INVESTIGATION OF SYNCHRONY-ELECTRIC DRIVE STARTING CHARACTERISTIC OF OIL AND CHEMICAL INDUSTRIES

E.M. Farkhadzade, R.A. Pashayev, S.A. Khanakhmedova

Azerbaijan State Oil Academy
Azadlig avenue 20, Baku, AZ1010, Azerbaijan

ABSTRACT

This summary reviews one of the way enhancing electric drive stability and reliability oil and chemical industry by changing rotor circuit parameters

Keywords: synchrony-electric drive, rotor circuit parameters, influences, synchronous, oil technical.

I. INTRODUCTION

The first category electric drive parameters including oil extracting and chemical industry mechanisms are choused in accordance to there characteristics to provide a reliable working so under normal state conditions as under emergency system state conditions.

The static resistant moment practical remains constantly in piston mechanisms in case of the speed change concerning with emergency state systems independently from the speed due to terminated pressure stability in a pipeline. In a centrifugal pump the resistant moment changes in a square relationship with speed changing when the static level of fluid is unavailable in a pipeline but when static liquid level is available in changes in a parabolic law.

Oil technical compressor synchronous machine with brass start winding provides better acceleration and synchronizing machine during self start when circuit voltage is equal to nominal.

But in self-start after emergency systems states when the circuit can not be entirely restored these machines are not come into step of a synchronous machine and disengaged by protectors. These same machines with copper start winding which are used to drive centrifugal pumps have better features to start and to come into step of synchronous machines pathless there required starting voltage are more than 20% in a result conduced enormous voltage decrease in a circuit.

II. MAIN PART

The restriction start current method was propound for voltage decrease prevention by partly disengage (40–50%) start winding synchronous compensatory longitudinal circuit rods.

In synchronous machine partly start current decrease can be achieved by using start winding rods with a higher resistant. This promote besides decreasing starting current and increasing start torque numerous negative effects deteriorating parameters and characteristic form of synchronous machine.

Resolution about allowability of start winding parameters changing can be made up after stated that all negative influences for each concrete case are tolerable. In figure 1 start characteristics of synchronous machine with difference start winding were depicted. These curves were plotted by graphical integration dynamic torque curve for each period.

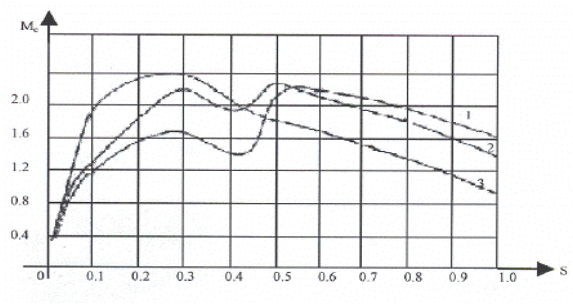

Fig.1. $M_E(S)$ curves in starting with shorten winding of stimulation
1 – brass starting winding containing 6 rods;
2 – combined starting winding containing 4 brass and 2 copper rods;
3 – copper starting winding containing 6 rods.

How you can see from the curves if start winding resistance increased 4 times it promotes 43.7% increasing start torque, at the same time fail in torque curve about semi synchronous speed increased from 0.04 to 0.4. Acceleration time is practically same for each machine ($t \cong 2.9$ sec. under torque resistance in a shaft 0.4 M_{sn}).

In accordance to dynamic curves (in a lapse of speed $S=0 \div 0.1$) the torque curve shocks increase with the enhancing start winding resistant, at the same time difference between max and min parameters increase too

(fig. 2). For example the relation ship between maximal torque value to minimal within S=0.06÷1 is 1.5 in a machine with copper winding, but 4.0 in machine with brass winding. Within S=0÷0.03 eventually 1.23 and 3.4.
It should be exclaimed that a machine with copper winding has starting current 20% more than a machine with brass winding with copper when S=0÷0.1.
In a machine with copper winding has a more electromagnetic torque (with S=0÷0.1) than a machine with brass winding. When S=0.05 the maximum amplitude value is 1.86 in a machine with copper winding, 1.13 – with copper winding, 1.13 – with brass winding. Eventually a machine with copper start winding can be easily come into step of synchronism even without excitation (M_s = 0.4 M_{sn}), by jet torque after one oscillation (S=0.0125÷0.02, oscillation torque amplitude 0.6 – 0.2). But machine with brass start winding accelerate till skiding S=0.022÷0.025 and remain.

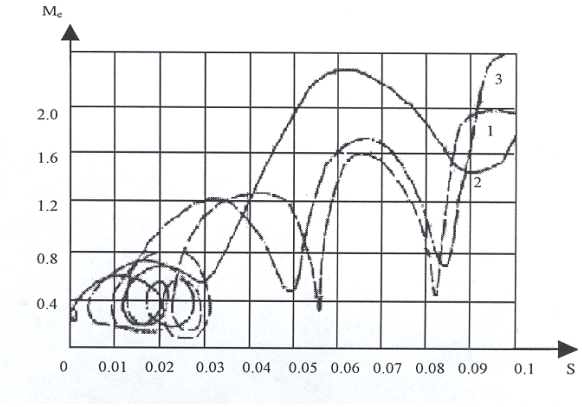

Fig. 2. . M_e(S) curves in starting of synchrony driver with shorten winding of stimulation.
1, 2, 3 – brass, copper, combined copper windings.

Desirable start characteristic can be easily achieved by using combined type start winding providing normal runing mechanisms and to minimize voltage fail in a circuit.

In a figure 2 depicted curve characterizing mean value torque from a skid (curve 2) but curve 3 dynamic from a skid within S=0÷0.1 for machine with combined type start winding consisting from four brass rods and two copper rods symmetrically situated in relation to pole axis. How can be seen from curve comparison a machine with combined type winding has more satisfactionary parameters than a machine with winding from the same material. Start torque is decreased in this way should be exclaimed. But it doesn't so influence to the machine acceleration till S=0.5.

III. CONCLUSION

At the same time enhancing characteristics within short skids provides a more torque value under synchronized speed, then a machine with brass start winding.
Amplitude torque value of the machine with combined start winding start – 3,7. entry – 1.2 and fail in characteristic when S=0.5 accordancly amplitude value 0.16.
Starting currents are 5 – 6% more than in a machine with brass start winding.

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