DESIGN OF GENERAL PURPOSE VARIABLE FREQUENCY DRIVE

P.Mahesh, G.Premchandh, P.Vigesh, N.Harshavardhan, Sk.Thayub UG Student, Department of EEE, Narayana Engineering College, Gudur,AP 524101.
Dr. V.Ravi prasad Professor, Department of EEE, Narayana Engineering College,Gudur, AP 524101

ABSTRACT
Motors are being used worldwide on industrial or domestic level. Electricity is the most power full tool to run any motor. Among all the motors are induction motors are used extensively due to their large no of applications. But there is a need to eliminate the problem. Associated with ac induction motor and to run it in a very efficient way. For that matter.Motor drive, or simply known as drive, describes equipment used to control the speed of machinery. Many industrial processes such as assembly lines must operate at different speedsfor different products. Where process conditions demand adjustment of flow from a pump or fan, varying the speed of the drive may save energy compared with other techniques for flow. Where speeds may be select from different pre-set ranges, usually the drive is said to be adjustable speed. If the output speed can be change without steps over a range, the drive is usually referred to as variable speed.

INTRODUCTION
ACS2000 drive has wide range of applications where it is used in food and beverage industries, water pump, mining and mineral, oil and chemical industries, power generation sector, marine ships, and so on. At the core of the drive direct torque control (DCT), which enables highly accurate process control. But we choose variable frequency control method by means of inverter operation, reliable control ensures high productivity, availability, and efficiency of operations. The ACS2000 is available in low harmonic drive for optimal performance of regenerative drive increases energy saving even further. The product variants make the drive compactable with common IEC and NEMA motor voltages so we can use the drive all over applications.

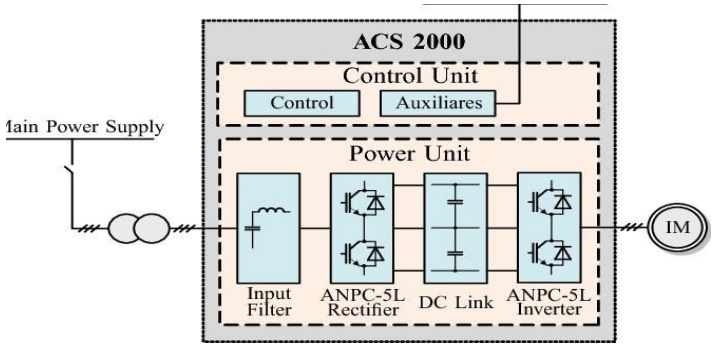
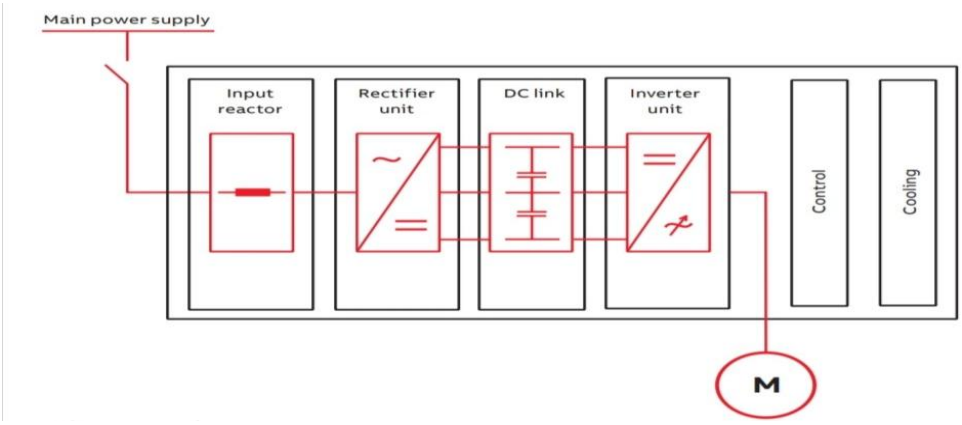


Fig: 1.Block Diagram of ACS2000 Drive

ACS2000 is available in three different configurations: Direct to line connection, Operatingwith an external transformer and Integrated input transformer

Direct to line connection

The ACS2000 direct-to-line features an active front end (AFE), which enables operationwithout a transformer. This can lower investment costs substantially. Due to its compact size and lighter weight compared to a drive requiring a transformer, you will save on transportation costs and need less space in the electrical room.



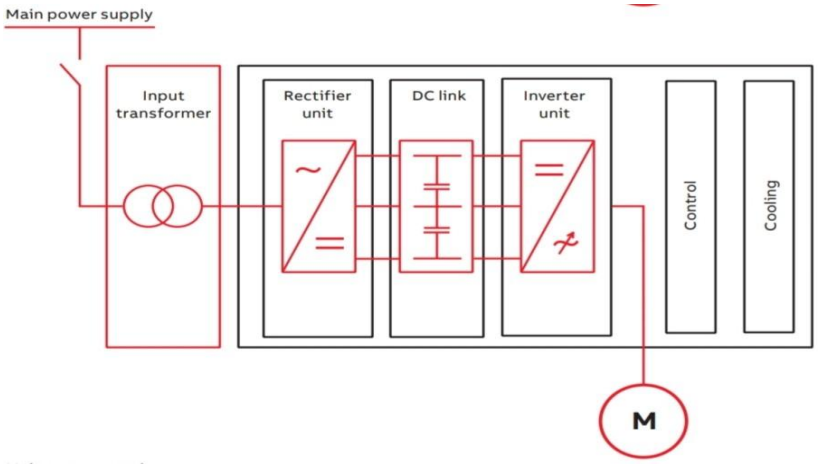
External transformer

For applications where a voltage-matching input transformer is needed or galvanic isolationfrom the power supply is required, the ACS2000 can be connected to a conventional oil or dry-type converter transformer. This solution minimizes your cooling demand in the e- house (electrical house).

Integrated transformer ig -1.2 External transformer

Alternatively, the ACS2000 is also available with an integrated input transformer allowingquick and easy installation and commissioning.

The ACS2000 regenerative drive features an active front end (AFE) for applications with high braking energy which allows full power flow both in motoring and generating mode. Regeneration



offers significant energy savings compared to other braking methods as energy is fed back to the supply network. Regeneration is especially suitable for applications with frequent starts and stops. It allows energy efficient continuous braking of applications such as downhill conveyors or expanders in gas pipelines.

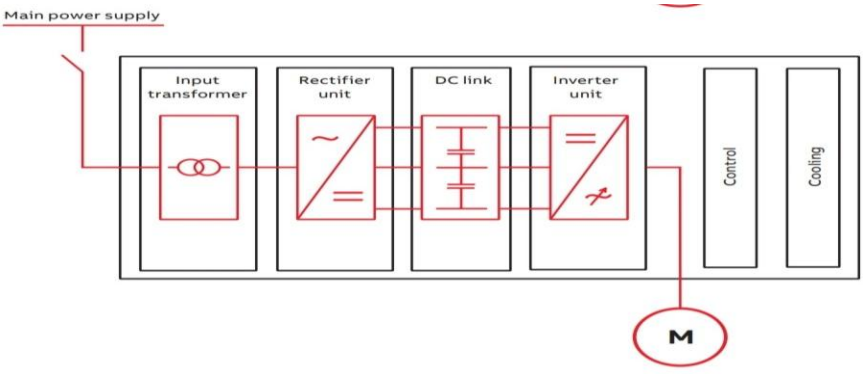


Fig -1.3 Integrated transformer

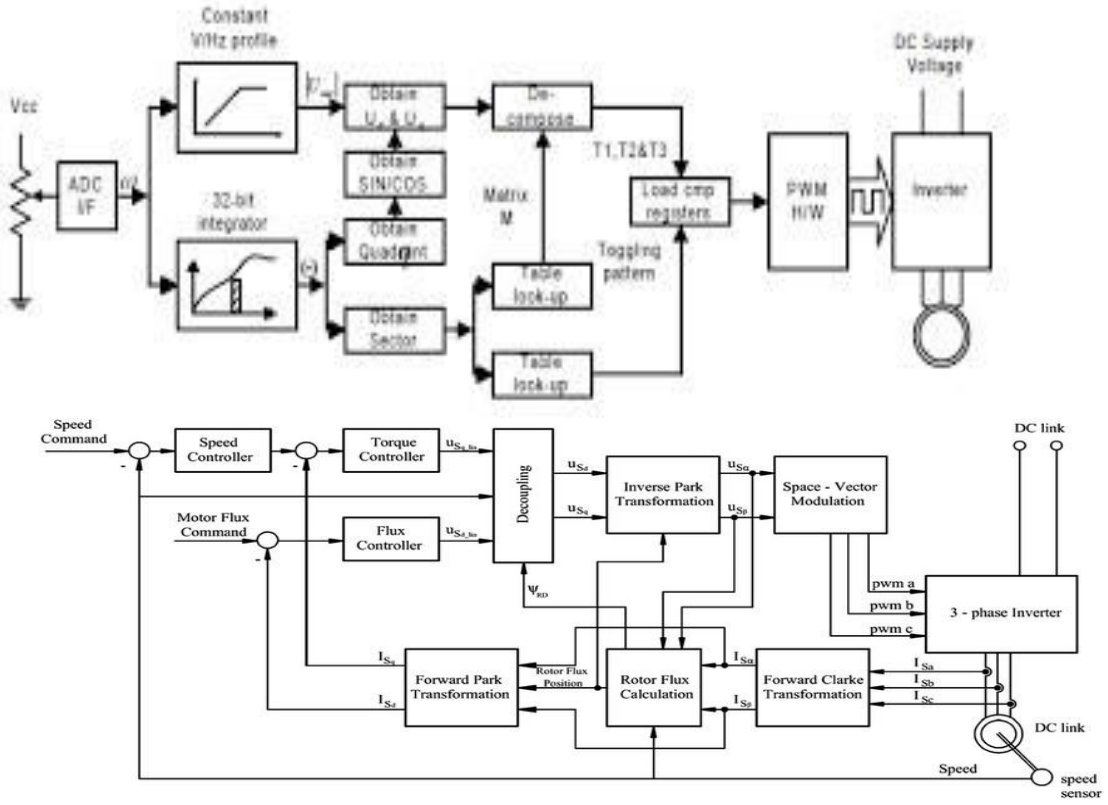
VARIABLE VOLTAGE AND VARTIABLE FREQUENCY

The VVVF scalar control scheme has been used broadly in the industry due to the speed/torque control advantage in rotary induction motor-based drives. However, in the traditional VVVF scalar

control the percentage voltage drop across the stator resistance is more dominant compared to the voltage drop to produce the main flux at low frequencies. In addition, the VVVF scalar control scheme provides open loop control, and therefore the system cannot maintain speed accuracy both at low frequency and high load operation. To overcome these drawbacks, VVVF scalar control with slip frequency regulation is being widely suggested. Recently, induction motors are being adopted for many applications. Practical applications of these motors to various linear drives are now numerous. VVVF control with slip frequency regulation has been implemented on induction motor to demonstrate the effective closed loop control of linear speed. Simulation results have been obtained using MATLAB/SIMULINK.

OPENLOOP CONTROL

A control system is defined as a system of devices that manages, commands, directs, or regulates the behavior of other devices or systems to achieve a desired result. A control system achieves this through control loops, which are a process designed to maintain a process variable at a desired set point.



Closed loop control

Fig:1.4 Open loop control of VVF

The basis of constant V/F speed control of induction motor is to apply a variable magnitude and variable frequency voltage to the motor. Both the voltage source inverter and current source inverters are used in adjustable speed ac drives. The following block diagram shows the closed loop V/F control using a VSI. A speed sensor or a shaft position encoder is used to obtain the actual speed of the motor. It is then compared to a reference speed. The difference between the two generates an error and the error so obtained is processed in a Proportional controller and its output sets the inverter frequency.

CONCLUSION

The vector control model of the IM uses direct vector control framework with open and closed loop speed and flux. In view of the sufficient investigation of induction motor mathematical model and

vector rule, simulation was done by Matlab/Simulink environment. The results illustrate validity of this model, and it is observed that the torque ripples is low in Vector control induction motor, steady tracking has high accuracy, and the torque has short-lived response attributes, all of which are steady with the hypothetical analysis of vector control V/F speed regulation. In the mean time this system strategy for simulation model is straightforward and convenient, which gives powerful intends to the recognition and debugging in practical motor control system.

REFERENCES

[1]. S Takiyar and B. K. Chauhan, "Hybrid Method for Customized Control of Induction Motor", International Journal of Computer and Electrical Engineering, Vol. 5, No. 4, pp.350-355, August 2013.
[2]. RinchenGeongmitDorjee. "Monitoring and Control of a Variable Frequency Drive Using PLC and SCADA", International Journal on Recent and Innovation Trends in Computing and Communication, Volume. 2 Issue. 10, pp-3092-3098, October 2014.
[3]. Sagar P. Jain and Dr. Sanjay L. Haridas, "Energy Efficient AutomizedBotteling Plant Using PlcAndScada With Speed Variable Conveyor Assembly", IOSR Journal of Electronics and Communication Engineering, Volume 9, Issue 1, Ver. II, PP 09-14, Jan. 2014.
[4]. R. CharletPriya, "Variable Frequency Drive Induction Motor in Air Conditioner Using Seven-Level Inverter", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 3, Special Issue 4, pp-12-19, May 2014.
[5]. Mr.Ankur P. Desai, Mr.Rakesh.J.Motiyani, Dr.AjitsinhR.Chudasama, "Energy Conservation Using Variable Frequency Drive in Pumping Application", In proceedings of International Journal Of Engineering Development And Research, pp 121-126, January 2014.
[6]. ThavatchaiTayjasanant, WilsunXu, "Interharmonic-Flicker Curves", IEEE Transactions On Power Delivery, Vol. 20, No. 2, pp-1017-1024 April 2005
[7]. Sanjay N. Huse, Ravindra D. Kale, Dr. D.R.Mane, Prof. V.P.Dhote, "Use of the VFD to minimize the throttling effect of the Hostel water supply system by the automation of the system", International Journal of Scientific & Engineering Research, Volume 6, Issue 2, pp-92-96, February 2015.
[8]. Robert A. Hanna, "Harmonics and technical barriers in Adjustable Speed Drives", IEEE Transactions on Industry