vibration was coming from Fan to Motor, so Mechanical team checked the Fan, its Bearing, and its Damper. But found nothing abnormal. Meanwhile some problem arises during firing in Kiln and firing was stopped.

We again checked the Motor in Decoupled condition. Again, everything was normal. Then we thought that it might be due to VFD problem, as during the same time New VFD was installed for speed control. But no problem was found in VFD.

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Alignment was done again, and trial taken in Both Decoupled and Coupled Condition. In Decoupled Motor was as smooth as Butter, but in Coupled Condition as Motor speed increases beyond 50% vibration level starts increasing.

Like always there was tussle between departments (Electrical, Instrument and Mechanical). **"This is not our fault"**.

So, to prove Mechanical wrong we put back the original motor in Place, and to our surprise and shock, everything was back normal in both Decoupled and Coupled condition, No Vibration, No overloading, smooth running of fan.

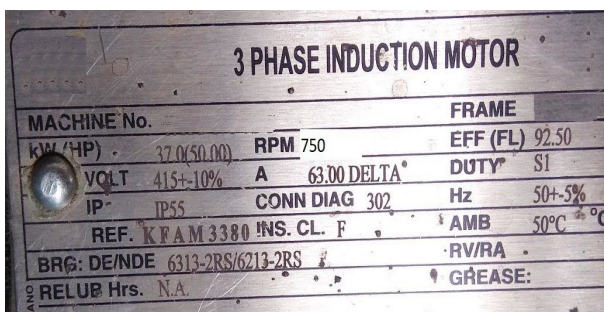
It was a strange problem for everyone. We checked the motor completely after removing rotor from Stator, checked each and everything but found nothing. Then after assembling it, we took the trial again. But as usual motor was running good in No-Load condition.

Now the plant was started normally, and we have all the time thought of every possibility. So, after 3-4 days, it strikes suddenly, can there be a wrong name plate? If yes how to check it. We checked Resistance, Inductance, IR Value and No-Load trial; everything was same with that of Actual installed motor. So, what was wrong? The only thing we did not check was RPM. As we believe what is written on the Motor Name Plate is **"A line drawn on the Rock or Patthar Ki Lakeer"**

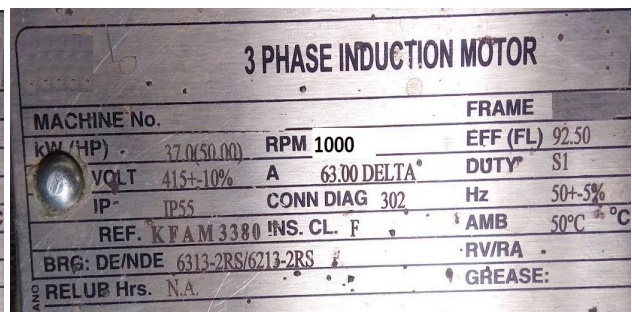
Now we checked the RPM for the First time in 7 Days and we Found the Problem. The motor was running at 1000 RPM instead of 750 RPM. And now all the Vibration levels, Damper position and Current level problem were clear.

So below was the name plate of the Motor

but, the motor RPM was this



Note - Pic use is for representational purpose only



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Normally 99% of the time we didn't check RPM and we believe what is written on Nameplate. **Such cases pose Dangerous risk and Safety to the Operator and to Equipment which motor is driving, what instead of Fan any Gearbox was coupled to the Motor, the gearbox could have been damaged.** So next time you are checking a Motor or Taking trial of New Motor, keep a Tachometer or RPM Checking meter with you.

In the meantime, when Problem of Motor was going on, I thought the Problem has gone **"Out of Syllabus."**

So, nothing is out of Syllabus. It is just the Approach.

Hope it will help, also share the same with other Electrical Maintenance Engineers you know.

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