

4TH ANNUAL INTERNATIONAL RESEARCH CONFERENCE

TORQUE CONTROLLER FOR THREE PHASE INDUCTION MOTOR

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OUTLINE

- Induction motors
- Problem statement
- Solution
- Torque controller(TORQCO)
- Case study
- Data collected and its analysis
- Novelties

Introduction to induction motor

- ❑ Since its invention one hundred years ago, the standard 3-phase induction motor has become one of the most used industrial equipment ever known

Advantages

- ❑ Simplicity of construction, low cost, reliability and relatively high efficiency.

Disadvantages

- ❑ Speed control and high starting Torque

Problem statement

High starting torque

- From the moment the machine is switched on, all the requisite energy to magnetize the motor, provide acceleration force to the rotor coupled to the load alongside kinetic energy to overcome force of inertia besides electrical and mechanical losses must all be accounted for. To achieve this at full supply voltage allows a significant surge of current that induces a considerable amount of stress on the entire system including the adjacent appliances.

Solution

- In light of the above cited energy requirements and losses, it is necessary to develop a device that may enable machines routinely overcome the stresses caused by the energy demand through the regulation of the initial torque. Currently, the types of starters available in the market such as direct-on-line, star-delta starters use classical mechanical switches that are prone to problems like switch disconnection, fundamental wave form distortion and interference. The torque controller device is an improved model that is devoid of torque oscillation, switching disconnection and harmonic distortion

Torque controller(TORQCO)

- TORQCO series starter is new type start-up equipment which integrates electric force and electronic techniques computer technique and modern control theory. It is the new generation product to replace the conventional star-delta starter, self-coupling voltage-drop starter and magnetic control voltage-drop starter.

Case study

- A study carried out at Toror factory withering section to evaluate the efficiency of the torque controller in terms of energy consumption and eliminating torque oscillation in the motor system. The study involved connecting two motors with the same output power in order to establish its energy consumed when starting and running the motor for 20 hrs for 15 Days.

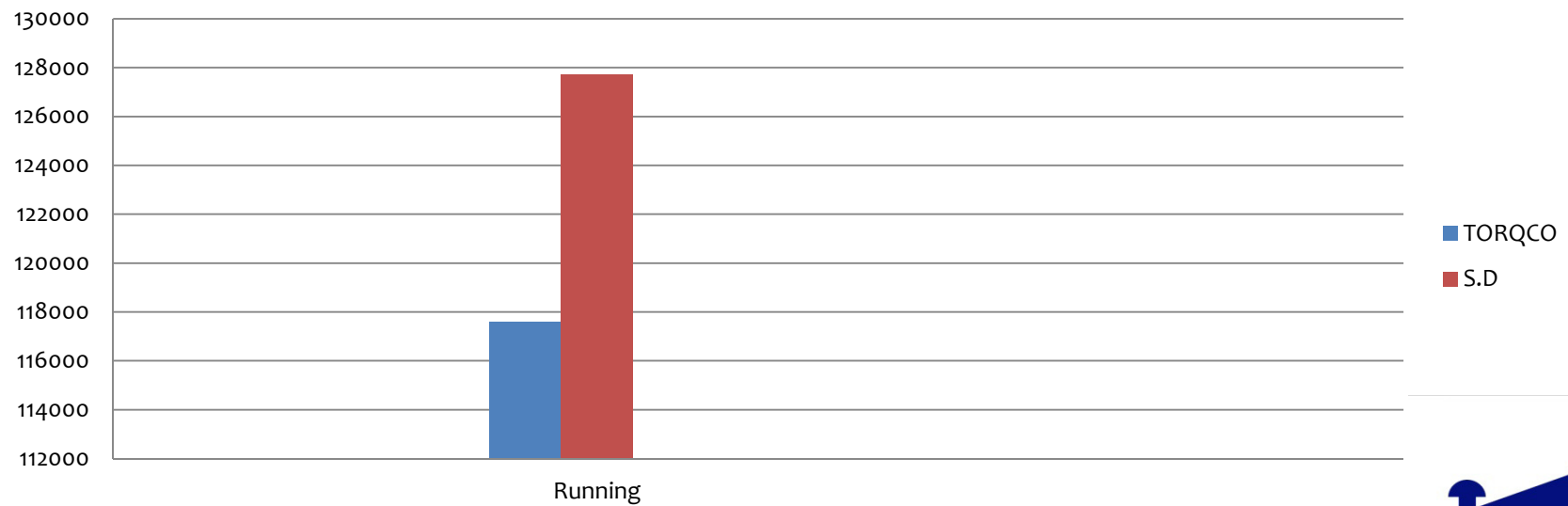
	USING TORQUE CONTROLLER			USING STAR-DELTA STARTER	
DATE	DIRECTION OF AIR FLOW	PEAK VALUE	OPERATING VALUE	PEAK VALUE	OPERATING VALUE
22.1.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	9.9
23.1.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	9.8
24.1.2014	IN	32	9.9	47	10.1
	OUT	31	9.4	47	9.9
25.1.2014	IN	32	9.7	48	10.2

	OUT	31	9.4	47	9.9
27.1.2014	IN	33	9.8	48	10.2
	OUT	31	9.4	47	9.9
28.1.2014	IN	33	9.8	48	10.2
	OUT	31	9.5	47	9.9
29.1.2014	IN	32	9.7	48	10.2
	OUT	32	9.8	47	10
30.1.2014	IN	31	9.4	47	10.3
	OUT	31	9.4	47	9.9
31.1.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	9.8

1.2.2014	IN	33	9.8	48	10.2
	OUT	31	9.4	47	9.8
3.2.2014	IN	32	9.8	48	10.1
	OUT	31	9.5	47	10
4.2.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	9.9
5.2.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	10.0
6.2.2014	IN	32	9.8	48	10.2
	OUT	31	9.4	47	9.9

DATA ANALYSIS

Energy consumed in W/h for 20 hours



Energy saved in the 7.5Hp Motor=10107.46Wh

- =10107/1000
- =10.107KWh
- Using the KPLC class C1 rates for KWh of Ksh 5.75 per unit
- =5.75*10.107
- =Ksh 58.118
- When the motor is running for 20hrs a day Ksh 58.118 is saved
- Assuming in a month of 30 days
- =58.118*30
- =Ksh 1743.54
- KVA demand is when starting =0.06196/0.87
- KVA demand =0.0712KVA
- Total cost of energy saved=**Ksh 1743.54**

Novelties

- Saves energy.
- Increases lifespan of the machine and the adjacent appliances.
- Reduce wear and tear rate of the machine.
- Stabilizes power flows in an industrial set-up.
- Reduces cost of machine maintenance.



TORQUE CONTROLLER

Torque controller connected to a chiller plant



KPA CHILLER PLANT

Torque controller connected to a chiller plant at Kenya Ports Authority



Presenting a paper

During the 21st Engineers international conference where I was presenting a paper on my innovation.



AWARD WINNING

During the 3rd National Science, Technology and innovation week where the innovation scooped the best innovation award



THANK YOU

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